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Abstract

Update on non-pharmacological interventions in parasomnias

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Parasomnias are abnormal behaviors that occur during the sleep and can be associated, in particular during adulthood, with impaired sleep quality, daytime dysfunction and occasionally with violent and harmful nocturnal behaviors. In these cases, therapies are often considered. Pharmacological treatments are invasive and often have limited efficacy. Therefore, behavioral approaches remain an important treatment option for several types of parasomnias. However, the evidence-based approaches are limited. In the current review, we highlight results from various non-pharmacological techniques on different types of parasomnias and provide a glimpse into the future of non-pharmacological treatments in this field.

**Introduction**

The term parasomnia originates from the Greek word “para” (meaning “alongside of”) and the Latin word “somnus” (meaning “sleep”). Parasomnias are defined as abnormal behaviors that occur during the sleep period, during specific sleep stages or during sleep-wake transitions [1, 2]. They are usually classified by the sleep stage during which they occur [2] into rapid eye movements (REM) parasomnias, non-REM (NREM) parasomnias and other parasomnias [3]. NREM parasomnias include disorders of arousals (from NREM sleep), confusional arousals, sleep terrors, sleep enuresis, sleepwalking and sleep-related eating disorder, while REM parasomnias comprise nightmare disorder, recurrent isolated sleep paralysis, and REM sleep behavior disorder (RBD) [4]. Sleep-related hallucinations, and exploding head syndrome are grouped to other parasomnias and their association to specific sleep stage remains unclear [5]. While parasomnias are more common in childhood, they can persist or even occur de novo during adulthood [6]. The neurobiological mechanisms that underlie parasomnias are not fully understood but parasomnias are believed to be the consequence of a dissociation between wakefulness, NREM or REM sleep with behaviors characteristic of one state succeeding the other [7]. Although current research focuses mainly on the nighttime symptoms, impaired daytime functioning is often reported in subjects with parasomnias. Commonly, fatigue, sleepiness and neuropsychiatric symptoms such as anxiety, depression, obsessive compulsive symptoms, phobic complaints and cognitive deficits have been reported [6, 8, 9].
Pharmacological agents have been reported for the treatment of parasomnias. Their efficacy is related to the type of parasomnia being treated. Antidepressants, especially those that affect the body's level of serotonin, have some efficacy in the treatment of sleep terrors, considering the serotonergic model that has been suggested for this parasomnia. In addition, benzodiazepines (mainly clonazepam and diazepam), anticholinergic and dopaminergic (such as pramipexole) agents, calcium blockers and stimulants (such as gamma-Hydroxybutyric acid) yielded positive responses in some types of parasomnias [2, 10-12].

Pharmacotherapy is not always effective in NREM parasomnias (no improvement in one third of patients), while medications (i.e. antidepressants) can sometimes cause or worsen parasomnia symptoms[13].

Due to these limitations of pharmacotherapies, behavioral therapies are often considered to be the first-line treatment for parasomnias, whenever treatment is needed. Psychotherapy has been reported to be beneficial for parasomnias, mainly by reducing classical trigger factors of parasomnias such as stress and anxiety. In addition, psychotherapy aims to increase the awareness for emotional conflicts over the individuals’ own behaviors and judgments, which often provokes important dysfunctional behavior reinforcement patterns that are possibly related to parasomnias episodes. However, the literature on cognitive–behavioral interventions for parasomnias consists mainly from case reports and only few controlled trials, with a statistically relevant sample size. In the current review, we highlight results from various non-pharmacological techniques on different types of parasomnias, we review recent reports on this topic and provide a glimpse into the future of non-pharmacological treatments in parasomnias.

NREM Parasomnias
Sleepwalking (SW)
Sleepwalking or somnambulism is defined by the American Academy of Sleep Medicine as a series of complex behaviors that are usually initiated during arousals from sleep and culminate in walking around with an altered state of consciousness and impaired judgment [4]. The sleepwalking episode typically starts during slow-wave sleep (SWS) and thus these episodes are most often seen during the first third of the night when SWS is more abundant [14]. According to the third edition of the International Classification of Sleep Disorders
(ICSD 3), the diagnosis of SW is based only on clinical criteria, however, several neurophysiological biomarkers might have supportive role in the diagnosis [15]. Data from controlled studies on behavioral treatments for sleepwalkers is limited. Standard management strategies include scheduled awakening, safety measures, reassurance and education of sleep hygiene [16-18].

