

Review Article

Behavioural and Cognitive-Behavioural Treatments of Parasomnias

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Parasomnias are unpleasant or undesirable behaviours or experiences that occur predominantly during or within close proximity to sleep. Pharmacological treatments of parasomnias are available, but their efficacy is established only for few disorders. Furthermore, most of these disorders tend spontaneously to remit with development. Nonpharmacological treatments therefore represent valid therapeutic choices. This paper reviews behavioural and cognitive-behavioural managements employed for parasomnias. Referring to the ICSD-3 nosology we consider, respectively, NREM parasomnias, REM parasomnias, and other parasomnias. Although the efficacy of some of these treatments is proved, in other cases their clinical evidence cannot be provided because of the small size of the samples. Due to the rarity of some parasomnias, further multicentric researches are needed in order to offer a more complete account of behavioural and cognitive-behavioural treatments efficacy.

1. Introduction

The term “parasomnia” is derived from the Greek “para” (meaning “alongside of”) and the Latin word “somnus” (meaning “sleep”). Parasomnias are defined as unpleasant or undesirable behaviours or experiences that occur predominantly during the sleep period or within close proximity to sleep. During the last century these phenomena have been carefully studied both polygraphically and clinically, showing that they encompass a wide number of conditions. According to the International Classification of Sleep Disorders (ICSD-3) parasomnias may be categorized according to the sleep phase of origin: Rapid Eye Movement (REM) sleep parasomnias, non-REM (NREM) sleep parasomnias, or miscellaneous, when they arise independently of sleep stage [1].

Since parasomnias are typically benign experiences that tend to resolve spontaneously in the course of development,

they are frequently overlooked both by patients and clinicians. Consequently, few studies concern the treatment of these conditions, and most of these works are uncontrolled and based mostly on case reports.

Pharmacological treatments are available for these disorders, but the evidence of their efficacy is variable depending on the disorder. Furthermore, since most of NREM parasomnias are typical of childhood, particular attention must be paid towards pharmacological side effects. Consequently, behavioural and cognitive-behavioural treatments of sleep disorders received a growing attention in the last decades.

Despite the fact that the best known and validated cognitive and behavioural interventions aim to treat insomnia [2, 3], there is also a number of studies concerning parasomnias. Some of these treatments can be applied to a variety of parasomnias [4], as scheduled night awakenings or daytime naps [5, 6], while others are specific to a single disorder, as in the case of imagery rehearsal therapy for nightmares [7].

A systematic account of nonpharmacological treatments efficacy is lacking. This review will therefore cover the nonpharmacological treatments available for parasomnias, taking into account both controlled studies and case reports.

2. NREM Parasomnias

NREM parasomnias are classified on the basis of the behaviours displayed by the patient during the episode [1]. The NREM group includes confusional arousals, sleep terrors, and sleepwalking. The general criteria for these disorders of arousal include: (a) recurrent episodes of incomplete awakening, (b) absent or inappropriate responsiveness, (c) limited or no cognition of dream report, and (d) partial or complete amnesia for the episode. The three subtypes have distinct diagnostic codes, and additional criteria are elaborated for each manifestation of partial arousals. In the ICSD-3, sleep-related eating disorder has also been included within the NREM group, because it has many features in common with these disorders [1]. These frequently overlap and it is not unusual for patients to meet the criteria for more than one of these conditions. Some of NREM parasomnias arise in comorbidity with psychiatric disorders, psychotropic usage, and sleep disorders [8]. A detailed anamnesis on medical, psychiatric, and drug usage is therefore needed for a proper evaluation of NREM parasomnias.

There are no large controlled trials assessing treatment efficacy in most of these conditions. Most of what is known comes from small trials or clinical and anecdotal evidence.

2.1. Confusional Arousals. Confusional arousals (CA) are characterized by disoriented behaviour or slow mentation during an arousal from NREM sleep [1]. This condition is the consequence of a partial or incomplete awakening, usually out of slow-wave or stage N3 sleep. Therefore, most of the episodes tend to occur at the same time every night and can be predictable. The patient often displays vocalizations with occasional complex behaviours and typically has a poor recall of events the following day. Attempts to awaken the person are often unsuccessful and may be met with vigorous resistance; occasionally the patient can become aggressive and violent. The prevalence ranges from 2.9% in adults to 17.3% in children [9]. Even though this behaviour is typically benign, sometimes the symptoms may persist into adulthood.

2.1.1. Treatment. The first-line treatment in children with CA is reassurance, because the disorder tends to decline spontaneously with age [10]. Patients should also be taught to avoid any precipitating factors, including central nervous system depressants and sleep deprivation [11].

Attarian suggests scheduled or anticipatory awakening as a behavioural technique to prevent these events [12]. This consists in awakening the child 15 to 20 minutes before the usual time of occurrence of CA, in order to alter the sleep state and therefore to abort the event. During the scheduled awakening, the parent should comfort the child [9]. An episode of CA should be allowed to run its course, unless an attempt to leave the bed or to harm the patient occurs, since

efforts to restrain the behaviour may lead to aggressiveness [13].

When CA become frequent or do not respond to behavioural therapy, the possibility of a comorbid sleep disorder should be ruled out. Treating the concomitant conditions may reduce the episodes [14].

2.2. Sleep Terrors/Night Terrors/Pavor Nocturnus. Sleep terrors (ST), also known as night terrors or pavor nocturnus, are conditions characterized by an unexpected arousal from stage N3, with an abrupt scream and behavioural manifestations of intense fear. They usually have a sudden onset, and the individual displays behaviours of extreme distress, confused verbalizations, autonomic arousal, and increased body movements, sometimes including sleepwalking. The child cannot be consoled or woken and typically has a partial or complete amnesia of the episodes the next day [1]. Prevalence of ST also varies with age from 1% in the elderly to 6.5% in children [15].

