

Nightmares and their treatment

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Abstract

Nightmares are manifested by scary and devastating dreams. In severe cases, they are associated with sleep disorders, heart problems, permanent fatigue, high levels of anxiety, fear of falling asleep, or secondary cognitive deficits after sleep deprivation, and thus may increase vulnerability to the development of other mental disorders. Lucid dreaming, the dreaming experience, and the realization that one is dreaming are easy-to-learn techniques that can provide effective and significant relief.

INTRODUCTION

Nightmares have attracted human attention since ancient times. One of the earliest descriptions of nightmares can be found in the Old Testament. They were often perceived as a premonition or a message about the future sent from God and were therefore interpreted with utmost importance. These messages were interpreted either by an individual who was called to do so (e.g. Biblical Joseph), or the explanations were interpreted according to a dream book. Interpretations could have been calming in case of a positive prediction, or they could prepare the individual for a threat or acceptance and coming to terms with the expected fate. The first medical text about nightmares was written by John Bond, who dealt with nightmares in a paper in 1753. Nightmares were attributed to unknown spirits or ghosts that lie down on a sleeping person at night, squeeze their chest, and make their breathing more difficult. This spiritual

influence then causes feelings of choking, crushing, or sexual violence (Stein 2010).

A dream is now understood as a conscious mental activity that occurs during sleep. Some scientists believe that dreams have no function. Others think that dreams are a night's continuation of processing information parallel to the conscious thinking during the day, or that they reprogram the central nervous system for conscious functioning the next day (Hobson 1997). There is a range of evidence suggesting that dreaming is essential for learning and memory processing, provides cognitive feedback about a person's mental functioning and helps a person to adapt to emotional and physical stress (Moffitt *et al.* 1993). Some psychological theories mention the critical influence of the subconscious, in which dreams are formed to reflect the greatest fears of a person, unprocessed anxiety-inducing experiences, and motives

that are denied or suppressed from consciousness in everyday life (Schredl *et al.* 2000).

Using polysomnography, sleep can be divided into stage 1 (onset of sleep), stage 2 (light sleep), stage 3 and 4 (deep sleep), and rapid eye movement phase (REM) (Sopp *et al.* 2019). REM sleep occurs cyclically approximately every 90 minutes during the night in conjunction with high brain activity, rapid spontaneous eye movements, and suppression of voluntary motor activity. Dreams occur during all phases of sleep. They are reported by 80 percent of those who wake up during REM sleep and sleep onset (stages 1 and 2), and 40 percent of those who wake up from deep sleep. Patient reports on the content of their dreams vary, depending on the stage of sleep from which they are awakened. Dreams experienced during REM sleep tend to be bizarre and detailed, with storyline associations.

In contrast, dreams experienced in a deep sleep are more abstract (e.g. dreams of colour or emotions). Dreams in stages 1 and 2 are more straightforward, shorter, and have fewer associations than REM sleep dreams (Foulkes 1985; Simor *et al.* 2012; Sopp *et al.* 2019).

Nightmares are frequent in those who experience a severe stress period, are overwhelmed by their problems, physically exhausted, or have experienced a traumatic or very negative experience (Samara *et al.* 1999). These factors may be associated with poor sleep quality and decreased performance during the day (Ross & Gary 2002). Frequent nightmares that are not associated with underlying psychopathology occur in most children and some creative adults (Pagel 1989). However, recurring nightmares are the most defining symptom of post-traumatic stress disorder, though they may be associated with other psychiatric diseases as well (Pagel 2000). Nightmares are an unnerving experience, accompanied by intense feelings of horror, anxiety, or fear. Typical contents of nightmare are threats to an individual's safety, life (either one's own or often of someone close), or self-esteem (Gieselmann *et al.* 2019). During nightmares, significant vegetative symptoms appear (Woodward *et al.* 2003). Vocal manifestations and body movements may also occur. Upon awakening from a nightmare, the individual is alert and oriented. He can retell his dream, both after waking up and in the morning (Lancee & Spoomaker 2015). Nightmares may occur in people without a mental disorder, but may also accompany some mental disorders, such as mentioned PTSD (Raskind *et al.* 2013). The content of nightmares may be related to the past, when reminders of a traumatic, inadequately processed painful event return, or may relate to future threats (Pruiskma *et al.* 2016).

From an evolutionary perspective, nightmares can have a protective warning purpose for a person (Olliges 2010). If an individual has experienced a traumatic episode, the individual needs to be cautious in the future until it becomes evident that the episode will not recur,

or the person can handle it. It actually can represent an effort of the subconscious to cope with a traumatic experience, which still weighs on the individual and is not emotionally resolved in the psychic reality. Therefore, it returns repeatedly in nightmares (Malcolm-Smith *et al.* 2008). Nightmares may also be accompanied by somatic sensations, such as palpitations, tremors, increased sweating, pain in parts of the body that reflect the traumatic event (Amdo *et al.* 2016). Increased alertness and vigilance may be reflected in the quality of sleep; sleep can be shallow, disrupted by the smallest stimuli that did not have influence before.

METHOD

Studies used in this narrative review were obtained through the PubMed database, including sources from January 1st 2000 to January 31st 2020. The search terms included: Nightmares and treatment. Filters activated: Clinical Trial, Review, Humans, Adult: 19+ years. Additional resources were obtained by reviewing the reference lists of the primarily selected articles, including book chapters mentioned in the articles. The texts were collected, systematized by their importance, and critical texts itemized in reference lists were investigated. The selected articles had to meet the following inclusion criteria: (1) published in peer-reviewed journals; (2) studies in humans; or (3) reviews on the related topic; (4) book chapters in related topic. The exclusion criteria were: (1) abstracts from conferences; (2) commentaries. The total of 3952 articles was nominated by primary assortment using keywords. After the selection according to the inclusion and exclusion criteria, 239 pieces were chosen. After a complete inspection of the full texts, 83 papers were selected. Secondary papers from the reference lists of the primarily selected articles were examined, evaluated for appropriateness, and added to the primary list of the documents (n = 114). In total, 197 papers were included in the review process (Figure 1), in consistence with the PRISMA Guidelines (Page & Moher 2017).

