Chapter 12
Nightmare Disorders in Children

Sriram Ramgopal, Marcin Zarowski and Sanjeev V. Kothare

Introduction

Nightmares have long intrigued thinkers and philosophers. Ancient civilizations associated nightmares with the presence of spirits or shamanistic powers [1]. Despite this fascination, however, nightmares remain an exceptionally common human experience, more so among young people. Nearly half of all children are reported to experience a nightmare [2]. In most children, nightmares are not severe enough to impair daytime functioning. In a minority of children, severe or persistent nightmares may lead to disturbances in mood and poor sleep quality. Sleep specialists should be able to determine if nightmares are interfering with daily life and if these dreams are secondary to another condition. Treatments for nightmares are largely limited to lifestyle changes, though psychiatric intervention may be beneficial for severe and persistent nightmares.

S. Ramgopal (✉) · M. Zarowski
Department of Neurology,
Boston Children's Hospital, Boston, MA, USA
e-mail: Sriram.Ramgopal@childrens.harvard.edu

8 Garfield Lane East, Andover, MA 01810, USA

M. Zarowski
Polysomnography and Sleep Research Unit,
Department of Developmental Neurology,
Poznan University of Medical Sciences, Poznan, Poland
e-mail: marcin.zarowski@gmail.com, zarowski@ump.edu.pl

S. V. Kothare
Center for Pediatric Sleep Disorders,
Department of Neurology, Boston Children's Hospital,
Harvard Medical School, Boston, MA 02115, USA
e-mail: sanjeevkothare@hotmail.com

S. V. Kothare, A. Ivanenko (eds.), *Parasomnias,*
DOI 10.1007/978-1-4614-7627-6_12, © Springer Science+Business Media New York 2013

Case Example

A 14-year-old girl, evaluated by multiple computed tomography (CT) scans after suffering a fall from a height, was found to have a thyroid nodule, which was thought to be malignant in nature. A few weeks later, the patient developed episodes of behavioral arrest and nocturnal awakenings. These events were thought to be seizures, and she was started on levetiracetam. Escalating doses of the same did not reduce the frequency of these events. The patient was evaluated in the epilepsy monitoring unit, where it was found that these events did not have an electrographic correlate. The patient was subsequently diagnosed to have pseudoseizures and nightmares. Levetiracetam was discontinued and the patient was treated with counseling and reassurance. Following biopsy, the thyroid lesion was found to be benign. The patient had a gradual reduction of nightmares over 6 weeks to 3 months.

Definition

Nightmares are defined by both the American Academy of Sleep Medicine and the American Psychiatric Association. The *International Classification of Sleep Disorders, 2nd edition* defines nightmares as "recurrent episodes of awakening from sleep with recall of intensely disturbing dream mentation, usually involving fear or anxiety, but also anger, sadness, disgust, and other dysphoric emotions" [3]. Some investigators have questioned the importance of waking after sleep in the definition of nightmares, as secondary consequences of nightmares can occur in individuals who are not woken out of their sleep. A distinction may be justified on the finding that psychological morbidities may be greater in those with dreams that wake them out of sleep [4]. This has led to the introduction of the term *disturbed dreaming* to describe such dreams which have the emotional component of nightmares but which do not necessarily lead to complete awakening of the subject [5–7].

Nightmares are also defined in the *Diagnostic and Statistical Manual IV (DSM-IV)* as "repeated awakenings from the major sleep period or naps with detailed recall of extended and extremely frightening dreams, usually involving threats to survival, security, or self-esteem." Further attributes of nightmares specified by the DSM-IV are the occurrence of these events during the second half of the sleep period, a rapid awakening of the affected individuals following the dream, the presence of significant distress in daytime function, and the absence of other psychiatric disorders [8].

Epidemiology

Incidence and Prevalence

It is difficult to ascertain the prevalence of nightmares due to differences in definitions and cultural norms. Sporadic nightmares are best regarded as a normal human experience. Children may be unable to verbalize the content of their dreams, and thus

the presence of bad dreams must be ascertained by the caregiver. Approximately 50 % of 3–6-year-old children and 20 % of 6–12-year-olds experience nightmares [2]. Nightmares are present in approximately one third of children who present to a sleep specialist [9].