2.2.1. Treatment. The first treatment in children with infrequent episodes of ST is reassurance, since they often outgrow it by late adolescence [10]. Similarly to the episodes of CA, any attempt at interrupting the event by blocking, touching, and grabbing will likely lead the patient to react with an aggressive behaviour and may even cause injuries: then it is not recommended. Some authors suggest to wait for the event to run its course and then to guide the child back to bed [12].

The patients should also be educated to avoid sleep deprivation and other precipitants, such as alcohol and drugs [11]. Furthermore, it is important to make the bedroom as safe as possible to minimize the risk of injury, by sleeping on the ground floor, removing obstructions in the bedroom, and closing doors and windows [10, 12].

When the episodes become more frequent or tend to persist into adulthood, treatment is warranted. A wide range of drugs has been suggested, but potential side effects must be a cause for concern, especially in younger patients. Behavioural methods include psychotherapy [16], relaxation therapy [17], and autogenic training or hypnosis [18].

Anticipatory or scheduled awakening can also be used to prevent ST [19]. A study by Lask [20] reported the use of scheduled awakenings in 19 successive children. Parents were instructed to note at what time the episodes happened and subsequently to wake their child fully 10–15 minutes before the terror occurred. The night terrors stopped within a week of starting treatment, and at followup one year later no relapses were reported [20]. This technique is relatively low-risk, but special attention must be paid when the patient is significantly sleep deprived. In this case it is better to increase total sleep time before intervening specifically to treat ST [6].

Kellerman [21] described a behavioural treatment with relaxation therapy in a three-year-old girl with night terrors and acute leukaemia. The treatment, targeted at reducing anxiety related to parental separation and medical procedures, reduced and eventually eliminated the events. In the same study an analogous treatment with a five-year-old boy was reported with similar results [21].

Kales et al. [16] described the effect of psychotherapy in treating adult patients with night terrors. Out of three

patients, two completed psychotherapy and showed a complete disappearance or a clear reduction of the episodes; a third patient discontinued therapy and showed no improvement.

Hurwitz et al. [18] reported the use of hypnosis in the treatment of 27 adult patients with sleepwalking and ST. A total of 74% of patients improved after instruction in self-hypnotic exercises.

2.3. Sleepwalking/Somnambulism. Somnambulism, or Sleepwalking (SW), is a parasomnia characterized by complex purposeless tasks and wandering episodes of variable duration, arising from stage N2 or N3. Frequently the patients show no memory of the event [1]. Prevalence of SW varies from 4% in adults to 17% in children less than 13 years of age [22].

2.3.1. Treatment. Most cases of SW are benign and resolve spontaneously without treatment when the child grows up. Hence, the first-line treatment is supportive and includes avoiding sleep deprivation and creating a safe environment, giving the sleepwalker quiet guidance back to bed if necessary. It can be also noteworthy to reassure the patient that SW is not linked with underlying psychiatric illness. Treating other apparent predisposing factors and addressing triggering factors is also important. In particular, reversing comorbid sleep disordered breathing conditions often dramatically diminishes nocturnal behaviours, even when patients only have a mild burden of disease [8].

Nevertheless, if symptoms become chronic and the frequency of SW episodes is severe, a targeted intervention is indicated. A number of nonpharmacologic treatments, including anticipatory awakening, psychotherapy, and hypnotherapy have been reported.

Anticipatory awakenings are used in children with NREM parasomnias [23]. This treatment is most appropriate when SW episodes occur at a highly predictable time each night [10] and parents are willing to implement the treatment protocol for at least 1–4 weeks. This consists in waking the patient just prior to the typical onset of an episode. The evidence for the efficacy of scheduled awakenings as a treatment for SW in young children is limited to few published studies [5, 19, 20]. These uncontrolled case reports showed that treated children had no reoccurrence of parasomnia at 6–12 months of followup. Weaknesses of these studies include lack of reliable data on parent monitoring of SW. Although positive results have been reported in children, there are few data concerning the efficacy in adult patients [5, 19].

Behavioural interventions aimed to change the sleep pattern are also suggested: some authors hypothesized that daytime naps could decrease depth of night-time sleep and reduce the number of partial arousals [24, 25]. However, there are no published reports of the effectiveness of this treatment.

Psychotherapy may be helpful for treating SW in adults. A case report of two patients showed that psychotherapy helped developing strategies to cope with the patient's psychological conflicts [26], leading to a better control of the SW episodes. As shown by other works, in fact, psychological factors

can play an important role in triggering SW episodes [27–30]. Nevertheless, other studies have shown no effects of psychological treatment on SW [8].

The evidence for hypnotherapy is based mostly on anecdotal data and case reports. In two studies, a significant improvement after more than 6 months of followup was reported [18, 31]. However, other studies failed to confirm these results [18, 32, 33]. Only one randomized blind trial compared active hypnosis to suggestion hypnotherapy in 11 participants and did not show any additional benefit with the active therapy [32].

To our knowledge, randomized controlled trials of non-pharmacological treatments for somnambulism are lacking. Observational evaluations have generally been retrospective and uncontrolled and have relied solely on self-report of improvement by patients as outcome measures.