Schedule awakening is a behavioral intervention based on the involvement of briefly awakening the patient approximately 15–30 minutes prior to the expected episode. A study in children assessed the use of scheduled awakening in different age groups and reported a relevant decrease in the frequency of sleepwalking episodes over time [17]. Despite some questions raised, the short application of the technique does not seem to be associated with the development of insomnia in treated subjects with Arousal Disorders [19].

A wide range of interventions is currently used to prevent sleepwalkers from putting themselves or others in danger, a set of behavioral techniques referred to as safety measures. Safety measures are important for protection of the sleepwalkers and their bed partners and include, among others, the removal of potential dangerous and sharp objects from the room (i.e. mirrors), locking windows and protection from fallings [20].

Psychotherapy has an impact on SW episodes. Two case reports on SW patients have provided evidence that psychotherapy focused on emotional triggers proved to be effective against SW episodes. Cognitive behavioral treatment (CBT) is a short-term, goal-oriented psychotherapy treatment with frequent application in depression. A small case-series study reported improvement in several SW features after application of CBT in 6 sleepwalkers [21]. Another group applied psychotherapy for up to 18 sessions to two subjects with SW and reported a marked reduced frequency of sleepwalking episodes, according to authors mainly through a process that helped the sleepwalkers to understand the triggers (i.e. emotional conflicts) behind certain symptoms [22]. Several other types of psychotherapy have been reported in sleepwalkers. Recently, Drakatos et al. reported management and treatment strategies in 512 patients with NREM parasomnias, among them 40 with SW [23]. A subgroup of 12 patients with SW (5.8%) had increased levels of stress and anxiety and received CBT for insomnia (CBTi), CBT for reducing stress (CBTs-a) or Mindfulness-Based Stress Reduction (MBSR), a psychotherapy treatment that combines CBT methods with mindfulness meditation, following an education in sleep hygiene. Based on patients reports,
CBT and MBSR effectively reduced the parasomnia symptoms (mainly the frequency of episodes) in 80% of the treated subjects [23].

In summary, CBT might represent a promising avenue for the treatment of SW parasomnia and further large, controlled studies are required to fully elucidate its efficacy in this field.

**Sleep terrors**

Sleep terrors (ST) occur mainly during SWS. ST episodes last from 30 sec to 5 min, and the individual is amnesic for the events during the episode [3, 24, 25]. The individuals typically feel confused and stressed. Interestingly, there is an association between sleep terrors and psychiatric disorders. Patients tend to manifest anxiety and depressive symptoms [26]. The etiopathogenesis of ST remains unclear. However, similarly to SW, disrupted and fractioned SWS is a common feature in ST as well [15].

Several behavioral techniques have been reported in individuals with ST. One important step for the management of ST is the *reassurance*, which is a behavioral method that counteracts fears. The technique has been reported to be efficacious especially among children and adolescents with ST [18, 27].

Confirming anecdotal evidence, Attarian et al., [27] suggested behavioral techniques that focus on creating a safe sleep environment could be very helpful in the management of ST. Measures may include, among others, minimizing the risk of injury, by sleeping on the ground floor and removing obstructions in the bedroom.

*Scheduled awakening* has been reported in patients with ST as well and seems to be efficacious. It is important for the parents to keep firstly a sleep log typically for two weeks, in order to note accurately the time of the ST events [19]. Subjects with ST should be then awakened 15 minutes prior to the expected ST event [14, 28].

*Relaxation techniques* have been also applied, mainly in children with ST. More recently, a case study reported the beneficial effect of relaxation techniques in a 3 years old girl with co-exist acute leukemia and ST by reducing anxiety related to maternal separation and medical procedures [29]. In addition, regular control and advice on sleep hygiene was associated with improved ST severity in 15% of patients [13].
Psychotherapy, although rarely reported, can be beneficial in the treatment of ST [30]. However, Drakatos et al. indicated recently that CBTi, CBTs and MBSR for relieving stress trigger factors of ST are effective in 8% of patients with ST.