Age

Age is likely to be an important factor in the onset of nightmares. Nightmares are more common among younger children [10]. An epidemiological survey targeted to parents found that the prevalence of nightmares among 6–12-year-old children was 22 %. The incidence was noted to be higher amongst younger children [11], and decreased progressively as children aged. According to a study on normal school children aged 4–12 years, the incidence of scary dreams peaked among slightly older children, but this may be a reflection of the differential ability to remember and report such events [12]. The decreasing incidence of nightmares with age may reflect the attenuation of rapid eye movement (REM) sleep with pubertal growth [13].

Sex Differences

Nightmares occur with equal frequency among young boys and girls. From early adolescence, nightmares occur more frequently among females [14]. A study of 13–16-year-old individuals found that the recall of disturbing dreams rose as girls got older during this period, while it decreased in boys [15]. A study of college-aged students found that females were 50 % more likely to report having frequent nightmare attacks compare to males [16]. This finding however may suggest that females are simply more likely to recall bad dreams compared to males [17].

Pathophysiology

The exact mechanisms underlying dreams and nightmares elude any interdisciplinary study. Theories of nightmares and dreams in general, arise from a variety of disciplines, including neurocognitive research, psychoanalysis, psychology, evolutionary biology, and neurobiology. Sigmund Freud attributed nightmares to "masochistic wish fulfillment" and "maladaptive reactions" [18]. Later, personality theories, initially promoted by Hartmann, linked nightmares to impaired "ego boundaries" that fail to protect dreamers from sleep and waking state [19, 20]. Supportive evidence for these theories comes from research findings of increased frequency of nightmares in individuals with personality disorders [15, 21].

Nightmares typically occur during REM sleep, more often in the second half of the night to early morning hours (Fig. 12.1). Activation of the visual cortex during REM sleep via ponto-geniculo-occipital waves may lead to vivid visualizations

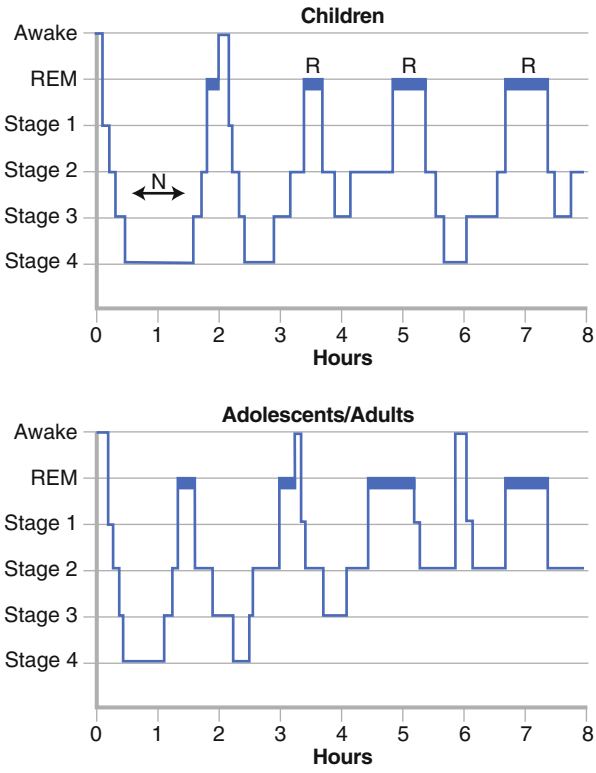

Fig. 12.1 Sleep cycles in children (*top* graph) and adolescents/adults (*bottom* graph). (**a**) Children tend to have progressively prolonged periods of rapid eye movement (REM) sleep ® during the latter part of the sleep cycle, thereby predisposing them to nightmares during the early hours of the morning. (**b**) The first non-REM phase in children is much longer in children compared to adolescents (N) and can last up to 2 h. This period of sleep, the majority of which is spent in N3 sleep, is when night terrors are most likely to occur.

characteristic of dreaming. The activation of the amygdala during REM sleep, as demonstrated by functional magnetic resonance imaging (fMRI) is postulated to be particularly important in the pathogenesis of nightmares [22]. Nightmares may thus occur following the activation of fear and emotional responses from the central nucleus of the amygdala. This hypothesis is also supported by the associations between posttraumatic stress disorder (PTSD) and hyperactivation of the amygdala [1, 23].