2.4. Sleep-Related Eating Disorder. The ICD-3 defines sleep-related eating disorder (SRED) as a NREM sleep parasomnia characterized by recurrent episodes of eating, occurring after sleep onset and accompanied by a reduced level of awareness. The sleep-related eating episodes are not linked to daytime eating disturbances such as bulimia nervosa, binge-eating disorder, or anorexia nervosa [1]. The average age of onset is approximately from 22 to 27 years with a mean of nearly 12 to 16 years before clinical presentation. This condition affects females (65%) more than males, and 80% of patients describe a diminished level of consciousness during eating episodes, with a varying degree of amnesia for the events [34, 35].

The distinction between SRED and Nocturnal Eating Syndrome (NES), which is openly recognized as an eating disorder, is still controversial. The main feature that distinguishes these two conditions is the level of awareness during the food intake, which is not impaired in NES [36]. Furthermore, consumption of at least 25% of intake after the evening meal and morning anorexia are typical features of NES [37].

2.4.1. Treatment. In 1993, Schenck et al. [34] concluded that, in comparison with pharmacological treatments which control night eating and induce loss of excessive weight, cognitive behaviour therapies are ineffective for this disorder. Although not being a controlled study, to our knowledge it represents the only research assessing the efficacy of nonpharmacological interventions versus pharmacotherapy.

Since an association between the usage of zolpidem and SRED has been suggested, a specific comprehensive assessment is requested before starting this therapy in patients with insomnia. In fact, zolpidem may cause or increase the frequency of SRED episodes in patients with sleep pathologies that lead to repeated arousals [38, 39].

All the other behavioural therapies studied in scientific literature refer to NES [40] and are therefore beyond the aim of this review.

3. REM Parasomnias

As parasomnias are grouped by the sleep phase in which they occur, REM sleep parasomnias can be defined as unpleasant

behaviours and experiences arising from REM sleep. Three main parasomnias of this subtype are recognized: nightmare disorder, recurrent isolated sleep paralysis, and REM sleep behaviour disorder (RBD) [1].

3.1. Nightmare Disorder. Nightmares are defined as disturbing mental experiences that are able to awake the sleeper from REM sleep. The experience generated internally by the dreamer seems real and vivid and can cause a wide range of negatively toned experiences like anxiety, fear, terror, anger, rage, and embarrassment that result in somatic manifestations like tachycardia, sweating, and tachypnoea. After the arousal, the subject is able to recover the content of the nightmare and is fully alert. The frequency of nightmares represents the disorder itself [1].

In children nightmares are very common, with a frequency of 75%, while in general population lifetime prevalence of nightmare experiences is close to 100% [41]. Regarding nightmare disorder, the prevalence in preadolescent children is 1.8–6% [42], while in adults it is up to 4% [43].

Although reported in strong relation with Posttraumatic Stress Disorder (PTSD), where the presence of nightmare follows a traumatic event, nightmares can occur also in other pathological conditions, such as drug abuse and stressful events and can be considered as normal reactions to acute and chronic combat and operational stress [44]. Nightmares are also present in major depression (MD) and according to Krakow et al., they pose an independent risk to suicidality [45].

Since nightmares are defined by their qualitative and quantitative features (i.e., content and frequency), a detailed evaluation is fundamental, both from treatment and research. The assessment of nightmares is typically performed with specific questionnaires assessing the frequency, distress, and intensity of the episodes [46–48]. Furthermore, of greater importance are logs and diaries that seem more accurate [41, 49].

3.1.1. Treatment. There are six behavioural and cognitive-behavioural techniques for the treatment of nightmares in the literature: imagery rehearsal therapy (IRT); exposure techniques; exposure, relaxation, and rescripting therapy (ERRT); lucid dreaming therapy (LDT); hypnosis; eye movement desensitization and reprocessing (EMDR).

In IRT the patient is asked to modify the plot of the recurring nightmare during wakefulness by verbal or written form, with a new self-made script in which the unpleasant part and/or the ending of the nightmare is replaced with a more pleasant one [50].

Exposure techniques consist in gradually exposing the patient to the source of the negative part of the nightmare during wakefulness and in safe surroundings [51].

In ERRT different types of intervention such as psychoeducation, sleep hygiene, progressive muscle relaxation, and rescripting the nightmare as exposure are combined together [52].

LDT is a restructuring cognitive technique. The patient is taught to become lucid in his nightmare through daily

exercises. Consequently, he will be able to perform actions during the nightmare that will modify its storyline [53, 54].

Hypnosis can be also adopted for the treatment of nightmares. Although the authors stated that the data were “very preliminary,” the treatment seemed to be effective [31].

According to the only meta-analysis investigating the size effect [55], all the previous treatments have a moderate effect, and there is no evidence that one is better than one other.

Also EMDR is employed for nightmares treatment. This is an 8-phase approach in which bilateral eye movement, tones, and taps are used to identify and reprocess the targeted disturbed memories and experiences in order to formulate insight and adaptive behaviour in patient with traumatic experiences. To our knowledge, the efficacy of this technique has been tested only in cohorts of PTSD patients [56, 57], with good outcomes for nightmares. In Silver et al. [56] study, EMDR subjects performed better than controls and other intervention groups, treated with relaxation training and biofeedback, in all variables investigating PTSD symptoms including nightmares. Also in a study by Raboni et al. [57] EMDR improved PTSD symptoms and sleep quality. In this case the quality and the frequency of nightmares have not been specifically investigated but they were addressed as a part of sleep quality which effectively improved [58].

At the moment it remains unclear whether nightmare disorder can equally benefit from all these different interventions, independently of the associated conditions (e.g., MD and PTSD).