NIGHTMARES

According to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; APA 2013), nightmares are defined as extremely dysphoric dreams that usually involve endangering the survival of an individual and / or one's emotional or physical sense of security. Upon awakening, the person quickly realizes that they were dreaming and realizes their surroundings. To qualify for the "nightmare" diagnosis, nightmares must cause considerable daily suffering and fear. They are also usually accompanied by sleep disturbances and mood disorders. Also, nightmares are often associated with various forms of psychopathology such as anxiety, depression, bipolar disorder, post-traumatic stress disorder (PTSD), suicidal thoughts, substance

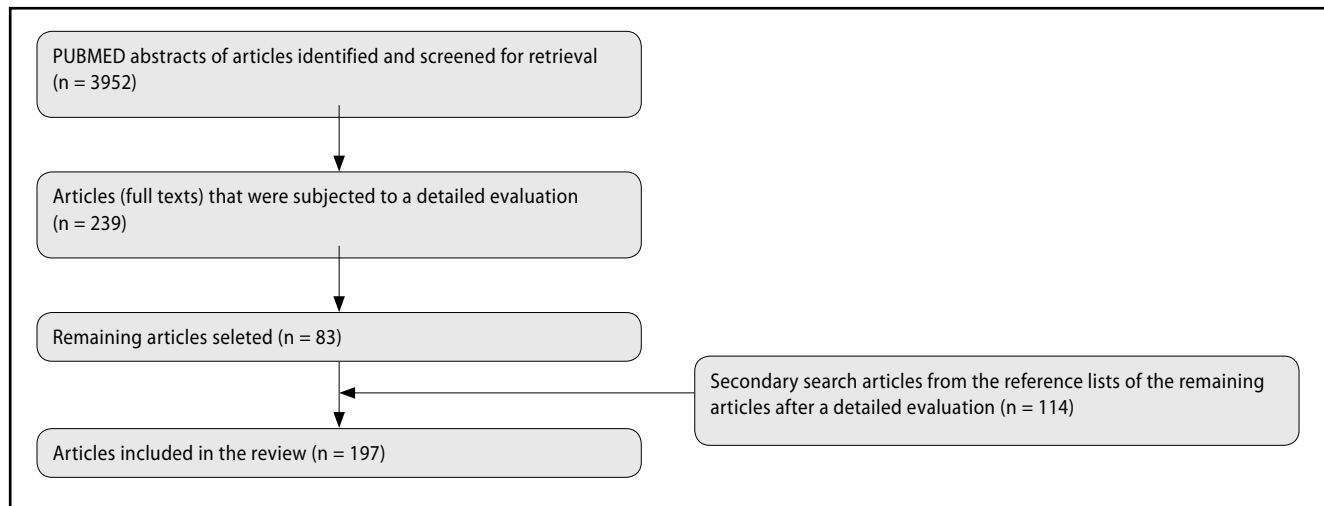


Fig. 1 . Summary of the selection process

abuse and personality disorders (especially schizoid and borderline) (Yudofsky & Hales 2004; Avidan & Zee 2006; Spormaker et al. 2006; Nielsen & Levin 2007; Sadock et al. 2009; Schredl et al. 2012; Schredl 2016).

The prevalence of nightmares is high, and approximately 2-5% of the total population suffers from one or more nightmares per week (Spormaker & van den Bout 2005; Schredl 2010; Sandman et al. 2013). In a sample consisting of psychiatric patients, prevalence rates were found to be much higher, with up to 30 % of patients suffering from nightmares as a disorder (Swart et al. 2013). In a two-week prospective study of college students, 47 % reported at least one nightmare (Wood & Bootzin 1990). The results of a general population study of 1,049 people with insomnia revealed that 18.3 % of them had nightmares (Ohayon et al. 1997). Nightmares are more common in women and are associated with an increase of nocturnal awakening, sleep disruptions and insomnia, tiredness, memory lapses and difficulties in concentrating and increased mental distress (Ohayon et al. 1997; Giesemann et al. 2019). Studies in the general population have revealed that 5 to 8 % of adults report a current problem with nightmares (Table 1) (Bixler et al. 1979; Klink & Quan 1987).

Nightmares are vivid and frightening night episodes, disturbing dreams, which include unpleasant emotions such as anxiety, fear, sadness, anger or despair, and lead to a sudden awakening (Simor et al. 2012; Zadra et al. 2006). Numerous studies have suggested that the frequency and level of anxiety in nightmares are related to a wide range of mental health disorders (Ohayon et al. 1997; Zadra & Donderi 2000; Tanskanen et al. 2001; Ross & Gary 2002; Nagy et al. 2015). Nightmare distress (ND) refers to the awakening distress or anxiety associated with nightmares (Belicki 1992; Mark et al. 2004), which mainly consists of daytime sleepiness and problems with daytime functioning (Böckermann et al. 2014). Compared to nightmare frequencies, ND is more closely associated with psychopathology (Belicki 1992; Samara et al. 1999; Martina & Reinhard 2001; Mark et al. 2004), particularly in psychiatric disorders with pronounced negative affectivity (e.g. anxiety and depression) (Wood & Bootzin 1990; Wang et al. 2019). Typically, the person awakens from REM sleep and can describe a detailed, associative, often bizarre dream plot. Usually, a person has difficulty returning to sleep.

The emergence of nightmares does not need to be associated with another psychopathology. They may appear as early as childhood. However, they often occur

Tab. 1. Nightmares

Dream type	Incidence	Symptoms	Sleep stage	Additive factors
Recurring nightmares in children	20-30 %, decreases with age	Scary, detailed scenes	REM sleep, usually late in the sleep period (e.g. 4-6 AM in the morning)	Usually do not signal pathology
Recurring nightmares in adults	5-8 %	More frequent waking up, memory disturbance during the day, and anxiety	REM sleep	Personalities with "fragile borders", creative personalities
PTSD	8-68 % of war veterans. At least 25 % of traumatized patients	Stereotypical dreams of trauma increased anger, fear, or sadness	Sleep onset and REM sleep	Significant trauma Increased arousal and anxiety during the day

Tab. 2. Medication inducing nightmares

Medications affecting neurotransmitters in the CNS
Antidepressants: <ul style="list-style-type: none"> • Tricyclic • MAOI • SSRI
Centrally acting antihypertensives: <ul style="list-style-type: none"> • beta-blockers • Rauwolfia alkaloids • Alpha agonists
Antiparkinsonian drugs: <ul style="list-style-type: none"> • levodopa • selegiline
Hypnotics: <ul style="list-style-type: none"> • zolpidem

in children suffering from separation anxiety disorder (van der Kolk *et al.* 1991) or after a traumatic experience that has not been sufficiently processed (Pennebaker 1985). Nightmares affect 20 to 39 % of children aged 5 to 12 years (Terr 1987). Contrary to popular belief, recurrent nightmares in children do not suggest underlying psychopathology (Hawkins & Williams 1992).