Complications

Psychiatric Sequelae of Nightmares

Nightmares are associated with emotional distress, though it is difficult to differentiate causes from effects. Disturbing dreams were found to correlate with anxiety, depression, neuroticism, and acute stress [7]. In older individuals, nightmares may additionally correlate with a higher risk of suicide [24]. Frequent nightmares may additionally be associated with a greater risk of psychosis [25].

Nightmares and Neurological Function

Nightmares can lead to disturbances in sleep quality, which in turn can affect daytime functioning. An adult study comparing 17 individuals with frequent nightmares with a control group found that patients with frequent nightmares had reduced sleep efficiency, increased wakefulness, reduced slow-wave sleep, and increased nocturnal awakenings [26]. Patients with frequent nightmares may also suffer from poorer functioning. A controlled adult trial found that individuals with frequent nightmares suffered from poorer executive function on objective tests. This was especially apparent on tests evaluating negative motor function. These findings could not be wholly accounted for on the basis of anxiety or sleep disturbance and are thus suggestive of alterations in frontal or prefrontal executive functioning in those with frequent bad dreams [27].

Risk Factors

Circadian Sleep Disorder

Few studies have identified risk factors for nightmares in children. A study of 218 children investigated an association between sleep problems and organization of wake/sleep cycle. The results of this study indicated that nightmares were twice as common in children with irregular sleep/wake patterns in the first year of life (46 %) compared to children with normal sleep routines (29 %), though this difference did not achieve a statistical significance [9].

Population-Based Correlates

Larger population studies have provided more information regarding risk factors for nightmares in children. A Canadian longitudinal study using a representative sample of 987 children found that a past history of nightmares was highly predictive of the persistence of nightmares through early childhood. Around 82 % of children who had nightmares at 29 months still had them at 41 months, and of these, 88 % still had nightmares at 50 months, 87 % had persistent nightmares at 5 years, and 90 % had persistent nightmares at 6 years [28]. The presence of nightmares in early childhood is thus predictive of the continued risk of nightmares in later years. High family income, absence of siblings at 29 months of age, and a nonimmigrant mother all correlated with the presence of bad dreams. Bad dreams at 50 months were more common among children in single-parent homes, in those with shorter sleep latencies, and in children who were given food or drink after awakening at night [29]. Child anxiety in earlier life, parent-reported difficulties in falling asleep at 17 months, and shorter sleep onset latencies corresponded with bad dreams at 5 years of age [29].

Psychological Factors

Emotional and psychological factors in both the child and his/her parents have long been postulated to play an important role in the development of nightmare disorders in children. The direction of causality is unclear. In a prospective study on elementary school students using parent-based surveys, children who experienced nightmares were significantly more likely to be rated as anxious by their parents [21]. In adolescents, anxiety was found to correlate strongly with the presence of disturbing dreams, a trend that was particularly more apparent in adolescent girls [15]. Other correlates for nightmares include generalized anxiety disorder, separation anxiety, and overanxious disorder [15].

Presenting Symptoms

Nightmares are common events in children, though they are usually sporadic. Children may awake from nightmares and be anxious and frightened, and may also wake up their parents during the night. Children often can recall their nightmares, and this may lead to increased anxiety during waking hours. The content of nightmares varies depending on the age of the child. Younger children may have more abstract nightmares involving ghosts or monsters. As children age, the content of these nightmares may instead involve fears to bodily injury and physical danger [30]. Concerns about behavioral competence and social approval may predominate in older children [31]. The content of dreams is similar in girls and boys in younger children. In older children, dreams classified by as "worrisome thoughts" involving harm to self or to loved ones, were more common in girls [12].

Nightmares are not associated with any specific findings on examination. On polysomnography conducted in the sleep laboratory, nightmares were shown to be associated with periodic limb movements [32], though it is not known if these findings extend to nightmares in the natural setting.

Nightmares Secondary to Other Conditions

Psychiatric Conditions

Patients with PTSD often suffer from distressing dreams. Nightmares in PTSD are often associated with longer nocturnal awakenings [32]. Most nightmares in these patients are related to the traumatizing event, though in up to half of patients, nightmares may be idiopathic in nature. Nightmares may lead to a poorer sleep in these patients and can thereby worsen the emotional symptoms of PTSD [33].