3.2. Recurrent Isolated Sleep Paralysis. Recurrent isolated sleep paralysis can be defined as the persistence of REM sleep, in terms of muscle atonia, into wakefulness. This condition is identified with an inability to speak and to move the limbs and the trunk at sleep onset or upon awakening from sleep, even though the subject maintains a conscious state and a proper recall of the situation. The duration of the episode may vary from seconds to minutes [1]. This disorder may cause relevant consequences, like fear of sleep and anxiety before going to bed. Near 7.6% of the general population experiences at least one episode during lifetime [59].

3.2.1. Treatment. To our knowledge, no controlled studies of behavioural treatment for this condition are present in the literature. However, a reasonable management of this parasomnia is possible. Since sleep paralysis represents a benign and infrequent parasomnia, reassurance is the first-line treatment [60]. Since cultural elements can influence the clinical presentation of sleep paralysis, cultural explanation has to be taken into account [61].

As the frequency of sleep paralysis can be increased by sleep deprivation, a correct sleep hygiene is highly recommended, especially for shift workers and in circadian disorder induced by jet lag [62]. Furthermore, since daytime naps can trigger episodes of sleep paralysis, a proclivity for daytime sleep must be discouraged [63].

3.3. REM Sleep Behaviour Disorder. REM sleep behaviour disorder (RBD) is a parasomnia characterized by the absence

of sleep atonia during REM sleep and acting out of dreams, leading to injurious or potentially dangerous behaviours to the patients or bedmate [64]. The estimated prevalence is 0.38% in general population and 0.5% in elderly [1]. RBD can occur in a chronic as well as an acute form. Acute forms are connected mainly with withdrawal states from sedative-hypnotic agents and alcohol [65]. It is important to note that some serotonergic antidepressants are known to cause RBD elevating tonic submental electromyogram activity during REM sleep [66]. The chronic form of RBD can be either idiopathic or associated with neurological disorders, most notably synucleinopathies such as Parkinson's disease, multiple system atrophy, and dementia with Lewy body disease [67, 68].

3.3.1. Treatment. RBD represents the only parasomnia for which the pharmacological intervention is the clear mainstay of the treatment. However, controlling environmental safety is a fundamental intervention. Hence, likely dangerous objects should be removed from the bedroom, windows protected, mattresses positioned on the floor, and cushions put around the bed. These interventions are even more important when drug intolerance or ineffectiveness develops [69]. Even though environmental manipulations are suggested as an effective treatment, to our knowledge, RCT studies are still lacking in the literature.

4. Other Parasomnias

According to ICSD-3, under the category "other parasomnias" are enlisted all parasomnias that are not related to a specific sleep stage [1].

4.1. Exploding Head Syndrome. Exploding head syndrome (EHS) is characterized by the perception of an abrupt, sudden, loud noise or sense of explosion in the head when going to sleep or waking up [70]. These experiences are usually painless, but the patient can be terrified and the episodes result in a great deal of fear, confusion, and distress. Usually, it is a benign and infrequent experience, but it can also flow into a chronic form and result in relevant clinical consequences. Accurate prevalence rates are still lacking since a great part of the literature refers to case studies. EHS is a rare condition [71] and just few studies reported data in small samples [72].

4.1.1. Treatment. No controlled clinical trial is currently reported in the literature for this syndrome. A nonpharmacological treatment is anyway possible and may be effective. In different studies [71, 73, 74] it is suggested that education and reassurance that EHS is a fairly benign condition are helpful. In a case study, Ganguly et al. [71] reported that the reassurance itself led to a remission of the episodes after a 6-month followup. Obviously, further evidence for treatment efficacy is needed.

4.2. Sleep-Related Hallucinations. Sleep-related hallucinations are hallucinatory experiences, in particular visual phenomena, that occur at sleep onset (hypnagogic) or on awakening (hypnopompic) [75]. It has been suggested that they can be caused by a REM sleep intrusion into wakefulness, and it may be difficult to differentiate these experiences from dream occurring just prior to waking [76]. A less frequent variation of this form is represented by prolonged, long, vivid visual hallucination after waking during the night. They can occur as isolated phenomena or be a part of the symptomatic picture of narcolepsy. The prevalence of hypnagogic hallucinations is up to 25%, and they are more common than hypnopompic ones that occur in 7% of the general population [77].

4.2.1. Treatment. Being the least studied parasomnia, little is known about treatment possibilities. Different studies suggest that sleep deprivation, cigarette smoking, and certain medications such as β -adrenergic agonists, sedative hypnotics, and certain antidepressant can trigger the episodes. Therefore, avoiding these primary causes can relieve the problems [12]. No specific interventions have been evaluated for sleep-related hallucinations. Silber et al. [76] reported two patients treated with hypnosis, although with limited success. It must be underlined that, in healthy individuals, both hypnopompic and hypnagogic hallucinations tend to resolve spontaneously with time.

4.3. Enuresis. Sleep enuresis is characterized by the intermittent involuntary voiding during sleep, in absence of a physical disease, in children older than 5 years. Episodes can occur either during REM or NREM sleep [78]. For the diagnosis at least one episode a month for at least three months is required. This condition is more common in children with developmental delay, physical or intellectual disabilities, and psychological or behavioural disorders. It is very common in childhood, with a frequency of almost 10–16% at 5 years, and probably more prevalent in adolescence and adulthood than generally thought [78].