Even in adulthood, nightmares may appear sporadically but are often associated with other psychopathology within a specific mental disorder. Nightmares are often described in creative people who show “thin boundaries” in psychological tests (Hawkins & Williams 1992). People with “thin borders” are less likely than others to define the world around them in specific terms. They rarely define problems as black and white, but instead see themselves and the world in shades of grey (Hartmann 1984).

Nightmares are also associated with the use of drugs, especially those that affect the levels of neurotransmitters in the central nervous system, such as antidepressants, narcotics, or barbiturates. Fearful dreams may occur during the withdrawal of drugs that cause REM sleep rebounds, such as ethanol, barbiturates, hypnotics, and benzodiazepines (Table 2) (Pagel 1989; Toner *et al.* 2000).

Meaning of dreams

In the area of nightmare distress (ND), Belicki (1992) believes that the ND partially develop from individual's opinions and their assessment of dreams when they wake up. In one study, researchers talked to people with frequent nightmares but with a different ND level, and found that severely distressed individuals considered their nightmares about being more serious, paid more attention to them, and were less likely to evaluate their nightmares as mere dreams (e.g. they saw nightmares as a sign that something terrible will happen) (Belicki 1992). In the clinical treatment of nightmares, Belicki

taught persons suffering from nightmares to adjust their beliefs about nightmares (instead of trying to reduce the frequency of nightmares) and found that ND has alleviated (Belicki & Belicki 1986).

This finding shows that nightmares can be effectively reduced by changing the individual's belief about dreams (e.g. that what happens in dreams is destined to happen). In a study about the treatment of post-traumatic stress disorder, the nightmares were reduced by psychoeducation, which helped to correct individual's convictions about dreams (Krakow 2015). Apart from people's convictions about dreams, associations between dreams and other variables (e.g., frequency of dreams, dream content, physical health, personality, and treatment effect) also play a significant role in the occurrence and treatment of nightmares. For example, those who consider dreams meaningful and useful tend to report more remembered dreams (Cernovsky 1984; Michael *et al.* 1996; Beaulieu-Prévost & Zadra 2005).

Hall's study (1996) suggests that people who think that dreams have no meaning tend to be creative and think more independently. King & DeCicco (2009) found that individuals, who believe that dreams reflect their physical health, report more body parts in their dreams and show significantly lower physical functioning. People who were indifferent to their dreams reported a higher level of wellbeing (King & DeCicco 2009). Also, people who believed that dreams contained information about spiritual issues reported that they were less unhappy in their dreams and had higher scores on the meta-personal self-construct (King & DeCicco 2009). A therapy patient, who regarded dreams as symbolic and psychological, gained more useful information from their dreams during psychoanalytic treatment, than one who saw them as independent (Alex 1971).

Several studies have identified gender differences in dream beliefs; women usually have more positive attitude to their dreams than men and are more likely to believe that dreams have some unique functions, such as reflecting daily lives or transmitting messages from God or the devil (Paul & Roland 1988; Michael *et al.* 1996; Schredl 2002; Schredl 2013). In conclusion, the conviction about dreams plays a vital role in their interpretation and subsequent feelings.

Sleep and attachment

If a nightmare occurs in children, they are often soothed by the parent. If the child is feeling safe enough, nightmares rarely occur. If they do, it is often related to events that scare the child. They are more common after returning from a children's camp or a hospital (Hawkins & Williams 1992). The best solution is a calm, quiet parent's embrace. People with anxiety in childhood have a higher frequency of dreams with aggressive and self-degrading themes than individuals with safe attachment (McNamara *et al.* 2011). Although the association of nightmares with attachment in childhood has

not been studied yet, it is hypothesized that childhood anxiety may increase vulnerability to nightmares, in analogy to anxious children, who are more vulnerable to developing PTSD if they experience trauma. Van der Kolk *et al.* (1991) report that the disappearance of PTSD symptoms (including nightmares) is not so much about the history of the trauma itself, but more about the possibility to obtain safety and comfort in another individual. The way a person attaches to a close individual reflects strategies that have been taught to cope with adverse events. A more secure relationship with a partner forms a reliable refuge that helps the victim regulate their anxiety, anger, helplessness, and sadness in a way that fosters a positive self-understanding and relationship with the close person. A reliable partner helps the affected person to actively solve emotionally intense symptoms such as nightmares, intrusive thoughts, and memories (Kobak & Cole 1991).

Nightmares in PTSD

In many patients who have post-traumatic stress disorder, secondary insomnia occurs because of the nightmares. These are frightening dreams reminiscent of the traumatic event the patient experienced. Flashbacks of traumatic events can also occur during falling asleep, causing severe anxiety and preventing sleep altogether (Belleville *et al.* 2019).

Nightmares are a defining symptom in post-traumatic stress disorder (PTSD) (Ross *et al.* 1989; Fawzi *et al.* 1997). After a major fire in London in 1666, Samuel Pepys wrote: "To this day, I cannot sleep without the great horrors of fire." PTSD-related nightmares appear after an intensely frightening or very emotional experience. People with PTSD generally report waking up from dreams, that involve reliving the trauma. In these dreams, patients experience strong emotions, such as anger, intense fear or sadness, in a way that would be an appropriate response to the original traumatic event. PTSD-related nightmares usually occur during REM sleep, but can also appear during the sleep onset, which may prevent an individual from falling asleep (Ross *et al.* 1989; Belleville *et al.* 2019).