Nightmares may occur in the context of other psychiatric diseases and cause additional distress. In such situations, treatment should primarily be aimed at managing the primary psychiatric condition. Disturbing dreams may occur in delirious patients and are often recalled by patients following their recovery [34]. Patients with borderline personality disorder [35] and depression [25] have been documented to have frequent bad dreams and poor sleep quality. Patients with schizophrenia have also been reported to have greater numbers of nightmares compared to controls and which may persist despite treatment [36]. In one study, 44 % of patients with Tourette's syndrome reported frequent bad dreams and/or night terrors [37].

Medications

Bad dreams may occur as a consequence of drug toxicity. Drugs which alter the normal synaptic activity of serotonin, norepinephrine, and dopamine may lead to nightmares. Opioids [38], beta-blockers [39–41], levodopa [42], and ketamine [43] have been associated with nightmares. Statin drugs have also been reported to cause bad dreams [39–41]. Sleep physicians should particularly be aware that chronic amphetamine use and withdrawal have been implicated in the genesis of nightmares [44]. Nightmares have also been documented following withdrawal from selective serotonin reuptake inhibitors and tricyclic antidepressants [44, 45]. Other drugs associated with nightmares include benzodiazepines, anticholinergics, clonidine, and barbiturates [39–41, 44].

Drugs of Abuse

Drugs of abuse are frequently associated with bad dreams. Cannabis and cocaine withdrawal have been documented to cause unpleasant dreams [46]. Alcohol intoxication and withdrawal are noted to increase the frequency of nightmares [47, 48].

Diagnosis

Nightmares are usually reported by the patient and/or the parent. Clinicians should be aware of other conditions that may lead to frequent nightmares that require attention. Issues such as physical or sexual abuse or drug use require a high index of suspicion to identify as patients do not typically volunteer this information.

Nightmares, which occur in the latter half of the night, may be confused with night terrors. Night terrors occur during non-REM sleep in the first half of the night, and cannot be remembered upon awakening. Symptoms of night terrors include vocalizations, hyperagitation, and autonomic signs. Children with night terrors do

not awake spontaneously, are often difficult to console after waking up, and have poor to no recall of the event.

Instrumental investigations are not indicated to diagnose nightmares. However, with unusual presentations, one may consider ordering a 24-h electroencephalography (EEG) to rule out seizures. Similarly, if the suspicion for obstructive sleep apnea or periodic limb movements of sleep is high, one may order a sleep study to rule out these conditions, because treatment of these conditions can reduce sleep-fragmentation, and thereby reduce nightmares.

Treatment

Sporadic nightmares typically do not require treatment. Lifestyle measures should be tried in nightmares that occur more than once a week, persist for several weeks to months, or which are particularly severe. Parents should be advised to limit the exposure to television and/or graphic content for a few hours prior to going to sleep. Other daytime stressors should be identified and appropriately managed. Maintenance of a regular sleep schedule may be an important means to improve the quality of sleep and possibly reduce the frequency of bad dreams [9]. Treatment of the underlying anxiety may also be considered with psychological or pharmacological intervention.

Nightmares which occur more frequently and which disturb daily functioning may benefit by a comprehensive behavioral evaluation. Cognitive behavioral therapies (CBTs), including systematic desensitization [49, 50], imagery rehearsal [50–52], relaxation techniques, extinction [53], and eye movement desensitization [54] have been reported as beneficial in treating nightmares. However, these techniques have not been validated in larger prospective studies [55]. Nightmare-focused CBT may be more effective than simpler relaxation techniques [56]. In adults, the American Academy of Sleep Medicine recommends image rehearsal therapy, systematic desensitization, and relaxation training for the treatment of nightmares [57]. The feasibility and efficacy of these strategies in the pediatric age group are not fully established.

Systematic Desensitization

Systematic desensitization is a CBT which aims to reduce fears and anxieties induced by certain phobias. A procedure described by Palace et al. involves the replacement of the anxiety in addition to dream reorganization strategies. This practice was highly effective on a case report of a 10-year-old boy with recurring nightmares [50]. Another report of systematic desensitization in adults utilized manuals intended to train subjects on relaxation techniques [58]. In the study conducted by Miller et al. [59], 10 subjects underwent therapy with relaxation and systemic desensitization techniques and were compared with 11 controls. The results of the study demonstrated that behavioral therapies were more effective than in controls at 25 weeks follow-up.

