



Review Article

The role of cognitive–behavioral therapy in behavioral childhood insomnia

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ABSTRACT

Behavioral insomnia is a very common problem throughout childhood. It has negative impact on children and their families and can persist for many years if not treated. Interventions based on cognitive–behavioral therapy (CBT) principles have mainly focused on withdrawing excessive parental bedtime involvement and helping children develop self-soothing strategies for falling asleep and resuming sleep during the night. With young children, these interventions are mostly based on training and modifying parental behaviors. Changing parental sleep-related expectations, beliefs and perceptions is an important component in these interventions. With older children and adolescents, more versatile interventions exist and they include additional components of CBT including relaxation and stress reduction techniques, modifying cognitive processes related to worrying and anxiety, positive imagery training and others. Extensive research has established the efficacy of behavioral interventions in early childhood. However, research on interventions for older children has been very limited and has failed to provide sufficient information on the efficacy of specific CBT techniques for childhood insomnia.

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1. Behavioral insomnia of childhood

Pediatric sleep problems are among the most frequent complaints parents present to pediatricians and other child-care professionals [1–11]. The most common sleep problems during infancy and early childhood are problems related to initiation of sleep and maintenance of sleep during the night, usually referred to as bedtime and night-waking problems [1,5,12–14]. The prevalence of these problems during infancy and childhood is estimated to range between 20% and 30% [14]. Bedtime and night-waking problems are classified in the International Classification of Sleep Disorders (ICSD) [15] under the diagnostic category of Behavioral insomnia of childhood. The ICSD discriminates between two types of childhood behavioral insomnia: (a) the “sleep-onset association type” which refers to difficulties falling asleep at bedtime and resuming sleep after awakening during the night (manifested in crying, fussing, refusal to lie down, etc.) in the absence of “special conditions” (usually caregiver’s assistance, feeding, rocking, etc.) and (b) the “limit-setting” type which is characterized by the child’s persistent refusal to go to sleep or to return to bed after a night-waking and by the caregiver’s difficulty to set appropriate limits necessary for facilitating sleep.

The main difference between the “sleep-onset association” type and the “limit-setting” type is that the first terminology is used

more often with infants, whereas the latter is more suitable to older children. But both types implicate that the sleep problems occur in the context of parent–child interactions and family dynamics [16,17]. Therefore, interventions for these disorders focus on changing both parental and children’s sleep-related behaviors.

The ICSD diagnostic criteria do not specify the frequency of insomnia symptoms (e.g., number of times per week the child wakes up, the time it takes him or her to fall asleep). Unfortunately, empirical studies on early childhood sleep problems use different diagnostic criteria and do not usually distinguish between the two types of behavioral insomnia [14]. Although there are no standard empirical criteria for childhood insomnia [10], most studies use a combination of frequency (e.g., three or more infant night-wakings per night that require parental assistance, several times a week) and duration (e.g., 30 min or more to fall asleep) [14].

The diagnosis of behavioral insomnia is usually not considered for infants under the age of 6 months because polyphasic sleep (multiple sleep episodes distributed around the day and night) and multiple night-wakings are developmentally appropriate during the first months of life. However, around the age of 6 months most infants develop consolidated sleep and acquire the ability to “sleep through the night” (i.e., six consecutive hours or more) [11,18,19], and those who fail to develop this ability may be considered as presenting a sleep problem.

The importance of early diagnosis of childhood insomnia is highlighted by findings from different studies demonstrating that sleep problems during the first years are not only very prevalent but, if not treated, may be quite persistent [20–22]. Moreover, it

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has been demonstrated that sleep problems are correlated with poor cognitive and emotional functioning of children [22–31] and with family stress and parental psychopathology [9,32–36]. Treating childhood insomnia is thus important and beneficial not only for improving sleep but also for alleviating broader behavioral correlates. Indeed, a growing body of research suggests that behavioral interventions for childhood insomnia are highly effective and lead to a large and rapid improvement in children's sleep, especially during the first years of life [14,37–39]. For instance, based on a systematic review of the literature, Ramchandani and colleagues [39] concluded that “specific behavioral interventions showed both short term efficacy and possible longer term effects for dealing with settling problems and night-waking.” In addition, a few studies have demonstrated that these interventions also lead to improvements in child behavior and to higher parental well-being [21,40–44].