More than 70 % of war veterans and civilians with PTSD report persistent nightmares and sleep disturbances (Harvey *et al.* 2003; Wittmann *et al.* 2007; Sandahl *et al.* 2017). The nightmares of PTSD recall the painful event the patient experienced. They may even be pseudo-hallucinations in their nature. Ross *et al.* (1989) believe that the occurrence of nightmares is an essential symptom of PTSD. The nightmares affect not only sleep but also the sleep-related behaviour. Patients with severe nightmares often develop a fear of falling asleep (Zayfert & DeViva 2004; Inman *et al.* 1990). Biological findings point to increased activity and reactivity of the autonomic nervous system. This is represented by accelerated heart rate and fluctuating blood pressure, but also abnormal sleep architecture (prolongation of sleep latency, fragmentation of sleep, reduced

sleep time) (Sopp *et al.* 2019). Nightmares may also be associated with other problematic behaviours that lead to sleep deprivation (e.g., safety behaviour before sleep, nocturnal overeating, or sleeping in a chair) (Spoomaker & Montgomery 2008). Some researches consider the occurrence of nightmares in PTSD as an essential symptom that precedes a chronic sleep disorder (Spoomaker & Montgomery 2008; Germain *et al.* 2008, Kobayashi *et al.* 2008).

The association between the severity of PTSD and sleep disturbances was addressed by Germain *et al.* (2004). The authors examined 367 people with PTSD that lasted from 6 months to more than 30 years. The severity of PTSD was most closely related to a sleep disorder. In the non-exposure condition, more traumatic events predicted fewer nightmares at posttreatment, whereas more nightmares predicted more nightmares at posttreatment (Miller *et al.* 2019). The occurrence of nightmares does not only mean the occurrence of terrible experiences during sleep, but sleep is also disturbed in other variables. Sleep deprivation gradually accumulates and subsequently develops in a chronic state of stress with increased levels of inflammatory cytokines and activation of a sympathetic neural net (McEwen 2006). Sleep disturbance diminishes after successful PTSD therapy (Spoomaker & Montgomery 2008; Germain *et al.* 2008; Giesemann *et al.* 2019). However, the causality is not known –whether, after a painful experience, nightmares initially start and then PTSD develops, or the sequence is the other way around (Koren *et al.* 2002). Some studies suggested that polysomnographically evident sleep disturbances and nightmares may be a predictor of PTSD development (Mellman *et al.* 2002; 2004). This would indicate that sleep disturbance occurs earlier, and it is not only a symptom of PTSD. Study of Woodward *et al.* (2017) suggest that trauma-focused psychotherapy for PTSD is more effective than non-trauma-focused therapy in improving nightmares.

Findings indicated that individuals with lower verbal memory performance were less likely to respond to treatment across two sleep interventions. Veterans with traumatic brain injury displayed higher symptoms but no altered trajectories of treatment response. Together with prior literature, findings suggest that verbal memory functioning may be essential to consider in PTSD treatment implementation (Scott *et al.* 2017)

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 (Pruksima *et al.* 2016).

Nightmares and mental disorders

Nightmares may also occur in patients with other psychiatric disorders. Depression is sometimes associated with the themes of suffering and misunderstanding in dreams (Cartwright & Lamberg 1992; Beauchemin

& Hays 1996). Patients with schizophrenia and dissociative disorders may have intense dreams during the relapses (Seeman 2018; Agargun *et al.* 2003). Panic attacks may occur during REM sleep in patients with panic disorders and patients with asthma and respiratory sleep disorders (Monday *et al.* 1987, Maebara *et al.* 2002; Sheaves *et al.* 2015). Reflection of REM sleep associated with alcohol withdrawal and usage of sedative-hypnotics that chronically suppress REM sleep may develop into disruptive nightmares (ICSD 1997). Nightmares should be considered in the therapy of dissociative disorder patients (Agargun *et al.* 2003).

PSYCHOTHERAPEUTIC PROCEDURES OF THE NIGHTMARES TREATMENT

The most explored therapeutic approach for treating nightmares is cognitive-behavioural therapy. Several cognitive-behavioural therapy (CBT) techniques are effective in alleviating the symptoms of a nightmare (see Spoomaker *et al.* 2006 and Lancee *et al.* 2008 for review).

Progressive deep muscle relaxation

A study was conducted to evaluate the effect of deep progressive muscle relaxation (Miller & DiPilato 1983). The principle of this technique is to induce muscle tension and subsequent muscle relaxation. Patients are asked to clench and relax each muscle group alternately (Pruiksma *et al.* 2018). Miller & DiPilato (1983) examined 32 women divided into three groups. The first group was treated with progressive muscle relaxation, the second with systematic desensitization, and the third was a control group. In both treatment groups, the frequency of nightmares decreased by 80 %, and in 12 patients, the nightmares wholly disappeared.

Exposure therapy

Another option in treating nightmares is exposure therapy. This approach uses gradually increased exposures. Patients are asked to write a list of anxiety-inducing dreams or situations and sort them according to the anxiety level (e.g. on a scale of one to ten, but the number of intermediate steps may be even higher). The patient then chooses the level, on which they want to begin (it is recommended to choose from the least problematic points). Then the patient is exposed to the selected situation/dream. They are instructed to go through their dream as long as necessary until their anxiety drops. The patient is repeatedly exposed to one dream/situation until the experienced anxiety is acceptable to them. Then they can move on to the subsequent point and proceed again with the same routine. Difficulty differences between steps should not be substantial and should be spread evenly (Cogan *et al.* 2019). The efficacy of the exposure to nightmares has been demonstrated in a randomized controlled study by Burges *et al.* (1998). The authors studied 170 adults

with nightmares. The therapy lasted four weeks. The results were investigated after the treatment and in six months follow up. Probandes were divided into three groups. The first group underwent the exposure treatment, the second was doing relaxation methods (both groups underwent therapy at home according to using the manual), and the third was on the waiting list. In the exposure treatment group, the most significant improvement occurred, but there was also the largest drop-out.