Image Rehearsal Therapy

Image rehearsal therapies attempt to change the storyline of dreams towards more pleasant outcomes. Several studies [51, 52, 60] have investigated image rehearsal as a means of treating nightmares. Wile [51] evaluated three types of treatments on a group of 25 children with frequent nightmares: (a) in the first group, subjects used techniques to promote positive dreams in place of negative dreams ($n = 11$), (b) in the second group, subjects used a positive affirmation prior to going to sleep ($n = 11$), and (c) in the third group, subjects used dream-relevant coping tasks, such as exposure objects of their nightmares in a controlled daytime settings ($n = 3$). The study found that dreams disappeared in the first group at a median of 3 months, at 5 months for the second group, and at 2 months for the third group. The other study, reported by Krakow et al. [52], evaluated a three-step process for the elimination of nightmares in a series of nine adolescent girls aged 13–18 years with frequent nightmares. This treatment consisted of (a) selecting the nightmare, (b) modifying the nightmare according to the subject's desires, and (c) rehearing the new version of the dream for 5–20 min each day. When comparing the series to a control group, there was a significant decrease in reported nightmares per month in the study group. A more recent study by Lancee et al. [60] evaluated image rehearsal therapy on a larger scale on a sample of 399 patients with frequent (> 1/week) nightmares. Over a 6-week period, subjects were instructed to use cognitive restructuring techniques to visualize changed nightmares for 10–15 min per day. The study found that patients who underwent image rehearsal therapy underwent a more rapid decrease in nightmare frequency compared to controls. Additionally, subjects reported improved sleep quality, and decreased depression and anxiety. Although this large study specifically excluded children, it overall suggested that image rehearsal treatments may be an effective form of therapy in patients with frequent nightmares.

Lucid Dreaming

Lucid dreaming is a variant of image rehearsal therapy whereby patients are made aware that they are dreaming, thereby enabling them to alter a dream storyline. A study performed on a sample of 16 subjects who underwent 2 h of lucid dreaming counseling either individually or as a group found a significant fall in the frequency of events, though the decline among those who underwent individual treatment was more significant [61]. The therapy was also found to improve dream-frequency reduction in a sample of 5 patients who had PTSD or idiopathic nightmares, previously been treated with progressive deep muscle relaxation and image rehearsal therapy [62].

Progressive Deep Muscle Relaxation

Progressive deep muscle relaxations are procedures in which muscles are tightened and relaxed. The therapy can be combined with breathing exercises, word cues, and imagery. In his study on nightmare therapies, Miller found that the 11 women who underwent the deep muscle relaxation had a larger and more consistent reduction in nightmares compared to controls [59].

Hypnosis

Hypnosis may be beneficial in some children with recurrent nightmares. A prospective analysis was performed on 36 patients (four children) with frequent parasomnias who were treated with hypnosis therapy. Ten patients in the trial suffered from nightmares. All patients were treated with up to two hypnosis sessions. A sustained benefit from the therapy was observed in 40.5 % of patients who responded to the trial over a 5-year period. Unfortunately, the authors concluded that a significant fraction of patients may not respond to hypnosis. This study has not been attempted in an exclusive pediatric cohort.

Pharmacological Interventions

Pharmacological treatments are not warranted for idiopathic nightmare disorders in children, nor have they been tested. Nightmares in PTSD may respond to clonazepam, prazosin, or clonidine [57]. However, clonidine itself can provoke nightmares, because of its short half-life, with subsequent REM rebound.

Conclusion

Despite their high frequency in otherwise normal children, and a benign and self-limiting course, nightmares are distressing events for young people and can be a cause of worry among caregivers. Clinicians should be sensitive to the needs and emotional difficulties experienced by patients who complain of nightmares. Although sporadic nightmares may only require reassurance, patients with frequent nightmares may need further evaluation to identify if these events are secondary to other conditions, especially anxiety disorders. Specialists should especially be capable of differentiating frequent nightmares from those secondary to PTSD, as well as from nocturnal seizures and nocturnal panic attacks. Nightmares should also prompt the treating physician to look for an associated daytime anxiety disorder, which would need to be treated before the nightmares can be controlled.

Lifestyle measures are the mainstay of therapy for idiopathic nightmares. Options may be particularly limited in younger children with persistent nightmares.