4.3.1. Treatment. A consistent literature about nonpharmacological treatment of nocturnal enuresis is present [79]. Conservative nonpharmacological treatments include education and support about this condition combined with advices about avoiding caffeine based drinks and encouraging adequate fluid intake. The patients must be taught to void every two or three hours during the day and to avoid holding when they feel to urinate. Moreover, instructions about comfortable posture will help the patient to relax pelvic floor muscles [79]. As in several behavioural and psychological disorders, rewarding agreed behaviours (such as drinking adequately, voiding before sleep, and engaging in management) can be more effective than rewarding what is out of the patient's control, that is to say, dry nights [80].

One of the most dated techniques is the alarm training, employed since 1938 [81]. As reported by a systematic review [82] of 56 trials in children, it is the most effective long term treatment. Alarms act as an operant behavioural technique.

Children are trained to suppress bladder emptying during sleep or to wake to void by signalling when they urinate, with the usage of bell and pad alarms placed on the bed, whereas personal alarms are worn in the child's underwear. Both types are equally effective [83].

Children with nocturnal enuresis have an increased risk of psychological and behavioural disorders. When marked symptoms are present, a full psychological or psychiatric assessment is recommended. The NICE guideline concludes that there is no evidence to justify the cost of psychotherapy for enuresis without clinically relevant psychological disorder. In this particular case, NICE recommends treating comorbid disorders, in order to improve the adherence to enuresis treatment [80].

Other complementary treatments (i.e., acupuncture) have been used for sleep enuresis. Among them hypnotherapy has been studied in one small randomized controlled trial, in which it appeared to be as effective as a pharmacological intervention (imipramine), with a lower relapse rate after cessation of treatment [84].

5. Conclusion

Several behavioural and cognitive-behavioural treatments of parasomnias are available. They have the obvious advantage of avoiding the risk of side effects of pharmacotherapy and deserve particular attention.

As this paper shows, the literature to date is based mainly on case reports or uncontrolled studies in small samples, offering only few examples of well-designed researches. Concerning sleepwalking, nightmares, and enuresis there is a number of controlled trials that allow evaluating the efficacy of these treatments. However, not all these studies of non-pharmacological treatments in sleepwalking were performed with adult patients, and the number of patients enrolled for the other studies was often limited. On the other hand, most of the behavioural and cognitive-behavioural treatments of other parasomnias cannot rely on valuable evidence.

Nonetheless, a nonpharmacologic approach to sleep disorders carries several further benefits. First of all, cognitive and behavioural treatment implies that the patient has an active part in his own treatment. This can possibly lead to a long term benefit to the patient if he learns how to recognize the signs of his disease and how to cope with it. Also, this can have a repercussion on the patient's awareness and ultimately on his quality of life.

Because of the rarity of some parasomnias and the limits of the studies reviewed in this paper, larger multicentric trials would be required. This will help to further evaluate the efficacy of behavioural and cognitive-behavioural treatments of parasomnias in adults and to compare them to pharmacologic treatments.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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References

- [1] American Academy of Sleep Medicine, *International Classification of Sleep Disorders*, American Academy of Sleep Medicine, Darien, Ill, USA, 3rd edition, 2014.
- [2] G. D. Jacobs, E. F. Pace-Schott, R. Stickgold, and M. W. Otto, "Cognitive behavior therapy and pharmacotherapy for insomnia: a randomized controlled trial and direct comparison," *Archives of Internal Medicine*, vol. 164, no. 17, pp. 1888–1896, 2004.
- [3] D. Riemann, C. Baglioni, B. Feige, and K. Spiegelhalter, "Insomnia—state of the science," *Der Nervenarzt*, vol. 85, no. 1, pp. 43–49, 2014.
- [4] V. Hirscher and D. Riemann, "Kognitive Verhaltenstherapie eines Patienten mit Parasomnie," *Verhaltenstherapie*, vol. 21, pp. 179–186, 2011.
- [5] N. C. Frank, A. Spirito, L. Stark, and J. Owens-Stively, "The use of scheduled awakenings to eliminate childhood sleepwalking," *Journal of Pediatric Psychology*, vol. 22, no. 3, pp. 345–353, 1997.
- [6] V. M. Durand and J. A. Mindell, "Behavioral intervention for childhood sleep terrors," *Behavior Therapy*, vol. 30, no. 4, pp. 705–715, 1999.
- [7] M. Escamilla, M. LaVoy, B. A. Moore, and B. Krakow, "Management of post-traumatic nightmares: a review of pharmacologic and nonpharmacologic treatments since 2010," *Current Psychiatry Reports*, vol. 14, no. 5, pp. 529–535, 2012.
- [8] C. Guilleminault, C. Kirisoglu, G. Bao, V. Arias, A. Chan, and K. K. Li, "Adult chronic sleepwalking and its treatment based on polysomnography," *Brain*, vol. 128, no. 5, pp. 1062–1069, 2005.
- [9] S. Kotagal, "Parasomnias in childhood," *Sleep Medicine Reviews*, vol. 13, no. 2, pp. 157–168, 2009.
- [10] T. B. A. Mason II and A. I. Pack, "Pediatric parasomnias," *Sleep*, vol. 30, no. 2, pp. 141–151, 2007.
- [11] M. M. Ohayon, C. Guilleminault, and R. G. Priest, "Night terrors, sleepwalking, and confusional arousals in the general population: their frequency and relationship to other sleep and mental disorders," *Journal of Clinical Psychiatry*, vol. 60, no. 4, pp. 268–276, 1999.
- [12] H. Attarian, "Treatment options for parasomnias," *Neurologic Clinics*, vol. 28, no. 4, pp. 1089–1106, 2010.
- [13] M. R. Pressman, "Disorders of arousal from sleep and violent behavior: the role of physical contact and proximity," *Sleep*, vol. 30, no. 8, pp. 1039–1047, 2007.
- [14] C. Guilleminault, L. Palombini, R. Pelayo, and R. D. Chervin, "Sleepwalking and sleep terrors in prepubertal children: what triggers them?" *Pediatrics*, vol. 111, no. 1, pp. e17–e25, 2003.
- [15] B. H. Nguyen, D. Pérusse, J. Paquet et al., "Sleep terrors in children: a prospective study of twins," *Pediatrics*, vol. 122, no. 6, pp. e1164–e1167, 2008.
- [16] J. D. Kales, R. J. Cadieux, C. R. Soldatos, and A. Kales, "Psychotherapy with night-terror patients," *American Journal of Psychotherapy*, vol. 36, no. 3, pp. 399–407, 1982.
- [17] J. Kellerman, "Behavioral treatment of night terrors in a child with acute leukemia," *Journal of Nervous and Mental Disease*, vol. 167, no. 3, pp. 182–185, 1979.