Unlike other exposure-based nightmare treatments, that are based on self-help formats and may include other methods such as nightmares diaries and relaxation exercises (e.g. Burgess *et al.* 1998, Lancee *et al.* 2010), modern treatment via imaginal exposure (IE) consists only of imaginary exposure to the content of the nightmare. More precisely, after a brief reactivation of the main nightmare, participants are invited to recreate the entire nightmare scenario in their imagination vividly and are encouraged to focus on and experience all the accompanying emotions. If necessary, possible (cognitive) avoidance tendencies are briefly discussed to be subsequently eliminated. Similar to IR (rescription in imagination), participants receive a total of approximately 40 minutes for imagination exposure during each treatment session. However, the duration of individual exposures in imagination may vary depending on the nightmare scenario, the intensity of the emotions caused by the nightmare and/or the level that patients are willing to commit to the exercise fully. In terms of exposure to other nightmares than the baseline nightmare, it is only permitted, if exposure to nightmares has caused a substantial decline in nightmares at the beginning of the treatment process, and if the negative emotions accompanied by the core nightmare are fully tolerable (Cogan *et al.* 2019).

Systematic desensitization

Unlike the exposure therapy, systemic desensitization is complemented by anxiety education and work. The effectiveness of systematic desensitization was investigated by the study of Miller & DiPilato (1983), which was mentioned in the section on progressive muscle relaxation. The frequency of nightmares decreased in both actively treated groups (progressive muscle relaxation and systematic desensitization), and there was no difference between the two groups at 15 weeks of observation. However, after 25 weeks, there was a statistically significant difference in the decrease in nightmare intensity in favour of systematic desensitization. No recent studies have been published to address this issue. Another study (Kellner *et al.* 1992) verified the effectiveness of systematic desensitization in comparison to dream transcription. The principle of desensitization with instructions on how to carry out this treatment was explained to the first group. The second group was then taught how to rescribe the dream in imagery. In both groups, the frequency of nightmares

decreased after seven months. There was no statistically significant difference in effectiveness between the two techniques.

Lucid dreaming therapy

Lucid dreams happen, when the person experiencing a dream realizes, that they are dreaming (Baird *et al.* 2019). It is a learnable technique that can provide effective and significant relief from nightmares (Abramovitch 1995). With this treatment, sleeping patients focus on realizing that what they are experiencing is not a reality and therefore adjusting the dream to their liking (Brylowski 1990; Zadra & Pihl 1997). The effectiveness of the lucid dreaming therapy was first described in a patient with nightmares (Brylowski 1990). The efficacy of this therapy was then examined in a pilot study by Spoomaker *et al.* (2006). Patients were divided into three groups. The first group underwent two-hour individual lucid dreaming therapy, and the second group underwent one two-hour group lucid dreaming therapy, the third was on the waiting list. Compared to the control group, the incidence of nightmares decreased in both group and individual approach of this therapy, measured by a follow-up questionnaire at 12 weeks after intervention. Holzinger *et al.* (2015) showed the efficacy of lucid dreaming therapy as add on therapy to Gestalt therapy.

Imagery rehearsal therapy (IRT)

The most recommended approach for the treatment of nightmares nowadays is the imagery rehearsal therapy (IRT), which is also the most empirically supported treatment of nightmares (Krakow *et al.* 2000; Krakow *et al.* 2001; Forbes *et al.* 2003; Lancee *et al.* 2008; Augedal *et al.* 2013; Hansen *et al.* 2013; Belleville *et al.* 2018; Harb *et al.* 2019; Pruiksma *et al.* 2019). At IRT, patients are advised to change (rewrite) the nightmare storyline into an alternative and less disturbing story, which they then exercise in their imagination (e.g. Krakow & Zadar 2012). IRT can successfully reduce nightmare frequency and fear of them (Augedal *et al.* 2013, Hansen *et al.* 2013) and improve sleep quality (Krakow *et al.* 2001; Casement & Swanson 2012). Exposure techniques are also useful in treating nightmares in addition to IRT. With imaginal exposure (IE) for nightmares, patients are exposed to the content of their nightmares. Exposure-based techniques have produced favourable changes in the frequency and intensity of face-to-face nightmare (Cellucci & Lawrence 1978; Miller & DiPilato 1983) and self-help formats (Burgese *et al.* 1998; Grandi *et al.* 2006; Lancee *et al.* 2010).

The starting point of this technique is to evoke a nightmare in imagination. The patient should endeavour to recall the dream with as many details as possible, including the emotional component. Afterwards, they should then write down the dream. The next task is to make a change in the event. The patient can reshape either the topic and storyline, ending, or any other

part so that the story goes well (Kunze *et al.* 2017, Giesemann *et al.* 2019). The therapist should be a guide rather than a creator of the new story. The patient then repeats the alternative story. They can make further changes, according to their needs. The positive course of the dream is essential. The patient and the therapist then discuss this so-called cognitive shift.

Krakow *et al.* (2001) used 3 group therapy sessions. In the first meeting, patients practice positive imagination, and at the same time, they are instructed about cognitive-behavioural techniques, that can be used to process negative ideas. In the second meeting, they use the acquired skills on a simple nightmare of their choice. They used the model of Neidhardt *et al.* (1992) in which they recorded both the original nightmare and the ideal alternative scenario. Once they have mastered this step, the patients are asked to manage the process in their mind only (without writing it down). They are advised to imagine this “new dream” for 5 to 20 minutes a day. They are also advised not to work on more than two new dreams a day. Exposure to traumas must be gradual so that the attention is first paid to less traumatic dreams. In the third session, the patients discuss their experiences and improvements. They are also given an opportunity for questions.