Cognitive-behavioral interventions include treatment approaches that use both cognitive (e.g., modification of thoughts, attitudes and beliefs) and behavioral methods, based on learning theory, to change behaviors. Interventions aimed at changing sleep behaviors of infants and toddlers usually focus on changing parental cognitions and behaviors in order to induce changes in infants' sleep. In the following sections we describe the cognitive and behavioral components of CBT for childhood insomnia. We separated the discussion for early childhood (infants and toddlers) insomnia and later childhood (pre-school and school age children) insomnia because of age-specific developmental issues such as nighttime fears that merit a separate discussion and because of different characteristics of working with parents as agents of change, as compared with direct work with the child.

2. The role of CBT in behavioral insomnia of infants and toddlers

The development of infant and child sleep patterns and sleep disorders is influenced by a complex matrix of physiological (e.g., maturational, medical and temperamental factors) and psycho-social factors (e.g., cultural influence, parental factors such as perceptions and psychopathology and parent-infant interactions) [17,45]. Although the focus of this review is on the behavioral aspects of children's sleep problems and related interventions, it is important to emphasize that night-waking problems in young children could be influenced and exacerbated by physiological factors such as allergies, colic and breathing problems [46–48]. Thus, before implementing CBT for childhood behavioral insomnia, it is important to screen for physiological factors that may contribute to the sleep problem. If present, these factors should be addressed before or in combination with the psychologically oriented interventions.

The most prominent and persistent findings regarding the factors contributing to the development of night-waking problems in early childhood are related to the reported links between parental involvement in the settling process and infant night-wakings. Different studies have found that infants who fall asleep while receiving significant help from their parents (e.g., while being fed, rocked, cuddled, etc.) have a higher number of night-wakings requiring parental attention, in comparison to infants who fall asleep by themselves or with minimal parental assistance [49–55]. It is assumed that when parents are highly involved in helping their infants to fall asleep, infants learn to associate falling asleep with parental presence and assistance (“sleep-onset association”) and fail to develop self-soothing skills. For example, in one study assessing factors associated with fragmented sleep, parental presence during bedtime was most strongly associated with interrupted sleep in 17-month and 29-month-old children [54]. In another recent study based on an internet sample it was found that

parental encouragement of infant self-soothing was significantly associated with fewer night-wakings [52]. However, it is important to notice that studies based on objective recording of infant sleep (actigraphy or video recordings) demonstrate that although sleep-disturbed infants tend to wake up more than controls, their main problem is their inability to resume sleep without parental assistance [56–58]. “Self-soothers” are more likely to resume sleep by themselves when they wake up during the night, whereas “signalers” tend to cry and fuss to elicit parental help [59]. Moreover, falling asleep is not always immediate when parental help is provided and consequently sleep-disturbed infants often need repeated visits from their caregivers.

Although the links between parental nighttime behavior and infant sleep problems could be bi-directional (e.g., infants with more night-waking encourage their parents to become more involved), the findings in this area suggest that parents play an important role in the development and maintenance of early insomnia [17]. In accordance with these findings, the most common behavioral interventions for infant sleep problems are focused on changing parental sleep-related perception and reducing parental nighttime involvement; these changes in parental behavior are supposed to lead to the development of self-soothing skills of sleep-disturbed infants and to more consolidated sleep [14,38,39].

2.1. The cognitive component

Parental behaviors during the settling process and during the night seem to be influenced by the parents' cognitions (e.g., expectations, interpretations, perceptions) and emotions. Therefore, an important part in CBT for early childhood insomnia focuses on altering parental cognitions regarding the sleep of their infant in order to facilitate a behavioral change [38,60].

Although the *cognitive* part has received less attention in the literature, recent studies have demonstrated significant links between parental sleep-related cognitions and infant sleep patterns implying that these cognitions may explain parental behavioral patterns and involvement during the night. These studies highlight the importance of addressing parental cognition in clinical interventions [56,61–65].

