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PARASOMNIAS (A AVIDAN, SECTION EDITOR)

Behavioral Interventions for Parasomnias

Judith Owens[1] · **Michael Mohan**[1]

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Abstract Parasomnias are phenomena which may arise from NREM sleep (confusional arousals, sleep terrors, and sleepwalking) or REM sleep (nightmares). All are more common in children. While generally benign and outgrown with age, they may come to clinical attention when sufficiently disruptive to the patient or the patient's family and in some cases may pose significant safety concerns. In addition to proper preventative measures, behavioral techniques—such as alteration of sleep timings, implementation of scheduled awakenings, and psychotherapy—are important tools in the clinician's armamentarium. Research into the effectiveness of these interventions primarily consists of case series. However, particularly in the treatment of nightmare disorder, several randomized controlled studies also support their use and in fact suggest they may equally if not more effective as pharmacotherapy for treatment of these common sleep disorders.

Keywords Parasomnias · Confusional arousals · Sleep terrors · Sleepwalking · Nightmare disorder · Scheduled awakenings · Psychotherapy · Imagery rehearsal therapy · Rescripting therapy · Lucid dreaming · Sleep hygiene · Hypnosis

This article is part of the Topical Collection on *Parasomnias*

✉ Judith Owens
judith.owens@childrens.harvard.edu

Michael Mohan
michael.mohan@childrens.harvard.edu

[1] Department of Sleep Medicine, Boston Children's Hospital, 300 Longwood Avenue, Boston, MA 02115, USA

Introduction

Parasomnias are undesirable and often complex behaviors or events that occur during or surrounding the sleep period [1]. They are typically divided into those events that occur primarily during NREM sleep, those which occur in REM sleep, and miscellaneous parasomnias, which may arise from either NREM or REM. NREM parasomnias, discussed in this chapter, include confusional arousals, sleep terrors (pavor nocturnus), and sleepwalking (somnambulism). These phenomena are also commonly termed disorders of arousal or "partial arousal" parasomnias, as they combine features of both sleep and wakefulness and are therefore thought to involve incomplete arousal from the sleep state. Nightmares are the most common REM-associated parasomnia and will also be included in this chapter. Discussion of REM behavior disorder, another REM parasomnia, and other miscellaneous parasomnias such as sleep enuresis, sleep-related movement disorders, sleep-related groaning (catathrenia), and recurrent isolated sleep paralysis are beyond the scope of this chapter.

NREM Parasomnias

NREM parasomnias exist on a continuum such that most patients' behaviors will have features of multiple NREM parasomnia subtypes, and an individual patient may have more than one subtype of event at a given time or over a period of time. For convenience, however, NREM parasomnias are typically divided into confusional arousals, sleep terrors, and sleepwalking. NREM parasomnias are more common in childhood and usually remit with age (with the concomitant reduction in slow wave sleep [SWS], stage N3 of NREM, especially in the second decade of life). However, in some cases, these may arise in or persist into adolescence and adulthood. All are associated with reduced or absent responsiveness during the

event, disorientation, and partial to complete amnesia for the episode. As NREM parasomnias consist of incomplete awakening generally from N3 (or less commonly N2) sleep they are therefore typically concentrated in the earlier stages of the night, in which SWS is more prevalent, usually occurring within a few hours after sleep onset. They may last from a few minutes to as long as 30 to 40 minutes; during an episode, children or adolescents may have the appearance of being awake, and many children actively avoid comforting or soothing from caregivers. Attempts to awaken or restrain the patient may be met with resistance or even aggression. Events may be triggered by environmental stimuli (e.g., noise or attempted awakening during SWS) and are typically exacerbated by sleep loss, which results in a compensatory increase in SWS. The frequency of episodes varies widely from several times a year to nightly and in some cases, multiple times per night. While episodes may be linked to increased stress or emotional distress, the vast majority of cases are not primarily a result of underlying mental health or neurological disorders. There is often a familial component, with an increased prevalence in first degree relatives of affected individuals; for example, the likelihood of sleepwalking is 45 % if one parent has the disorder and 60 % if both parents are affected [2••].

Confusional Arousals

During a confusional arousal, the patient generally exhibits agitation, disorientation, crying/moaning, and slow mentation on arousal from sleep without displacement from bed. Episodes typically last 5–15 minutes. They typically first occur before age 7, sometimes presenting from a very early age, which may make them difficult to distinguish from a short nighttime awakening, especially in infants.