Rousseau *et al.* (2018) in their regression analyses showed that IRT predicted higher self-efficacy about dreams ($\beta = .578$) and that self-efficacy about dreams predicted improvement in insomnia

IRT efficiency

The efficiency of IRT has been studied in several research studies. Krakow (1995) investigated its effects in 58 patients with chronic nightmares. Thirty-nine patients were treated with IRT, 19 were a control group (on the waiting list). There was a statistically significant decrease in the occurrence of nightmares compared to the control group. Another study by Krakow *et al.* (2001) followed a total of 168 patients with PTSD after a sexual assault. The first group underwent IRT with three sessions. The control group was on the waiting list. Patients were followed 3 and 6 months after the treatment. In the treatment group, there was a significant decrease in the frequency of nightmares compared to the start of therapy. In the control group, there was only a non-significant decrease. Compared to the control group, the effect of the therapy persisted after 3 and 6 months. Another study of Thünker & Pietrowsky (2012) explored the efficacy of IRT in 69 subjects. Twenty-two of them suffered primarily from nightmares, 21 from depression and nightmares, and 26 from PTSD and nightmares. Patients with primary nightmares and patients with depression and nightmares were all treated. The PTSD and nightmares group was divided into a treatment group ($n = 14$) and a control group ($n = 12$). The therapy consisted of eight 50-minutes sessions. Both the frequency of nightmares and related anxiety experienced were monitored. The

frequency of nightmares decreased in all treatment groups. Anxiety also decreased in all three groups; the smallest decrease was reported in the PTSD group. The efficacy of IRT is being investigated in several other studies (Nappi *et al.* 2012; Cook *et al.* 2010, Thunker *et al.* 2012).

Significant improvements in targeted nightmare frequency and intensity were evident to 12-month post-treatment (Forbes *et al.* 2003). IRT also showed efficacy when used as an internet-based intervention in the study of Gieselmann *et al.* (2017) in 127 patients and resulted in lower nightmare distress.

A more recent meta-analysis, Casement & Swanson (2012) included 13 studies with 511 patients on IRT efficacy and reported that IRT had a significant effect on the frequency of nightmares and sleep quality. The effect of treatment was present even at 6 and 12 months follow up. The studies included in the meta-analysis also showed that IRT has an impact on overall symptomatology of PTSD, leading to a significant decrease even though the IRT does not primarily target symptoms of PTSD others than the nightmares. According to Casement & Swanson (2012) findings, IRT proved more effective in civil patients than in war veterans. IRT also showed comparable efficacy to CBT strategies in terms of nightmares, though CBT proved to be more efficient in other PTSD symptoms (Belleville *et al.* 2010, Ulmer *et al.* 2011, Talbot *et al.* 2014). Moreover, the combination of IRT and CBT-I (cognitive behavioural therapy for insomnia) showed significant general improvement of sleep quality than either of those methods alone, even though CBT-I was not crucial in nightmare reduction (Galowski *et al.* 2009; Germain *et al.* 2011; Margolies *et al.* 2013), though it showed moderate effect in some studies (Davis *et al.* 2007). Lancee *et al.* (2015) also showed that IRT is an effective treatment for nightmares among patients with comorbid psychiatric disorders and can be employed in addition to the on-going treatment.

Imagery Rescription (IR)

The rescription in imagination protocol is inspired by traditional protocols in the IRT treatment (e.g. Krakow & Zadra 2006) as well as the protocol for IR therapy for early childhood trauma (Arntz & Weertman 1999). Unlike traditional IRT techniques, the current protocol focuses entirely on IR exercises. More specifically, treatment components such as psychoeducation about sleep, nightmares, and mental images, as well as keeping diaries about nightmares and discussing the content of nightmares, were discarded. Instead, participants are acquainted with the rewriting technique immediately at the beginning of the first treatment session. After reactivating the underlying nightmare, the participants are instructed to change the nightmare in any way leading to a more satisfactory story. Unlike traditional IRTs, and trauma rescripting protocols (e.g. Arntz & Weertman

1999), participants are required to change their nightmare in their imagination actively.

Instead of first thinking about how to modify a nightmare and then practising it, nightmares are changed immediately after reactivation, while the accompanying emotions are still accessible. Activation of emotional memories seems necessary for the adequate integration of corrective information (Foa & Kozak 1986). In order to make the rewriting as successful as possible, it has been suggested that the negative emotions accompanying the adverse event (e.g. a nightmare) be sufficiently activated before re-rewriting (Arntz 2012; Dibbets & Arntz 2015). It is essential to distinguish between short emotion reactivation (approximately 1-3 minutes) and prolonged activation when patients are exposed to an aversive event repetitively and for a prolonged period (usually 45–60 minutes). Thus, reactivation of an aversive event in rewriting therapy is not considered as exposure, but an essential part of the rewriting technique.

Under the current protocol, it is not necessary to exercise a new nightmare scenario as often as possible, but rather fine-tune the new scenario so that the negative emotions accompanying the nightmare are minimized, and the patient is delighted with the new script, and ultimately feels well. This can be accomplished in a one-time rewriting exercise, but it may also require multiple exercises (possibly across multiple sessions) to rewrite the original nightmare to make the patient feel comfortable enough with the new nightmare script. Other nightmares than the baseline nightmare can only be addressed in treatment if the rescripting of the baseline nightmare is successfully achieved at the beginning of the treatment process (Cogan *et al.* 2019).

Even though imagery rescripting and imaginal exposure for nightmares seem to produce similar therapeutic effects, the results of the study of Kunze *et al.* (2019) suggest that imagery rescripting and imaginal exposure tap into different underlying processes.

Steps of imagery rescription of a nightmare

During the baseline assessment, all patients in the group are asked to identify the main nightmare to be treated later. Participants are instructed to choose a nightmare that is highly emotional and is part of a recurring (emotional) theme of the nightmares (e.g. killing, following, losing someone, etc.) (Arntz & Weertman 1999; Arntz 2012). The core of a nightmare is identified for several reasons:

- First, as the current treatment consists of only three 60-minute treatment sessions, it seems crucial to identify the most unpleasant nightmares as soon as possible.
- Second, the identification and treatment of one particular nightmare make it possible to examine the effects of a nightmare-specific treatment.

During the exercise, patients are asked to briefly visualise their main nightmare as vividly as possible until the

emotions are sufficiently reactivated (approximately 1-3 minutes). Nightmare frequency, clarity and subjective distress (SUD), as well as the tolerance of the negative emotions, caused by the core part of the nightmare, and the strongest emotions felt at the time of reactivation of the nightmare are measured after the reactivation. The nightmare used in this exercise is subsequently treated (Dibbets *et al.* 2012). While exercise might be mistaken for exposure, nightmare reactivation is relatively short, since the primary goal of imagery exercises is to reactivate emotions just enough to be immediately treated, it is not a long-term exposure and habituation to these emotions.