For example, in a study comparing sleep-related cognitions of parents with sleep-disturbed infants and control parents, parents of sleep-disturbed infants reported more cognitions reflecting difficulties related to limit-setting than controls [56]. In two different longitudinal studies maternal cognitions reflecting difficulties in limiting parental involvement during the night predicted higher active physical nighttime soothing, and these soothing methods predicted more infant night-wakings [53,62]. Moreover, in one of these studies, mothers were asked during pregnancy about their sleep-related cognitions (using hypothetical case descriptions of infants with sleep problems). When expectant mothers interpreted infant night-wakings as a sign of infant distress and anxiety they were more likely after delivery to get actively involved in settling the infant to sleep, and their infants had more night-wakings (measured by actigraphy and parental reports) than infants of mothers who emphasized the importance of infant self-soothing [53].

The importance of changing early parental knowledge and perceptions about infant sleep has also been demonstrated in a number of studies focusing on the effects of early parental education programs on the development of infant sleep patterns and problems [66–69]. These studies have shown positive results in preventing infant sleep problems and in establishing healthy sleep patterns at least during the first months. For instance, in one pilot, randomized, controlled study the authors assessed the effects of an early postpartum behavioral-educational intervention with first-time mothers. The findings demonstrated that at 6 weeks postpartum mothers who received information about sleep and strategies

to promote sleep had more nighttime sleep, and their infants had fewer night-wakings and longer sleep than mothers and infants in the control group [69].

From a clinical perspective, many parents of sleep-disturbed infants believe that if they would change their bedtime and nighttime interactions with their infants and reduce their involvement they would emotionally harm their child. Limiting their involvement is perceived by many parents as insensitive and even abusive to the child, especially when it involves leaving the infant to cry. These perceptions are often loaded with negative emotions of guilt, anger and doubts about parental competence [56,61]. When parents hold these cognitions, clinical recommendations to limit their nighttime involvement are likely to elicit resistance. Therefore, in clinical sleep intervention clinicians often address parental cognitions before implementing behavioral techniques, understanding that this process of changing parental perceptions and concerns is necessary to prepare the parents toward the behavioral intervention and to facilitate cooperation with the intervention [38,53,65,70]. Reframing parental cognition can also be enhanced by letting parents know that there are no published studies demonstrating adverse effects of clinical sleep interventions based on limiting parental involvement, on the infant's emotional well-being or on the infant-parent relationship [17].

In summary, growing evidence suggests that parental settling and nighttime behaviors are explained by their sleep-related cognitions, and therefore a change in their cognitions may lead to a change in their behavior. However, other factors besides parental beliefs and cognitions may explain why certain parents become highly involved in soothing their infants to sleep. For example, some parents may respond to a difficulty they identify in the child such as a difficult temperament or separation anxiety [17]. These factors can make it harder for the child to calm down and to fall asleep independently without parental assistance, and therefore should be taken into account when conducting a clinical assessment of a sleep problem and before implementing a behavioral intervention.

2.2. The behavioral component

Evidence-based behavioral techniques for early childhood insomnia have been described in detail in previous reviews [14,37,38,71], so we will only shortly outline them in the present paper. From a pure behavioral perspective most of these behavioral methods are based on the principles of extinction: it is assumed that infant night-wakings and attention-seeking behaviors are positively reinforced by parental attention and soothing behaviors such as rocking, feeding, etc. Therefore, removal of the reinforcement (i.e., parental involvement) will lead to a decline in the night-waking signaling behavior [72]. Indeed, according to a typical behavioral intervention, known as the “unmodified extinction” procedure, the parent is asked to put the infant awake in his/her bed and leave the room until the infant falls asleep. Night-wakings should also be ignored unless the parent thinks that it is absolutely necessary to approach the infant. It is expected that after a while, the infant will learn that his/her nighttime crying and signaling behavior is not producing any favorable consequences (parental attention). Eventually the infant would cease signaling and learn to self-soothe [73–75]. This program is easy for parents to understand and randomized controlled studies have found this method to be efficient in treating settling and night-waking problems [14,37,73,76,77]. However, many parents find it extremely difficult to consistently ignore their children's cry, which may even temporarily increase before subsiding (i.e., postextinction response bursting). As a result parents may find it hard to comply [37,38,60,74] and partial cooperation (i.e., inconsistent ignoring, visiting the infant occasionally) may reinforce the undesired behavior, thus

impeding the intervention process [72]. Because of this limitation and the concerns that total ignoring may result in significant infant and parental distress, more gradual extinction techniques have been developed to ease the process for the parents and the infants.