These episodes typically last for 6–13 months and only rarely persist into adulthood. Prevalence is estimated at 17.3 % of children aged 3–13 years and 2.9 % of adults [3]. They often co-occur in patients with sleep terrors or sleepwalking.

Sleep Terrors

Sleep terrors (also called night terrors, although they can also occur during naps) are characterized by sudden arousal during SWS, screaming or crying, lack of responsiveness to others, autonomic discharges (increased heart and respiratory rate, sweating, dilated pupils), and often an appearance of panic. Typical duration is 3–5 minutes. They are quite common in young children, with one survey of nearly 2000 Canadian families reporting a prevalence of 39.8 % in children between the ages of 2.5 and 6 years [4]. Sleep terrors are more common in males and often occur with a higher frequency when onset occurs at a younger age. They almost always resolve by late childhood, with an estimated frequency of just 0.6 % between 6 and 11 years of age [5•]. Similar to children, sleep terrors are more common in adults with sleep walking and other partial arousal parasomnias. However, in contrast to sleep terrors in children, sleep terrors in adults are rare and more likely to be associated with psychopathology or other medical cause; they also typically occur with a greater frequency, are associated with more vivid content and greater recall, and are more likely to come to medical attention.

Sleepwalking

Sleepwalking involves displacement from bed with wandering and in some cases performance of purposeless tasks and "automatic" behavior with limited or no cognition and little memory of or dream report from the event. Sleepwalking behavior may range from walking calmly into the parents' bedroom to performing bizarre or strange atypical actions such as urinating in a closet; occasionally, a sleepwalking child may appear agitated. Safety is a concern, as a sleepwalking child may go down stairs, let himself or herself out of the house, or step onto a balcony or out of a window, and injuries can occur. Episode duration is typically 5–15 minutes. Onset is usually at age 4–6 years. In one survey, 14.5 % of children exhibited sleepwalking between the ages of 2.5 and 6 [4]. In the Tucson Children's Assessment of Sleep Apnea Study of patients 6–11 years of age, sleepwalking was present in 6 % of children at baseline and resolved in 65 % within 5 years [5•]. Indeed, sleepwalking is much more likely than confusional arousals or night terrors to persist into adulthood and is estimated to occur in 4 % of adults [6].

Treatment of NREM Parasomnias

The bedrocks of management of NREM parasomnias remain reassurance and psychoeducation, and, given their high prevalence especially during childhood, there is surprisingly little in the way of empirical support for other management strategies in the current literature. The aforementioned statistics suggest reassurance is appropriate in a vast majority of cases due to the self-limited and largely benign nature of the episodes, and because most patients, particularly children, will outgrow the condition with age. Education should begin with providing a simple explanation to parents and patients regarding the underlying etiology and characteristics of the respective disorder emphasizing that especially in children, it is neither indicative of an underlying psychological issue nor results in psychological harm. For example, it is important to help caregivers understand that sleep terrors in particular are far more upsetting for the observer than for the child experiencing them. Counseling on appropriate safety precautions to avoid the possibility of harm during an episode is especially important in the case of sleepwalking [7••]. These may include window and door locks, alarms or monitors, gates in front of stairways, and properly storing and securing sharp objects [8].

Education should also focus on avoidance or reduction of risk factors which have the potential to result in rebound slow wave sleep (e.g., sleep restriction), increase arousals from slow wave sleep, or which might make features of sleep more likely to persist into wakefulness. In regard to the latter, use of sedative hypnotics or alcohol should be avoided as these may disrupt full transitions into wakefulness. Environmental disruptions to sleep such as ambient noise or forced awakening from sleep, especially at the beginning of the night, or consumption of caffeine should be minimized. In addition, the presence of intrinsic sleep disrupters such as sleep-related breathing disorders or periodic limb movements of sleep should be identified and treated, as these conditions can serve as precipitants of arousals and therefore partial arousal parasomnia episodes in susceptible individuals (Table 1) [9]. Medications which increase slow wave sleep, such as lithium, may increase partial arousal parasomnias, as may withdrawal from those medications and substances which suppress slow wave sleep, for example benzodiazepines, beta blockers, tricyclic antidepressants, or ethanol [10].

Additional intervention options including alteration of sleep schedule, scheduled awakenings, and psychological therapies are discussed in more detail below.