- [18] T. D. Hurwitz, M. W. Mahowald, C. H. Schenck, J. L. Schluter, and S. R. Bundlie, "A retrospective outcome study and review of hypnosis as treatment of adults with sleepwalking and sleep terror," *Journal of Nervous and Mental Disease*, vol. 179, no. 4, pp. 228–233, 1991.
- [19] L. J. Owens, K. G. France, and L. Wiggs, "Behavioural and cognitive-behavioural interventions for sleep disorders in infants and children: a review," *Sleep Medicine Reviews*, vol. 3, no. 4, pp. 281–302, 1999.
- [20] B. Lask, "Novel and non-toxic treatment for night terrors," *British Medical Journal*, vol. 297, no. 6648, p. 592, 1988.
- [21] J. Kellerman, "Rapid treatment of nocturnal anxiety in children," *Journal of Behavior Therapy and Experimental Psychiatry*, vol. 11, no. 1, pp. 9–11, 1980.
- [22] G. Plazzi, R. Vetrugno, F. Provini, and P. Montagna, "Sleepwalking and other ambulatory behaviours during sleep," *Neurological Sciences*, vol. 26, no. 3, pp. s193–s198, 2005.
- [23] J. D. Tobin Jr., "Treatment of somnambulism with anticipatory awakening," *The Journal of Pediatrics*, vol. 122, pp. 426–427, 1993.
- [24] M. A. Cashman and B. S. McCann, "Behavioral approaches to sleep/wake disorders in children and adolescents," *Progress in Behavior Modification*, vol. 22, pp. 215–283, 1988.
- [25] R. E. Dahl, "The pharmacologic treatment of sleep disorders," *Psychiatric Clinics of North America*, vol. 15, no. 1, pp. 161–178, 1992.
- [26] S. G. Conway, L. Castro, M. C. Lopes-Conceição, H. Hachul, and S. Tufik, "Psychological treatment for sleepwalking: two case reports," *Clinics*, vol. 66, no. 3, pp. 517–520, 2011.
- [27] R. J. Broughton, "Sleep disorders: disorders of arousal?" *Science*, vol. 159, no. 3819, pp. 1070–1078, 1968.
- [28] A. Kales, C. R. Soldatos, A. B. Caldwell et al., "Somnambulism. Clinical characteristics and personality patterns," *Archives of General Psychiatry*, vol. 37, no. 12, pp. 1406–1410, 1980.
- [29] S.-F. Gau and W.-T. Soong, "Psychiatric comorbidity of adolescents with sleep terrors or sleepwalking: a case-control study," *Australian and New Zealand Journal of Psychiatry*, vol. 33, no. 5, pp. 734–739, 1999.
- [30] D. Hartman, A. H. Crisp, P. Sedgwick, and S. Borrow, "Is there a dissociative process in sleepwalking and night terrors?" *Postgraduate Medical Journal*, vol. 77, no. 906, pp. 244–249, 2001.
- [31] P. J. Hauri, M. H. Silber, and B. F. Boeve, "The treatment of parasomnias with hypnosis: a 5-year follow-up study," *Journal of Clinical Sleep Medicine*, vol. 3, no. 4, pp. 369–373, 2007.
- [32] W. H. Reid, I. Ahmed, and C. A. Levie, "Treatment of sleepwalking: a controlled study," *The American Journal of Psychotherapy*, vol. 35, no. 1, pp. 27–37, 1981.
- [33] W. H. Reid, E. A. Haffke, and C. C. Chu, "Diazepam in intractable sleepwalking: a pilot study," *Hillside Journal of Clinical Psychiatry*, vol. 6, no. 1, pp. 49–55, 1984.
- [34] C. H. Schenck, T. D. Hurwitz, K. A. O'Connor, and M. W. Mahowald, "Additional categories of sleep-related eating disorders and the current status of treatment," *Sleep*, vol. 16, no. 5, pp. 457–466, 1993.
- [35] J. W. Winkelman, "Clinical and polysomnographic features of sleep-related eating disorder," *Journal of Clinical Psychiatry*, vol. 59, no. 1, pp. 14–19, 1998.
- [36] P. Vinai, R. Ferri, L. Ferini-Strambi et al., "Defining the borders between sleep-related eating disorder and night eating syndrome," *Sleep Medicine*, vol. 13, no. 6, pp. 686–690, 2012.
- [37] R. R. Auger, "Sleep-related eating disorders," *Psychiatry (Edgmont)*, vol. 3, pp. 64–70, 2006.