“Graduated extinction” techniques gradually limit parental involvement in the sleep initiation process but at the same time allow parents to assure the infant about their presence [78–81]. Parents are supposed to transfer a clear and consistent message to the infant: “we are here to protect and reassure you, but we expect you to fall asleep by yourself.” The “checking” procedure is the most common graduated extinction method. According to this technique, the parent is instructed to shortly visit the infant in fixed (e.g., every 5 min) or gradually increasing intervals if the infant is crying and protesting. The visit should be focused and short enough not to reinforce the infant's night-wakings or to stimulate attention-seeking behavior. For instance, the parent should avoid taking the infant out of the crib, but may return the infant to a sleeping position or shortly remind him/her that it is time to sleep [82]. The efficacy of the “checking” techniques have been demonstrated in multiple clinical intervention studies [14,58,80,83,84]. Another related technique is “parental presence” which is based on the assumption that sleep problems could result from separation anxiety in the infant (or the parent) [58]. For that reason parents are guided to sleep in the infant's room from bedtime to rise time for approximately a week without interacting with the infant or minimally interacting similarly to the “checking” procedure. The parent is supposed to leave the room after this first stage has been completed and the infant has learned to fall asleep while receiving only passive parental presence. This approach has been demonstrated to significantly decrease night-wakings in sleep-disturbed infants in one randomized controlled study [58]. However, there is need for more research on this method to further evaluate its efficacy.

Another technique based on graduated extinction that has been less thoroughly assessed involves implementing the behavioral intervention only during bedtime while assuming that sleep improvement and the acquisition of self-soothing skills at bedtime would generalize to later night-wakings [18,85]. Studies examining the effectiveness of this method have yielded mixed results. For example, in a recent study examining the effect of graduated extinction at bedtime on night-wakings in a small group of 7 sleep-disturbed infants and toddlers (using a multiple-baseline across-settings design) no generalization effects were found. The sleep of five children improved but this change was observed only after the parents consistently used the graduated extinction procedures during the night as well [18]. In another study using an interrupted time-series design, a graduated extinction procedure at bedtime was found to be effective in reducing overall sleep difficulties and especially bedtime problems in a small group of low-income ethnic minority preschoolers [72].

Additional behavioral methods based on other principles than extinction have received some support in treating early childhood insomnia as well. “Scheduled awakening” is one such method which may be helpful when the child's awakenings occur at relatively fixed hours [73,86]. In this case, parents are asked to awaken the child about 15 min before his spontaneous awakenings thereafter gradually increasing the time intervals between awakenings. Although the rationale underlying this method is not clear, it seems to increase sleep consolidation. Parents, however, find it quite difficult to comply with this method [73,86].

Whereas scheduled awakening focuses on the night-waking problem, another method, “faded bedtime,” has been documented to efficiently treat childhood insomnia while focusing on the bedtime process [14,87–89]. Eventually, the change at bedtime is supposed to lead to more consolidated sleep without intervening directly during the night. The idea behind this method is to create

a physiological pressure to sleep by delaying bedtime to a time that fits the child's natural tendency. Parents are guided to devote the time before bedtime to calming and enjoyable activities with the child ("positive routine"). The child is then supposed to enter his/her bed while feeling relaxed and tired enough to ensure that he/she would fall asleep rapidly. The underlying rationale of moving all the parent-child rewarding interactions out of bed and delaying sleep is similar to the principles of stimulus control and sleep restriction techniques applied in CBT for adult insomnia [90,91]. When a successful bedtime routine has been created, bedtime can be gradually advanced. Optimally, sleep during the day should be avoided, and therefore this method is difficult to implement with infants and toddlers who naturally need to nap during the day.

Another behavioral intervention that has recently been investigated with promising results is based on establishing a consistent bedtime routine. In a recent study, Mindell and colleagues [44] studied the effect of a specific and consistent bedtime routine on infant and toddler sleep. Participants were randomly assigned to routine or control groups. Mothers in the bedtime routine group were asked to establish a routine that included a bath, a massage and quiet activities. The findings demonstrated that in comparison to baseline, infants and toddlers in the specific bedtime routine group significantly improved on a number of sleep measures. In particular, they had shorter sleep latency and had a lower number of reported night-wakings. In addition, mothers rated their children's sleep as less problematic and rated their own mood as better in comparison to baseline. In contrast, children's sleep pattern and maternal mood did not change significantly in the control group.