Confusional arousal (CA)
Confusional arousals (CA) are characterized by mental or behavioral confusion and unresponsiveness to the environment associated with arousals during SWS, especially during the first third up to the first half of the sleep period [31]. Typically, CA are brief events that, apart from confusion, may include disorientation, sleeptalking, and simple motor behaviors. CA is often associated with SW and ST and other parasomnias (i.e. sleep-related sexual behaviors).
To the best of our knowledge, there are no controlled studies on behavioral/non-pharmacological treatment on CA. In children, reassurance is often suggested as the first-line approach in CA [18].
Furthermore, an additional behavioral technique is safety measures, where parents or family are instructed to overtake important precautions, i.e., placing mattresses on the floor, securing windows and outside doors, covering windows with heavy curtains, and using alarm systems and bells to alert parents should the child leave the room [18]. Furthermore, improving the sleep environment is important, in order to feel safe. Adult subjects with CA are counselled not to co-sleep with children, because even a single event might expose children to significant danger with serious consequences.
Anecdotal evidence suggests that scheduled awakening can be effective in the management and possibly in the prevention of CA as well [14, 31]. Scheduled awakenings may be ineffective in children or adults who do not present arousal parasomnias frequently or in a predictable time-frame [32].
In many cases, CA co-occur with other sleep-related disorder, such as sleep-related breathing disorders, circadian rhythm sleep disorders (i.e. shift work), narcolepsy, and encephalopathies [31]. Treating co-morbid sleep disorders may effectively decrease CA episodes as well [33]. In addition, avoiding centrally acting medications, stress management, taking appropriate precautions and applying measures to maximize sleep stability, together with sleep education (sleep hygiene, preventing sleep deprivation), are often considered in the management of CA [13].
Sleep enuresis (SE)

Sleep enuresis is an involuntary discharge of urine during night sleep. The pathophysiology of enuresis could be related to three main causative factors: a) excessive nocturnal urine production, b) nocturnal bladder over-activity, and c) failure to awaken in response to bladder sensations [34]. Episodes can occur either during REM or NREM sleep [35].

Early studies assessed the efficacy of pharmacotherapies (i.e. imipramine)[36], however, in the recent years an increasing number of studies and case reports reported efficacious behavioral strategies, often in combinations, to manage sleep enuresis. Several studies and case reports highlighted the efficacy of behavioral treatments against bedwetting in children and young people. Simple and complex interventions have been reported. Simple interventions included rewarding for dry nights, “lifting” (the caregiver lift the subject/child from their bed while they sleep and walking the child to the bathroom to pass urine, without necessarily waking the child) and bladder training (which is based on retention control training and fluid restriction). Even, the use of a diary, in which the patients note dry and wet nights has shown to be useful in reducing frequency of SE in 15%-20% of children with SE [35].

More complex interventions, such as enuresis alarm therapy and psychotherapy, have been also suggested for SE and reported by few studies. Enuresis alarm (EA) therapy consist of an alarm system which is triggered by micturition [37] and focuses on improving arousal in response to a sensation of a full bladder. Mowrer et al. [38] reported the use of enuresis alarms in bed-based condition in children. There are several types of enuresis alarms available: pad-and-bell alarms where the sensor pad is positioned under a draw sheet beneath the child in bed [35]. Cognitive therapy also appeared to be more effective than rewards in a small trial [39].

In a recent meta-analysis, it appears that simple behavioral interventions are less effective compared to more complex interventions, such as enuresis alarm therapy, and pharmacotherapy[40]. Apart from this, EA seems to be an effective long-term intervention [35].

Sleep-Related Eating Disorder
Sleep-Related Eating Disorder (SRED) is defined by the partial arousals from sleep time to consume food and occurs usually within the first 3 hours of falling asleep [4]. The episodes are characterized by rapid ingestion of food, specifically food high in calories [41]. The level of consciousness during the episodes, the time of nocturnal eating and the presence of eating disorders as comorbidities are crucial for the discrimination between SRED and night eating syndrome (NES), a syndrome that is characterized by conscious eating during the night and it is not a parasomnia [41]. Data on pharmacotherapy [42] and behavioral treatment for SRED are very limited. Hypnotherapy, psychotherapy and various behavioral techniques (safe sleep environment) did not show constant efficacy against SRED [43]. Recent data suggest that bright light therapy can be beneficial for disordered-eating behavior [44]. However, placebo-controlled studies, assessing symptom change frequently and the longer-term efficacy of bright light therapy against SRED, are needed.

REM Parasomnias

Nightmare Disorder
The essential feature of a nightmare disorder is the repeated occurrence of frightening dreams that lead to awakening [45]. Nightmares can be idiopathic or associated with other disorders including posttraumatic stress disorder (PTSD), substance abuse, anxiety disorder, borderline personality and schizophrenia spectrum disorders [46].