- [38] C.-H. Yun and K.-H. Ji, "Zolpidem-induced sleep-related eating disorder," *Journal of the Neurological Sciences*, vol. 288, no. 1–2, pp. 200–201, 2010.
- [39] T. I. Morgenthaler and M. H. Silber, "Amnestic sleep-related eating disorder associated with zolpidem," *Sleep Medicine*, vol. 3, no. 4, pp. 323–327, 2002.
- [40] K. C. Allison and E. P. Tarves, "Treatment of night eating syndrome," *Psychiatric Clinics of North America*, vol. 34, no. 4, pp. 785–796, 2011.
- [41] A. Zadra and D. C. Donderi, "Nightmares and bad dreams: their prevalence and relationship to well-being," *Journal of Abnormal Psychology*, vol. 109, no. 2, pp. 273–281, 2000.
- [42] S. Steinsbekk, T. S. Berg-Nielsen, and L. Wichstrøm, "Sleep disorders in preschoolers: prevalence and comorbidity with psychiatric symptoms," *Journal of Developmental and Behavioral Pediatrics*, vol. 34, no. 9, pp. 633–641, 2013.
- [43] C. Hublin, J. Kaprio, M. Partinen, and M. Koskenvuo, "Nightmares: familial aggregation and association with psychiatric disorders in a nationwide twin cohort," *The American Journal of Medical Genetics*, vol. 88, no. 4, pp. 329–336, 1999.
- [44] B. A. Moore and B. Krakow, "Characteristics, effects, and treatment of sleep disorders in service members," in *Living and Surviving in Harm's Way: A Psychological Treatment Handbook for Pre- and Post-Deployment of Military Personnel*, M. S. Freeman, B. A. Moore, and A. Freeman, Eds., pp. 281–230, Routledge, New York, NY, USA, 2009.
- [45] B. Krakow, J. D. Ribeiro, V. A. Ulibarri, J. Krakow, and T. E. Joiner Jr., "Sleep disturbances and suicidal ideation in sleep medical center patients," *Journal of Affective Disorders*, vol. 131, no. 1–3, pp. 422–427, 2011.
- [46] K. Belicki, "The relationship of nightmare frequency to nightmare suffering with implications for treatment and research," *Dreaming*, vol. 2, no. 3, pp. 143–148, 1992.
- [47] B. Krakow, M. Hollifield, R. Schrader et al., "A controlled study of imagery rehearsal for chronic nightmares in sexual assault survivors with PTSD: a preliminary report," *Journal of Traumatic Stress*, vol. 13, no. 4, pp. 589–609, 2000.
- [48] B. Krakow, R. Schrader, D. Tandberg et al., "Nightmare frequency in sexual assault survivors with PTSD," *Journal of Anxiety Disorders*, vol. 16, no. 2, pp. 175–190, 2002.
- [49] J. M. Wood and R. R. Bootzin, "The prevalence of nightmares and their independence from anxiety," *Journal of Abnormal Psychology*, vol. 99, no. 1, pp. 64–68, 1990.
- [50] B. Krakow and A. Zadra, "Clinical management of chronic nightmares: imagery rehearsal therapy," *Behavioral Sleep Medicine*, vol. 4, no. 1, pp. 45–70, 2006.
- [51] J. Wolpe, *Psychotherapy by Reciprocal Inhibition*, Stanford University Press, Stanford, Calif, USA, 1958.
- [52] J. L. Davis and D. C. Wright, "Randomized clinical trial for treatment of chronic nightmares in trauma-exposed adults," *Journal of Traumatic Stress*, vol. 20, no. 2, pp. 123–133, 2007.
- [53] A. L. Zadra and R. O. Pihl, "Lucid dreaming as a treatment for recurrent nightmares," *Psychotherapy and Psychosomatics*, vol. 66, no. 1, pp. 50–55, 1997.
- [54] V. I. Spoormaker and J. van den Bout, "Lucid dreaming treatment for nightmares: a pilot study," *Psychotherapy and Psychosomatics*, vol. 75, no. 6, pp. 389–394, 2006.
- [55] A. W. Augedal, K. S. Hansen, C. R. Kronhaug, A. G. Harvey, and S. Pallesen, "Randomized controlled trials of psychological and pharmacological treatments for nightmares: a meta-analysis," *Sleep Medicine Reviews*, vol. 17, no. 2, pp. 143–152, 2013.