Treatments for individuals with persistent nightmares suffer are inadequately tested and few of these strategies have been evaluated for use in children. In older children and adolescents, CBTs, such as desensitization, image rehearsal therapy and deep muscle relaxation may be helpful in controlling these events. In view of their distressing nature and their ramifications on psychiatric health and impaired sleep, better treatments are needed for children with persistent or severe nightmares.

Practical Points

- Nightmares are defined as episodes of awakening following "intensely disturbing" dream mentation involving fear, anger, disgust or other negative emotions.
- Nightmares are experienced by approximately half of 3–6-year-old children.
- Nightmares occur during rapid eye movement sleep and are most common in the early hours of the morning.
- The incidence of nightmares in childhood is roughly equal between boys and girls. Females may experience more nightmares during adolescence.
- Nightmares are more common in posttraumatic stress disorder, anxiety disorders, affective disorders, and Tourette's syndrome. They also occur more commonly in patients taking prescription or recreational drugs.
- Treatment of sporadic nightmares is limited to reassurance and lifestyle measures, including limiting exposure to television and video games before bedtime.
- Persistent nightmares may require psychological counseling and cognitive behavioral therapy.

References

1. McNamara P. Nightmares: the science and solution of those frightening visions during sleep. Westport:Greenwood Publishing Group; 2008.
2. Wittmann L, Schredl M, Kramer M. Dreaming in posttraumatic stress disorder: a critical review of phenomenology, psychophysiology and treatment. Psychother Psychosom. 2007;76(1):25–39.
3. American Academy of Sleep Medicine. The international classification of sleep disorders: diagnostic and coding manual. American Academy of Sleep Medicine; 2005.
4. Blagrove M. Haywood S. Evaluating the awakening criterion in the definition of nightmares: how certain are people in judging whether a nightmare woke them up? J Sleep Res. 2006;15(2):117–24.
5. Levin R, Fireman G, Spendlove S, Pope A. The relative contribution of affect load and affect distress as predictors of disturbed dreaming. Behav Sleep Med. 2011;9(3):173–83.
6. Levin R, Nielsen TA. Disturbed dreaming, posttraumatic stress disorder, and affect distress: a review and neurocognitive model. Psychol Bull. 2007;133(3):482–528.
7. Blagrove M, Farmer L, Williams E. The relationship of nightmare frequency and nightmare distress to well-being. J Sleep Res. 2004;13(2):129–36.
8. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th ed. DSM-IV-TR®. Washington: American Psychiatric Association; 2000.
9. Salzarulo P, Chevalier A. Sleep problems in children and their relationship with early disturbances of the waking-sleeping rhythms. Sleep. 1983;6(1):47–51.