Various psychological treatments for nightmare disorder or chronic nightmares in adults have been suggested, including the imaginal confrontation with nightmare contents (ICNC), relaxation, imagery rescripting and rehearsal (IRR), or awakening while having a nightmare.
For chronic nightmares, Imagery Rehearsal Therapy (IRT), Exposure Relaxation and Rescription Therapy (ERRT), Imagery Rescripting and Exposure Therapy (IRET), self-exposure, lucid dreaming treatment (LDT) and Eye Movement Desensitization Reprocessing therapy have been reported [45, 46].

**Image Rehearsal Therapy (IRT)** is CBT technique aiming to transform a nightmare into a positive scenario. This technique helps the patient to displace the previous content as soon as the same dream happens again [47]. Patients are suggested to repeat the technique every day for 10-20’. IRT had positive impact in 168 women with moderate to severe PTSD by improving sleep quality and reducing the levels of post-traumatic stress 3 and 6 months after screening.

Another study proposed IRT as part of CBT treatment in patients with chronic nightmares and found that at 3-month and 30-month follow-up, the IRT group had a 72% reduction in nightmare frequency (7.2/month to 2.0/month) compared to a 42% reduction in frequency (9.4/month to 5.0/month) noted in the recording-only group [48]. It is noted that only the rehearsal group had less total distress compared to other groups.

Exposure, Relaxation and Rescripting Therapy (ERRT) targets physiological, emotional, behavioral and cognitive aspects related to nightmares and includes psychoeducation, such as sleep hygiene training, progressive muscle relaxation therapy, exposure and re-scripting techniques [46]. It differs with IRT only in the exposure part of therapy [46]. Kunze et al. [49] performed imagery IRT and ERRT in two patients with nightmare disorder and reported positive results (improvement of sleep quality, reduction in the frequency/intensity of nightmares) and this result sustained at 3- and 6-months follow-up as well. Finally, Davis et. al. [50] found that 84% of 27 participants treated by manualized CBT reported an absence of nightmares. Lancee et al. [51] found that IRT and exposure appeared equally effective in ameliorating nightmare complaints.

**Self-exposure Therapy** is a successful CBT technique aiming to help the patient to confront fears stressful events. Patients are asked to create a list of events/dreams that are associated with anxiety and stress. The therapy involves exposing the patient gradually to the anxiety source, which might be a daytime event or a nightmare, without exposing the patient to danger [46].
In 170 adults with primary nightmares, the application of self-exposure therapy was significantly more effective against nightmares compared to placebo or no intervention [52]. Grandi et al. [53] reported a significant improvement in 10 adults with Nightmare disorder who followed a self-exposure manual and were asked to follow its instructions for 4 weeks in addition to the continuous therapeutic session with the therapist.

*Lucid dreaming treatment (LDT)* teaches nightmare sufferers to become lucid in their nightmare through homework during the day. This technique indicated effectiveness in decreasing frequency of chronic nightmares [54]. Spoormaker and van den Bout [54], found that in 23 nightmare sufferers that received LDT, the frequency of nightmares markedly decreased after 12 months follow up.

*Eye Movement Desensitization Reprocessing (EMDR)* therapy involves alternated bilateral sensorial stimulation at the same time that the traumatic event is being processed [55]. Recently, Raboni et al. showed that EMDR therapy improved depression, anxiety and sleep disturbances which are often associated with recurrent nightmares, in 13 patients with posttraumatic stress disorder (PTSD) [56, 57].

**REM Behavioral Disorder (RBD)**

Rapid Eye Movement (REM) sleep Behavior Disorder (RBD) is characterized by an abnormal behavior arising from REM sleep which is accompanied by (oft frightening) vivid dreaming [58-60]. REM sleep phase is typically characterized by random, rapid movement of the eyes, REM atonia (low/missing muscle tone in the skeletal muscles), and the propensity of the sleeper to dream vividly. In RBD, REM atonia is disturbed, which in combination with vivid dreaming might lead the patient to “act out his/her dreams” or dream enactment behaviour (DEB), exhibiting a variety of motor activities. RBD affects less than 1% of the general adult population and 2-8% of the older adult population [61, 62]. However, it can be commonly found in the context of neurodegenerative disorders such as Parkinson’s disease and dementia with Lewy body [63-66], predating their presentation by many years [67], but also in narcolepsy [68, 69] and rarely also in the context of a parasomnia overlap disorder and its extreme form of a wake-sleep state breakdown (status dissociatus) [70-72]. Dreams can be violent in subjects with RBD and therefore, RBD represents a complex and potentially dangerous condition with increased risk of experiencing self-injurious behavior [73, 74]. Types of injury ranged from light to severe, such as lacerations to fractures and subdural hematomas [75-79].
To our knowledge, there are no controlled studies on behavioral treatment for RBD. Non-pharmacological treatments focus mainly on:

1) avoiding and treating trigger factors such as sleep deprivation and sleep disorders including insomnia and sleep-disordered breathing and 2) securing patients’ and bed partner’s safety by removing potentially harmful objects out of the bedroom, placing the bed far from windows and separating bed partners [2]. Sometimes drugs can be exacerbating the problem, such as antidepressants, monoamine oxidase inhibitors, and beta-blocker [80].