- [56] S. M. Silver, A. Brooks, and J. Obenchain, "Treatment of Vietnam War veterans with PTSD: a comparison of eye movement desensitization and reprocessing, biofeedback, and relaxation training," *Journal of Traumatic Stress*, vol. 8, no. 2, pp. 337–342, 1995.
- [57] M. R. Raboni, S. Tufik, and D. Suchecki, "Treatment of PTSD by eye movement desensitization reprocessing (EMDR) improves sleep quality, quality of life, and perception of stress," *Annals of the New York Academy of Sciences*, vol. 1071, pp. 508–513, 2006.
- [58] R. N. Aurora, R. S. Zak, S. H. Auerbach et al., "Best practice guide for the treatment of nightmare disorder in adults," *Journal of Clinical Sleep Medicine*, vol. 6, no. 4, pp. 389–401, 2010.
- [59] H. Gast and C. L. Bassetti, "Nosological classification, definitions, epidemiology," in *Sleep Medicine Textbook*, C. L. Bassetti, Z. Đogaš, and P. Peigneux, Eds., pp. 369–375, European Sleep Research Society, 2014.
- [60] P. Gangdev, "Comments on sleep paralysis," *Transcultural Psychiatry*, vol. 43, no. 4, pp. 692–694, 2006.
- [61] J. T. V. M. De Jong, "Cultural variation in the clinical presentation of sleep paralysis," *Transcultural Psychiatry*, vol. 42, no. 1, pp. 78–92, 2005.
- [62] P. Gangdev, "Relevance of sleep paralysis and hypnic hallucinations to psychiatry," *Australasian Psychiatry*, vol. 12, no. 1, pp. 77–80, 2004.
- [63] T. Takeuchi, K. Fukuda, Y. Yamamoto, and K. Yamazaki, "What kind of sleep related life style affects the occurrence of sleep paralysis in normal individuals," *Journal of Sleep Research*, vol. 26, 1997, APSS II Meeting Abstract Book, abstract 518.
- [64] A. Iranzo, J. Santamaria, and E. Tolosa, "The clinical and pathophysiological relevance of REM sleep behavior disorder in neurodegenerative diseases," *Sleep Medicine Reviews*, vol. 13, no. 6, pp. 385–401, 2009.
- [65] J. M. Parish, "Violent dreaming and antidepressant drugs: or how paroxetine made me dream that I was fighting Saddam Hussein," *Journal of Clinical Sleep Medicine*, vol. 3, pp. 529–531, 2007.
- [66] J. W. Winkelman and L. James, "Serotonergic antidepressants are associated with REM sleep without atonia," *Sleep*, vol. 27, no. 2, pp. 317–321, 2004.
- [67] B. F. Boeve, M. H. Silber, J. E. Parisi et al., "Synucleinopathy pathology and REM sleep behavior disorder plus dementia or parkinsonism," *Neurology*, vol. 61, no. 1, pp. 40–45, 2003.
- [68] L. Ferini-Strambi, S. Marelli, A. Galbiati, F. Rinaldi, and E. Giora, "REM Sleep Behavior Disorder (RBD) as a marker of neurodegenerative disorders," *Archives Italiennes de Biologie*, vol. 152, no. 2-3, pp. 129–146, 2014.
- [69] M. W. Mahowald and C. H. Schenck, "REM sleep parasomnias," in *Principles and Practice of Sleep Medicine*, M. H. Kryger, T. Roth, and W. C. Dement, Eds., pp. 1083–1097, Elsevier Sanders, St. Louis, Mo, USA, 5th edition, 2011.
- [70] B. A. Sharpless, "Exploding head syndrome," *Sleep Medicine Reviews*, vol. 18, no. 6, pp. 489–493, 2014.
- [71] G. Ganguly, B. Mridha, A. Khan, and R. A. Rison, "Exploding head syndrome: a case report," *Case Reports in Neurology*, vol. 5, no. 1, pp. 14–17, 2013.
- [72] S. Fulda, M. Hornyak, K. Müller, L. Cerny, P. A. Beiting, and T. C. Wetter, "Development and validation of the Munich Parasomnia Screening (MUPS): a questionnaire for parasomnias and nocturnal behaviors," *Somnologie*, vol. 12, no. 1, pp. 56–65, 2008.
- [73] C. Sachs and E. Svanborg, "The exploding head syndrome: polysomnographic recordings and therapeutic suggestions," *Sleep*, vol. 14, no. 3, pp. 263–266, 1991.
- [74] G. Casucci, F. D'Onofrio, and P. Torelli, "Rare primary headaches: clinical insights," *Neurological Sciences*, vol. 25, no. 3, pp. S77–S83, 2004.
- [75] A. Ivanenko and S. Relia, "Sleep-related hallucinations," in *Parasomnias: Clinical Characteristics and Treatment*, V. Kothare and A. Ivanenko, Eds., pp. 207–220, Springer Science+Business Media, New York, NY, USA, 2013.
- [76] M. H. Silber, M. R. Hansen, and M. Girish, "Complex nocturnal visual hallucinations," *Sleep Medicine*, vol. 6, no. 4, pp. 363–366, 2005.
- [77] M. M. Ohayon, "Prevalence of hallucinations and their pathological associations in the general population," *Psychiatry Research*, vol. 97, no. 2-3, pp. 153–164, 2000.
- [78] C.-K. Yeung, "Nocturnal enuresis (bedwetting)," *Current Opinion in Urology*, vol. 13, no. 4, pp. 337–343, 2003.
- [79] P. H. Y. Caldwell, G. Nankivell, and P. Sureshkumar, "Simple behavioural interventions for nocturnal enuresis in children," *The Cochrane Database of Systematic Reviews*, vol. 7, Article ID CD003637, 2013.
- [80] National Institute for Health and Care Excellence, Nocturnal enuresis: the management of bedwetting in children and young people, CG111, 2010, <https://www.nice.org.uk/guidance/cg111>.
- [81] P. Y. Caldwell, A. Deshpande, and A. von Gontard, "Management of nocturnal enuresis," *British Medical Journal*, vol. 347, Article ID f6259, 2013.
- [82] C. M. A. Glazener, J. H. C. Evans, and R. E. Peto, "Alarm interventions for nocturnal enuresis in children," *Cochrane Database of Systematic Reviews*, no. 2, Article ID CD002911, 2005.
- [83] R. J. Butler and J. C. Robinson, "Alarm treatment for childhood nocturnal enuresis: an investigation of within-treatment variables," *Scandinavian Journal of Urology and Nephrology*, vol. 36, no. 4, pp. 268–272, 2002.
- [84] S. Banerjee, A. Srivastav, and B. M. Palan, "Hypnosis and self-hypnosis in the management of nocturnal enuresis: a comparative study with imipramine therapy," *The American Journal of Clinical Hypnosis*, vol. 36, no. 2, pp. 113–119, 1993.