10. Simonds JF, Parraga H. Prevalence of sleep disorders and sleep behaviors in children and adolescents. J Am Acad Child Psychiatry. 1982;21(4):383–8.
11. Vela-Bueno A, Bixler E, Dobladez-Blanco B, Rubio M, Mattison R, Kales A. Prevalence of night terrors and nightmares in elementary school children: a pilot study. Res Commun Psychol Psychiatry. 1985;10(3):177–88.
12. Muris P, Merckelbach H, Gadet B, Moulaert V. Fears, worries, and scary dreams in 4- to 12-year-old children: their content, developmental pattern, and origins. J Clin Child Psychol. 2000;29(1):43–52.
13. Chellappa SL, Munch M, Blatter K, Knoblauch V, Cajochen C. Does the circadian modulation of dream recall modify with age? Sleep. 2009;32(9):1201–9.
14. Schredl M, Reinhard I. Gender differences in nightmare frequency: a meta-analysis. Sleep Med Rev. 2011;15(2):115–21.
15. Nielsen TA, Laberge L, Paquet J, Tremblay RE, Vitaro F, Montplaisir J. Development of disturbing dreams during adolescence and their relation to anxiety symptoms. Sleep. 2000;23(6):727–36.
16. Ross L. Sleep and dreaming characteristics of frequent nightmare subjects in a university population. Dreaming. 1994;4(2):127–37.
17. Brand S, Beck J, Kalak N, Gerber M, Kirov R, Puhse U, et al. Dream recall and its relationship to sleep, perceived stress, and creativity among adolescents. J Adolesc Health. 2011;49(5):525–31.
18. Freud S. The interpretation of dreams. Plain Label Books; 1950.
19. Ross L. Ego boundary impairment and thought disorder in frequent nightmare sufferers. Psychoanalytic Psychology. 1990;7(4):529–43.
20. Hartmann E. The nightmare: the psychology and biology of terrifying dreams. New York: Basic Books; 1984.
21. Mindell JA, Barrett KM. Nightmares and anxiety in elementary-aged children: is there a relationship. Child Care Health Dev. 2002;28(4):317–22.
22. Miyauchi S, Misaki M, Kan S, Fukunaga T, Koike T. Human brain activity time-locked to rapid eye movements during REM sleep. Exp Brain Res. 2009;192(4):657–67.
23. Rauch SL, Shin LM, Phelps EA. Neurocircuitry models of posttraumatic stress disorder and extinction: human neuroimaging research—past, present, and future. Biol Psychiatry. 2006;60(4):376–82.
24. Susanszky E, Hajnal A, Kopp M. Sleep disturbances and nightmares as risk factors for suicidal behavior among men and women. Psychiatr Hung. 2011;26(4):250–7.
25. Levin R, Fireman G. Nightmare prevalence, nightmare distress, and self-reported psychological disturbance. Sleep. 2002;25(2):205–12.
26. Simor P, Horvath K, Gombos F, Takacs KP, Bodizs R. Disturbed dreaming and sleep quality: altered sleep architecture in subjects with frequent nightmares. Eur Arch Psychiatry Clin Neurosci. 2012;262(8):687–96.
27. Simor P, Pajkossy P, Horvath K, Bodizs R. Impaired executive functions in subjects with frequent nightmares as reflected by performance in different neuropsychological tasks. Brain Cogn. 2012;78(3):274–83.
28. Simard V, Nielsen TA, Tremblay RE, Boivin M, Montplaisir JY. Longitudinal study of bad dreams in preschool-aged children: prevalence, demographic correlates, risk and protective factors. Sleep. 2008;31(1):62–70.
29. Simard V, Nielsen TA, Tremblay RE, Boivin M, Montplaisir JY. Longitudinal study of preschool sleep disturbance: the predictive role of maladaptive parental behaviors, early sleep problems, and child/mother psychological factors. Arch Pediatr Adolesc Med. 2008;162(4):360–7.
30. Bauer DH. An exploratory study of developmental changes in children's fears. J Child Psychol Psychiatry. 1976;17(1):69–74.
31. Vasey MW, Daleiden EL. Worry in children. In: Davey GCL, Tallis F, editors. Worrying: perspectives on theory, assessment and treatment. Chichester: Wiley; 1994. pp. 185–207.
32. Germain A, Nielsen TA. Sleep pathophysiology in posttraumatic stress disorder and idiopathic nightmare sufferers. Biol Psychiatry. 2003;54(10):1092–8.