The controlled environmental safety consists of prevention measures that aim to decrease RBD frequency and to educate subjects with RBD and their bed-partners to create a safe environment by removing potentially dangerous objectives from the room [1, 2, 73]. Howell et al., suggested alarm therapy as an effective tool to prevent sleep-related injury (SRI) during DEB [81]. In this single case, authors reported that the use of a recorded voice message during DEB, such as “Peter, you are having a dream, lay back down” could reduce the risk of SRI [2, 81]. In another report, the use of a recorded message has been the most effective intervention in patients who failed to tolerate pharmacological medication [82].

**Isolated Sleep Paralysis**

Isolated Sleep Paralysis (ISP) occurs when rapid eye movement (REM)-based atonia perseverates into wakefulness [4], resulting in the inability of the affected person to move or speak during wakefulness. It is often accompanied by terrified hallucinations [4]. Some studies have pinpointed a genetic component of the disorder [83]. Epidemiological studies and a recent meta-analysis have elucidated further risk factors for the development of ISP, such as insomnia symptoms, trauma, stress, anxiety and psychiatric disorders [84-86].

There are no published controlled studies for the treatment of ISP. Jalal et al. suggested a combination of cognitive behavioral techniques for the treatment of ISP [87]. This combination consists of a focused-attention meditation and a muscle relaxation technique. The model contains four components: a) reappraisal of the content of the ISP episode; b) neuropsychological distancing; c) train to focused-attention meditation; d) muscle relaxation techniques. This model aims mainly in identify the source of ISP [87]. A different case study indicates that ISP occurrence can be decreased by reassurance and explanation of the physiological basis of the patient’s experience [88]. Recent studies suggested that even simple measures such as the change of sleeping positions (e.g., sleeping on the side instead of their
backs) and sleeping patterns (e.g., amount of time spent asleep), can prevent future ISP episodes [85].

Sharpless et al. presented the first psychotherapeutic manual for ISP [89]. The manual “Cognitive–Behavioral Therapy for Isolated Sleep Paralysis” is based on earlier experiences of the authors with the treatment of ISP, validated insomnia treatments and an empirical investigation into the ways how ISP sufferers attempt to both prevent and disrupt episodes. This treatment includes specific sleep hygiene, relaxation techniques to be used during RISP episodes, in vivo episode disruption techniques, several strategies to cope with frightening hallucinations, cognitive techniques to cope with thoughts and imaginary rehearsal to deal with RISP episodes. A CBT for isolated sleep paralysis manual now exists as a promising therapy, however systematic evidence for its magnitude of effectiveness is still missing from literature [85].

Other Parasonmias

Exploding Head Syndrome
Exploding Head Syndrome (EHS) is a condition in which a person experiences unreal noises, specifically loud and short, during falling asleep or waking up [90]. Very few data on the behavioral treatment in patients with EHS is available. Education and reassurance could be helpful in patients with EHS [91, 92], however further research is needed.

Sleep-Related Hallucinations
Sleep-related hallucinations are hallucinatory experiences, are vivid, often intense visual or sensory experiences that happen during sleep or often during transition states [93]. The sensory experiences would be auditory stimuli or a sense of movement. It is estimated that about 25-37% of people have reported hypnagogic hallucinations [94]. Occasionally sleep-related hallucinations may be associated with episodes of sleep paralysis [94]. Data on behavioral treatment of hallucinations during sleep are very limited. The use of sedative hypnotics or certain antidepressant and sleep deprivation can be hallucinogen and therefore should be avoided in patients with recurrent sleep-related hallucinations. Hypnosis has been applied for the treatment of hallucination in two patients with limited success [95].
Discussion

Treatment of parasomnias is not always necessary. However, it should be considered if episodes of parasomnias are very frequent and include violent and harmful behaviors that impose danger and/or psychological distress to the patients and the bed partners, or if they are associated with undesirable consequences such as daytime dysfunction and neuropsychiatric symptoms. Current treatment practice is typically based no “doctor’s choice” and depends on the parasomnia type.