Alteration of Sleep Schedule

As noted above, sleep restriction and an irregular sleep schedule should be avoided as rebound slow wave sleep may precipitate partial arousal parasomnias. Parents and patients should be advised to anticipate situations in which short-term (e.g., "sleep-overs") or longer-term sleep restriction (e.g., transition to a college environment) might be expected, as these may result in subsequent rebound SWS and more frequent episodes or even relapse in a previously "cured" patient. In contrast, some practitioners suggest mild *restriction* of sleep duration in order to in effect increase sleep pressure and thereby depress arousals from sleep. In our experience in recent years, however, we have found the converse strategy is often most effective: *i.e.*, *lengthening the sleep period* by even 30–60 minutes can dramatically decrease the frequency of these events, as illustrated by the following case report.

Case Report A 10-year-old typically developing otherwise healthy male presented to the sleep clinic with a history of prolonged (10–15 minutes) and agitated sleepwalking episodes 3–4 times per week for the past several years. These episodes were quite disruptive, requiring his family to take significant precautions to ensure his safety such as placement of gates above stairways and restricting his ability to engage in age-appropriate social behaviors such as attending sleepovers and participating in camping trips with his Boy Scout troop (his father was obligated to go on all of these trips to provide supervision at night). There was no clinical evidence to suggest the presence of a primary sleep disorder such as obstructive sleep apnea. His typical weekday sleep pattern was 9:30 p.m. to 6:30 a.m., yielding a sleep duration of about 9 h. Extending the sleep period to 10 h (8:30 p.m. to 6:30 a.m.) resulted in almost immediate decrease in the event frequency to 1–2 times per month. His parents reported that the episodes also became much more brief and benign in nature with less displacement from bed and resembling confusional arousals. Although the exact mechanism by which increasing sleep seemed to decrease

Table 1 Characteristic features of parasomnias in children and appropriate treatment modalities

	Confusional arousals	Sleep terrors	Sleepwalking	Nightmares
Timing during night	First third	First third	First third	Last third
Sleep stage	Slow wave sleep	Slow wave sleep	Slow wave sleep	REM sleep
Usual age of onset	2–6+	2–6+	4–6+	2–4+
Typical duration	<1 min	5–20 min	1–20 min	Variable
Ambulation	No	No	Yes	No
Autonomic arousal	Moderate	High	Mild	Mild to high
Recall of event	No	No	No	Vivid
Treatment Modalities				
Ensure environmental safety	+	+	+	N/A
Lengthen sleep period	+	+	+	Unknown
Scheduled awakenings	+	+	+	Unknown
Other behavioral strategies	Rarely needed	Case series support: • Autogenic training psychotherapy, • Hypnosis • Relaxation therapy	Case series support: • Hypnosis • Psychotherapy (mixed support)	Small controlled trial support: • Imagery rehearsal therapy • Cognitive restructuring therapy/lucid dreaming • Self-exposure therapy • Hypnosis

this patient's parasomnia events is unproven, we theorize that perhaps the mild decrease in sleep pressure and consequent reduction in the amount and density of rebound SWS was sufficient to reduce the opportunity for these events to occur.

Scheduled Awakenings

The scheduled awakening technique can also be considered in patients with very frequent (i.e., nightly or near-nightly) episodes; it is also most successfully employed when the events occur at predictable times. Studies have focused on use of the technique in children, with awakenings conducted by the parents who are able to observe the timings of the problematic events [11]. During the baseline period, parents record the timing and nature of their child's episodic sleep behavior using a sleep log, typically for 2 weeks. At the end of the baseline period, data sheets are reviewed and parents instructed in the implementation of scheduled awakenings approximately 15 to 30 min before the usual time of the onset of parasomnic episodes. The time is individually set based on each child's baseline data regarding the time of onset of events (typically 1.5 to 2.5 hours after the child falls asleep). Specifically, parents are instructed to awaken their child by shaking them lightly and asking them to wake up. Once the child has responded by opening their eyes and verbally responding, parents are instructed to then allow their child to fall back asleep. Typically, scheduled awakenings are continued for 4–8 weeks. During this time, parents are asked to continue to keep the sleep log on a daily basis [12].