33. Spoormaker VI. Montgomery P. Disturbed sleep in post-traumatic stress disorder: secondary symptom or core feature? Sleep Med Rev. 2008;12(3):169–84.
34. Roberts BL, Rickard CM, Rajbhandari D, Reynolds P. Patients' dreams in ICU: recall at two years post discharge and comparison to delirium status during ICU admission. A multicentre cohort study. Intensive Crit Care Nurs. 2006;22(5):264–73.
35. Semiz UB, Basoglu C, Ebrinc S, Cetin M. Nightmaredisorder, dream anxiety, subjective sleep quality in patients with borderline personality disorder. Psychiatry Clin Neurosci. 2008;62(1):48–55.
36. Lusignan FA, Zadra A, Dubuc MJ, Daoust AM, Mottard JP, Godbout R. Dream content in chronically-treated persons with schizophrenia. Schizophr Res. 2009;112(1–3):164–73.
37. Champion LM, Fulton WA, Shady GA. Tourette syndrome and social functioning in a Canadian population. Neurosci Biobehav Rev. 1988;12(3–4):255–7.
38. Vella-Brincat J, Macleod AD. Adverse effects of opioids on the central nervous systems of palliative care patients. J Pain Palliat Care Pharmacother. 2007;21(1):15–25.
39. Ali S, Khan SA, Iram S. Hypocholesterolemia secondary to atrovastatin therapy. J Ayub Med Coll Abbottabad. 2010;22(3):225–7.
40. Boriani G, Biffi M, Strocchi E, Branzi A. Nightmares and sleep disturbances with simvastatin and metoprolol. Ann Pharmacother. 2001;35(10):1292.
41. Gregoor PJ. Atorvastatin may cause nightmares. BMJ. 2006;332(7547):950.
42. Growdon JH, Kieburtz K, McDermott MP, Panisset M, Friedman JH. Levodopa improves motor function without impairing cognition in mild non-demented Parkinson's disease patients. Parkinson Study Group. Neurology. 1998;50(5):1327–31.
43. Blagrove M, Morgan CJ, Curran HV, Bromley L, Brandner B. The incidence of unpleasant dreams after sub-anaesthetic ketamine. Psychopharmacology (Berl). 2009;203(1):109–20.
44. Pagel JF, Helfter P. Drug induced nightmares—an etiology based review. Hum Psychopharmacol. 2003;18(1):59–67.
45. Pace-Schott EF, Gersh T, Silvestri R, Stickgold R, Salzman C, Hobson JA. SSRI treatment suppresses dream recall frequency but increases subjective dream intensity in normal subjects. J Sleep Res. 2001;10(2):129–42.
46. Schierenbeck T, Riemann D, Berger M, Hornyak M. Effect of illicit recreational drugs upon sleep: cocaine, ecstasy and marijuana. Sleep Med Rev. 2008;12(5):381–9.
47. Cernovsky ZZ. MMPI and nightmares in male alcoholics. Percept Mot Skills. 1985;61 (3 Pt 1):841–2.
48. Steinig J, Foraita R, Happe S, Heinze M. Perception of sleep and dreams in alcohol-dependent patients during detoxication and abstinence. Alcohol Alcohol. 2011;46(2):143–7.
49. Cavior N, Deutsch AM. Systematic desensitization to reduce dream-induced anxiety. J Nerv Ment Dis. 1975;161(6):433–5.
50. Palace EM, Johnston C. Treatment of recurrent nightmares by the dream reorganization approach. J Behav Ther Exp Psychiatry. 1989;20(3):219–26.
51. Wile I. Auto-suggested dreams as factor in therapy. Am J Orthopsychiatry. 1934;4:449–63.
52. Krakow B, Sandoval D, Schrader R, Keuhne B, McBride L, Yau CL et al. Treatment of chronic nightmares in adjudicated adolescent girls in a residential facility. J Adolesc Health. 2001;29(2):94–100.
53. Robertsa RN, Gordon SB. Reducing childhood nightmares subsequent to a burn trauma. Child Behav Ther. 1980;1(4):373–81.
54. Pellicer X. Eye movement desensitization treatment of a child's nightmares: a case report. J Behav Ther Exp Psychiatry. 1993;24(1):73–5.
55. Sadeh A. Cognitive-behavioral treatment for childhood sleep disorders. Clin Psychol Rev. 2005;25(5):612–28.
56. Lancee J, Spoormaker VI, Krakow B, van den Bout J. A systematic review of cognitive-behavioral treatment for nightmares: toward a well-established treatment. J Clin Sleep Med. 2008;4(5):475–80.
57. Aurora RN, Zak RS, Auerbach SH, Casey KR, Chowdhuri S, Karippot A et al. Best practice guide for the treatment of nightmare disorder in adults. J Clin Sleep Med. 2010;6(4):389–401.

58. Burgess M, Gill M, Marks I. Postal self-exposure treatment of recurrent nightmares. Randomised controlled trial. Br J Psychiatry. 1998;172:257–62.
59. Miller WR, DiPilato M. Treatment of nightmares via relaxation and desensitization: a controlled evaluation. J Consult Clin Psychol. 1983;51(6):870–7.
60. Lancee J, Spoormaker VI, van den Bout J. Cognitive-behavioral self-help treatment for nightmares: a randomized controlled trial. Psychother Psychosom. 2010;79(6):371–7.
61. Spoormaker VI, van den Bout J. Lucid dreaming treatment for nightmares: a pilot study. Psychother Psychosom. 2006;75(6):389–94.
62. Zadra AL, Pihl RO. Lucid dreaming as a treatment for recurrent nightmares. Psychother Psychosom. 1997;66(1):50–5.