Pharmacotherapy has shown moderate evidence for efficacy in this regard considering also potential side effects. Often long-term pharmacological treatments might be necessary since parasomnias are considered to be chronic conditions, especially those occurring in adulthood. Even in cases where pharmacological treatments are effective, parasomnias might re-appear after the termination of the pharmacological treatment, if triggers factors remain. Therefore, the use of cognitive and behavioral treatments for parasomnias represents an expanding clinical practice, which, apart from being less invasive, it is often well accepted by patients and might probably offer a better solution towards long-term management of parasomnias. In addition, this type of treatment implies that the patient has an active part in his own treatment. This can lead to a long-term benefit for the patient by learning how to recognize the signs of the disorder and how to cope with it, ultimately improving quality of life.

The literature on cognitive and behavioral treatment of parasomnias is limited and includes mainly case reports or uncontrolled trials with a small sample size, usually addressing only one type of parasomnia. Behavioral measures such as advice on improving sleep hygiene, safety measures and reassurance often represent an effective first line behavioral treatment option regardless of the parasomnia type. Other techniques seem to be more applicable for specific types of parasomnias. The new stress reduction approach MBSR, a behavioral program that has been used in several sleep disturbances, showed promising results in reducing the severity and frequency of episodes in patients with stress-associated parasomnias such as sleepwalking, sleep terrors and confusional arousals but also in patients with REM parasomnias, such as recurrent sleep paralysis. Similarly, enuresis alarm therapy seems to be effective for sleep enuresis. For nightmare disorder, behavioral techniques such as Imagery Rehearsal Therapy (IRT), Exposure Relaxation and Rescription Therapy (ERRT), Imagery Rescripting and Exposure Therapy (IRET), and self-exposure, can be effective by reducing the frequency of nightmares or by changing dream scenarios into more positive and productive dramas. Furthermore, cognitive behavioral treatment (CBT) for insomnia (CBTi)
and cognitive behavioral treatment for stress and anxiety (CBTs-a) have been reported to be an effective treatment options for several parasomnias, including sleepwalking, sleep terror, nightmare disorders, recurrent sleep paralysis and others. CBT-i is already an established therapy for insomnia, targeting its perpetuating factors and leading to decline of predisposing and precipitating factors. Parasomnias manifest frequently in association with precipitating and perpetuating factors such as stress, alcohol consumption, poor sleep hygiene or sleep loss. However, to our knowledge, structured CBT protocols tailored to parasomnia disorders are lacking.

It should be mentioned that this review focused mainly on recent reports on non-pharmacological therapies in parasomnias and a detailed systematic presentation of the literature was out of the review’s scope. Therefore, important studies on the field might be missing.

**Conclusions**

In summary, a wide range of cognitive and behavioral therapies are available, and overall, data indicate promising results of these therapies towards the improvement of parasomnias, especially when precipitating and perpetuating factors are psychologically driven. However, reliable evidence for their efficacy is still missing. Therefore, well-designed randomized controlled trials applying cognitive and behavioral techniques and appropriate control interventions or “active surveillance” in larger samples of patients with parasomnias are needed. In addition, due to the low prevalence of some parasomnias, large multicenter studies may help to recruit a large pool of patients with a wide variety of parasomnia types.

**Authors Disclosures**

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**Conflicts of Interest**

The authors declare no conflict of interest regarding the publication of this paper

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Table 1: Studies and case reports on behavioral and cognitive behavioral interventions in parasomnias.

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<td>Muscle-Relaxation (MR) Therapy</td>
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<td>Cognitive–Behavioral Therapy for Isolated Sleep Paralysis</td>
<td>Sharpless, B.A., 2016</td>
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<td>Reassurance</td>
<td>Gangdev, 2004</td>
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<td>Change sleeping positions and sleeping patterns (e.g timing)</td>
<td>Sharpless &amp; Grom, 2014</td>
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<td>Sleep-related hallucinations</td>
<td>Education and reassurance</td>
<td>Ganguly et al., 2013</td>
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<td>Hypnosis</td>
<td>Sachs et al., 1991</td>
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<td>Silber et al., 2005</td>
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Conflicts of Interest

The authors declare no conflict of interest.

Authors Disclosures

Maria Ntafouli, Andrea Galbiati, Claudio L. Bassetti and Panagiotis Bargiotas have nothing to disclose

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