Mechanism of transcription effect in imagination

Although both exposure-based and transcription-based techniques appear to be effective treatments for nightmares, there is still a debate about the mechanism of their effect (Hansen *et al.* 2013). It has been argued that IRT and exposure can function in different ways since techniques follow substantially different procedures. According to Mark's (1978) hypothesis, imagination is useful because its approach involves exposure, abreaction, and control. Bishay (1985), on the other hand, considers exposure and abreaction as only secondary to gaining control because changing the storyline is more effective than re-dreaming itself. The IRT working mechanisms and exposure to nightmares have not yet been systematically studied and therefore remain mostly unknown.

Traditional exposure therapy theories suggest that for the technique to be effective, exposure to the stimulus must continue until the fear of stimulation disappears. Within this framework of emotional processing (Foa & Kozak 1986, Foa & McNally 1996), it is suggested that reducing fear (i.e. reducing subjective units of distress; SUD) during and/or across exposure trials is a critical sign of the therapeutic change (Craske *et al.* 2008). However, more recent exposure therapy models do not emphasize fear reduction during exposure, but rather focus on other underlying processes. For example, the model of inhibitory learning of exposure therapy (e.g., Bouton 1993; Miller & Matzel 1988) reported that reduction of fear (in laboratory analogue for exposure therapy; (Bouton *et al.* 2001)) does not erase previously learned link between the stimulus (conditional stimulus) and aversive event (unconditional stimulus). However, the therapy creates new (inhibitory) memory (while the original fear memory remains intact) (Bouton 1993, Craske *et al.* 2014). Specific processes can facilitate inhibition learning, which seems critical to successful exposure therapy (Craske *et al.* 2014), such as fear tolerance (Craske *et al.* 2008).

Conversely, suppressing or avoiding negative emotions is considered dysfunctional (Craske *et al.* 2008). The ability to tolerate negative emotions during exposure (which is incompatible with the original memory of fear) could stimulate new inhibitory learning (Blu

et al. 2014). In support of this claim, it has been shown that lower tolerance for emotional anxiety is associated with more severe PTSD symptoms (Vujanovic *et al.* 2013). Also, avoiding negative emotional states predicts the severity of the response to fear (Karekla *et al.* 2004), while accepting negative emotions reduces anxiety (Eifert & Heffner 2003).

Other variables that are often associated with extinction learning and exposure therapy include the controllability and/or predictability of adverse events (Hofmann 2008). The extent to which people perceive certain events being under their control has long been considered an essential mediator of psychopathology and treatment (Rotter 1966). The importance of perceived controllability/predictability of aversive outcomes has therefore been recognized in several models of psychotherapy (e.g. Barlow 2002, Clark 1986) as well as in modern theories of fear (e.g. Mink & Zinbarg 2006). Importantly, not only uncontrollable aversive events but also unexpected emotional outbursts can facilitate the development of neurotic disorders (Barlow 2002).

For nightmares, this can be particularly important as patients regularly experience strong negative (and often menacing) emotions in response to their dreams. Thus, perceived controllability and/or predictability of injury (i.e. negative emotions due to nightmares) may be important variables in the dealing of nightmares. Although predictability/controllability of harmful events has mainly been associated with exposure therapy (e.g. Hofmann 2008), it may also play an essential role in rewriting in imagination treatment. In most rewriting-based therapeutic techniques, patients are encouraged to change adverse events according to their individual emotional needs. Thus, it can be assumed that patients will gain control of the emotions they experience in response to a specific adverse event (e.g. nightmares). Manageability and/or predictability of nightmare-induced emotions can be critical intermediary variables in both imagination and exposure techniques.

Although empirical evidence of the underlying working mechanism of imagery rewriting is still limited, Arntz (2012) recently suggested that IR could change the meaning of emotional events or memories through the extinction of a conditioned reflex, a process where fearful memories or other aversive stimuli removed by altering the negative valence of such stimuli. There is preliminary evidence of the inclusion of the extinction of conditional stimulus in the transcription in imagination (Dibbets *et al.* 2012, Hagensars & Arntz 2012). However, further research is needed to find out whether the extinction of the response to the stimulus is a crucial mechanism of the efficacy of transcription in imagination. Research into transcription in imagination in a post-traumatic nightmare suggests that rescription in imagination works by changing negative beliefs about self-sufficiency and the

ability to control disturbing images (Spoomaker 2008, Long et al. 2011).

Similarly, Krakow et al. (2001) and Germain et al. (2004) argued that changing nightmares utilizing rescription techniques improve patient's perception of nightmares (Hansen et al. 2013). The hypothesis that increased mastery explains the effects of transcription in imagination may be related to older explanations that emphasize the healing properties of revealing previously inhibited reaction (Arntz 2012). A key characteristic of nightmares is the inhibition of dream action tendencies, supported by the inability to control muscles due to sleep paralysis, leading to a sense of helplessness and uncontrollability. The sense of mastery could be re-established by expressing those inhibited answers, so mastering the content of a nightmare can be an index of therapeutic changes in rescription in imagination.

The efficiency of transcription in imagination in nightmares
The effects of IR and IE were comparable to those observed for other psychological nightmare treatments. Initial effects at post-treatment were sustained at 3- and 6-months follow-up, indicating that IR and IE both seem to be efficacious treatment components of nightmare therapies (Kunze et al. 2017).

A very recent study of Kristi et al. (2020) showed preliminary data about the efficacy of transcription in the imagination of nightmares in military personnel. The intervention group in the study underwent a program consisting of exposure, relaxation, and transcription parts and the results showed a medium-sized reduction of nightmares, as well as a significant reduction in other psychopathological symptoms such as depression and PTSD. Pruiskma et al. (2018) indicate that ERRT (exposure, relaxation and transcription therapy) with and without nightmare exposure and rescripting can significantly alleviate nightmares and related distress. Davis et al. (2011) show that treatment-related decreases in heart rate to nightmare imagery were as correlating with improvements in sleep quality and quantity. However, further research on a larger population is needed to assess the effect size of IR on nightmares.