The technique of scheduled awakening has been reported to work in up to 19 successive patients in some case series with full resolution at a 1-year follow-up [13]. The mechanism by which scheduled awakenings might work is not fully understood and may involve disruption of sleep cycling into slow wave sleep. This may increase slow wave sleep during later stages of the night and many practitioners, including ourselves, have noted experiences with patients in whom this technique simply pushes the events later into the night. However, it is important to keep in mind that given its noninvasive nature and ease of implementation families often trial this technique at home before coming to medical attention; therefore, the experience of the practitioner may be biased towards those patients in whom the technique is ineffective. Indeed, there are many patients in whom partial arousal parasomnias seem "time locked" into the first third of the night and in whom scheduled awakenings are effective [14]. Randomized studies are needed to determine the precise rate of effectiveness as well as specific aspects of treatment, such as the optimal timing for and duration of the awakenings, as well as the length of time (i.e., weeks to months) needed to see sustained improvement. Data on the efficacy of this method in adults in particular remains scarce [15•].

Psychological Therapies

Psychotherapy [16, 17], relaxation therapy [18], and hypnosis [19] have also received anecdotal support in the literature as treatments for parasomnias. A 2007 study examining the effect of 1 to 2 sessions of hypnosis on 36 patients aged 6 to 71 (four of them children) demonstrated improvement in 45.4 % at 1-month follow-up and 40.5 % at 5-year follow-up [20]. A 2013 retrospective study by Attarian and Zhu reported improvement in disorders of arousal in 6 out of 6 patients treated with behavioral therapy ranging from sleep hygiene advice (three patients) to three sessions of cognitive behavioral therapy and deep relaxation techniques (three patients) [21].

REM Parasomnias

Nightmares (Subheading Under REM Parasomnias)

Nightmares are disturbing dreams which awaken the dreamer from REM sleep. Nightmares are exceedingly common and are believed to occur in approximately 60 % of 4–6 year olds, peak in frequency at an age of 7–9 years (where prevalence is estimated at approximately 85 %), and then gradually decrease with age to a rate of approximately 4 % in adults [22]. In contrast to NREM parasomnias, nightmares are associated with full alertness on awakening and tend to occur in the latter half of the night in which REM sleep is concentrated [23]. Although the lifetime prevalence is close to 100 % [24], nightmares may occur with sufficiently distressing dream content and frequency to warrant treatment, particularly in patients with psychiatric disorders such as post-traumatic stress disorder (PTSD).

Treatment (Subheading Under REM Parasomnias)

Treatment options for nightmares include various types of psychological therapy. Cognitive behavioral therapy, where a patient is taught relaxation skills and self-instructions to reduce anxiety and which may specifically include imagery rehearsal therapy (IRT), where patients rehearse while awake more pleasant plots to their nightmares, is one such option [25]. Lucid dreaming, in which the patient is taught to learn that he or she is dreaming and change the content of the dream [26, 27], hypnosis [20], and self-exposure therapy (gradual desensitization to cues associated with the patient's nightmares through completion of a home manual) [28] have also received support in the literature. The combined technique of exposure, relaxation, and re-scripting therapy (ERRT), in which patients practice progressive muscle relaxation, receive sleep hygiene advice, and practice nightmare re-scripting across three weekly 2-hour sessions, was found in a 2007 study to result in absence of nightmares in the week following treatment completion in 38 % of treated patients ($n = 21$)

compared to 5 % of controls ($n = 22$) and in 1-week absence of nightmares in 84.2 % of treatment completers in 6-month follow-up ($n = 19$), by which time the control group had also been offered treatment [29]. A 2013 meta-analysis of randomized controlled trials for treatment of nightmare disorder found similar effect sizes for psychological treatments alone (0.48) and prazosin alone (0.50) [30••]. Differences between individual modes of psychological therapy did not reach statistical significance. However, with categorizing of therapy types into individualized therapy versus the self-help format, the individualized therapy effect size (0.74) was significantly better than that of self-help (0.36). The overall effect size (random) for the strongest recommended psychological therapy (IRT, 0.58) was not statistically significant from that of prazosin (0.50).

Conclusion

In conclusion, behavioral treatments, including psychoeducation, of both partial arousal NREM and REM parasomnias hold considerable promise, especially in the pediatric population for whom pharmacotherapy should be avoided. Future research should focus on randomized controlled trials with appropriate placebo or "sham" control interventions or "watchful waiting" and on comparing the relative efficacy of different treatment strategies to address these common sleep disorders.

Compliance with Ethical Standards

Conflict of Interest Judith Owens has received grants and personal fees from UCB and Jazz as well as personal fees from Pfizer, Purdue Pharma, Teva Pharma, and Rhodes Pharma outside of the submitted work.

Michael Mohan declares that he has no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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