PHARMACOTHERAPY OF NIGHTMARES

Many psychopharmaceuticals with different mechanisms of action have been tested for the treatment of nightmares, but so far, no medication has been found to provide sleep without them. We have evidence of the effect of prazosin in reducing nightmares in PTSD in placebo-controlled studies (Raskind et al. 2000; Raskind et al. 2002; Peskind et al. 2003; Raskind et al. 2003, Zayfert & DeViva 2004; Hoff et al. 2003; Raskind et al. 2007; Taylor et al. 2008; Germain et al. 2011; Raskind et al. 2013; Ahmadpanah et al. 2014). It is a centrally and peripherally acting alpha-1 adrenergic receptor antagonist. Doses of 10–15 mg per day were tolerated well in PTSD veterans (only a fraction of patients left

the study due to orthostatic hypotension) (Hoff et al. 2003; Raskind et al. 2007). Prazosin was more effective than a placebo in both improving and prolonging sleep and reducing nightmare occurrence (Zayfert & DeViva 2004; Khachatryan et al. 2015; Singh et al. 2016). The medication also led to an increase in the total REM sleep time and length of individual REM phases (Raskind et al. 2007). One mg of prazosin for 1-2 weeks is sufficient to suppress the symptoms of nightmares. In the case of ineffectiveness, prazosin should be increased to 15-20 mg per day within a few weeks while checking blood pressure. The most common side effects that occur in around 10 % of cases are sedation and orthostatic dizziness. Patients with PTSD, who were able to reduce nightmare frequencies significantly, also experienced a decrease in reactivity to traumatic stimuli during the day (Taylor et al. 2006). However, there is a particular discussion about the overall effect of prazosin and the American Academy of Sleep Medicine recently devalued prazosin, and nowadays, they do not consider it a first-line pharmacological intervention (Waltman 2018; McCall et al. 2018). This is in accordance with findings of Raskin et al. (2018) in their RCT of 304 veterans at ten weeks; there was no significant difference between placebo and prazosin group.

In addition to prazosin, other adrenergic agents have been tested, such as doxazosin (Rodgman et al. 2016). Alpha – 2 adrenergic receptor agonists, clonidine and guanfacine, have proven their effect on PTSD symptoms, including nightmares in children and adults (Boehnlein & Kinzie 2007, Strawn & Geraciotti 2008).

Trazodone is a substance that is effective in treating nightmares, as well as insomnia (Tanimukai et al. 2013). Trazodone is safer compared to tricyclic antidepressants because it does not increase the risk of constipation and delirium due to its low anticholinergic qualities (Warner et al. 2001). Besides, trazodone does not affect muscle relaxation, as it is the case with benzodiazepines (Kaynak et al. 2004). The mechanism of its effect on improving nightmares remains unclear. One states that it is the secondary effect due to its antidepressant and/or anxiolytic effect. However, this antidepressant and/or anxiolytic effect usually takes at least 1 or 2 weeks to start. The effect on nightmares, on the other hand, is usually in a matter of days, sometimes even after the first administration (Tanimukai et al. 2013). Thus, the therapeutic effect of trazodone on sleep appears to be independent of its antidepressant effect (Kaynak et al. 2004). It is believed that most dreams usually occur in REM sleep, one possible effect of trazodone in sleep disorders, including nightmares, could be related to REM suppression and increased slow-wave sleep through the antagonistic action of trazodone on 5HT_{2A} / 2C receptors. Trazodone has also been tested in 4 patients who have advanced cancer who experienced nightmares. In half of them, nightmares have subsided (Tanimukai et al. 2012).

Another substance in question is gabapentin. Gabapentin is an anticonvulsant with anxiolytic, antinociceptive and sleep-inducing effects. Hamner *et al.* (2001) reported the effect of additional gabapentin therapy (300–2100 mg per day) in combination with existing pharmacotherapy in 30 PTSD veterans. Adding gabapentin to the therapy helped reduce nightmares and sleep disturbances. Twenty-four of the 30 veterans (77 %) showed a mild to moderate improvement in sleep disturbance and overall severity of PTSD. Gabapentin affects the reuptake and release of GABA (Lydiard 2033).

Topiramate decreased nightmares in an open-label study with 35 veterans with PTSD (Berlant and van Kammen 2002) and double-blind RCT of Yeh *et al.* (2010) also in 35 patients. Another substance showing some effect in naturalistic study was duloxetine (Walderhaug *et al.* 2010)

Antipsychotics have also been used to treat nightmares. Risperidone, used in 10 patients after severe burns caused nightmare reduction at doses 0.5–2 mg at bedtime, mean 1 mg dose, already after one or two days of administration (Stanovic *et al.* 2001; Krystal *et al.* 2016). Olanzapine has been tested as an adjuvant treatment to existing treatment in five patients with resistant nightmares. All five patients experienced a rapid reduction of nightmares (Jakovljevic *et al.* 2003). Also, nightmare reduction has been reported in five patients with PTSD following aripiprazole administration (Lambert 2006).

Clonazepam therapy was mostly ineffective in improving sleep disturbances, particularly nightmares, associated with combat-related PTSD (Cates *et al.* 2004).

DISCUSSION

In nightmare therapy, we have many options to help the patient and how to set up treatment. When using psychopharmacs, we must take into account their possible side effects. The best-performing drugs were some anti-epileptics (gabapentin and topiramate), antipsychotics (olanzapine and risperidone), the antidepressants trazodone. Antidepressants from the SSRI, TCA and MOAI groups have been associated with the induction of nightmares as well as antiparkinsonians (selegiline and levodopa) and centrally acting antihypertensive drugs. Zolpidem, an often-prescribed cure for insomnia, can cause nightmares. The treatment options were mainly psychotherapeutic approaches. All psychotherapeutic approaches improved the patient's condition and nightmares. Some approaches have also had to reduce an effect on co-morbid anxiety, depressive symptoms and PTSD.

CONCLUSION

Nightmares concern both a healthy and clinical population and may occur in many psychiatric disorders. Research focuses mainly on the connection between nightmares and PTSD. The nightmares may also occur more frequently in patients with a borderline personality disorder or affective disorders. Among psychopharmaceuticals, prazosin, which influences the autonomic nervous system, is the most disputed in nightmares in PTSD, several other substances are considered to have the effect, but they lack studies on larger samples. From psychotherapeutic approaches, rescription of nightmares in imagery is recommended.

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