Additional behavioral steps parents can implement to prevent infant sleep problems include: (a) creating a clear differentiation between day activities and the night by minimizing or avoiding exposing the infant to light and to social activities during the late evening hours and the night; and (b) dissociating the feeding process with falling asleep and increasing intervals between feedings during the night. After the age of 5–6 months night feeding could be entirely avoided [65,71,92].

It is important to emphasize that most behavioral sleep interventions involve some level of infant protest and crying because of the introduced changes in their usual and preferred routines. As has been mentioned before, many parents find it very difficult to tolerate infant crying because of their fears and concerns that ignoring infant signals could be harmful to the child. Although concerns have also been raised in the scientific literature regarding the socio-emotional negative consequences of behavioral sleep interventions, [93,94] to date, there are no published studies demonstrating such adverse effects.

3. Bed refusal and nighttime fears in older children

Going to sleep is, for many children, a complex process that involves emotional challenges such as disengaging from ongoing family social activities, being alone in a dark room and coping with anxieties and intrusive thoughts and fears [95]. Nighttime fears are very common phenomena during pre-school and early school years with more than 70% of the children reporting such fears [96]. Scary dreams are often the trigger and the source for these nighttime fears [97].

A variety of interventions have been developed for nighttime fears and bed refusal. The proper intervention should be chosen on the basis of analyzing the cognitive, behavioral and emotional features that led to the evolution of the problem and to its maintenance. Bedtime refusal is usually treated by strengthening parental authority limit-setting skills, developing realistic and clear bedtime rules and using a positive reward system to encourage the

child to accept these rules and goals. The possible involvement of sleep schedule disorder (e.g., delayed sleep phase disorder) should be ruled out or treated separately by means to adjust the biological clock of the child to parental expectations or vice versa.

Perhaps the most common and spontaneous treatment for nighttime fears is cosleeping with the child. Parents often offer their presence near the child's bed or let the child sleep in their bed in response to nighttime fears [4], and indeed these interventions are usually effective in reducing these fears. However, sleeping in parental bed is a very strong incentive for many children and can serve as a powerful positive reinforcement that increases fears and facilitates negative cognitive sets of expectations. We usually recommend parents to offer their presence (when needed to alleviate nighttime fears or separation anxieties) in the child's room with the child sleeping in his or her own bed if the parents are not interested in cosleeping (in parents' bed) as a long-term life-style solution.

Cognitive-behavioral interventions for nighttime fears have evolved around the same principles of CBT for children's fears, phobia and anxiety disorders [98,99]. These interventions are based on a variety of techniques including self-control training, systematic desensitization, muscle relaxation, breathing control, guided imagery, positive self-statements and positive reinforcement. The efficacy of these methods has mostly been demonstrated in case studies and in a limited number of controlled studies. Most of these reports have been based on a combination of techniques and therefore the unique contribution of each technique cannot be established.

In a relatively comprehensive study on treatment for nighttime fears children were randomly assigned to treatment and waiting-list control groups [100,101]. Seventeen children, aged 6–12 years, were assessed following treatment and compared to 16 children in the waiting-list control group. Treatment was based on self-control training, relaxation techniques, positive imagery and self-statements training. The children received positive rewards for "brave" behaviors at night. Significant improvement was demonstrated in the treated group and the positive outcomes were still manifested in a 2.5-year follow-up. Other studies have shown positive impact of different combinations of cognitive-behavioral techniques [102–106]. A different type of intervention was based on children's "creative" imagination that lead them to "see" monsters at night [107]. In this study, 142 children (aged 4–6 years) were randomly assigned to either an intervention group or a control group in which no intervention was conducted. The children in the intervention group were told a story about a child who was scared of a monster at night. The child then drew the monster, wrote it a letter and attached it to the drawing. This made the fear disappear. After hearing the story, the children were asked to draw their own scary monster and to write it a letter explaining that they were not afraid of it anymore. The letter was then put in a special place in their room. This intervention led to significant reduction in fears as reported by the children. This study supports the idea that a child's imagination can serve to overcome fears, as is often done in popular children's books dealing with children's fears.

4. Treating insomnia in older children and adolescents

As children mature, the etiology of their sleep problems becomes more complex and their treatment is more closely related to insomnia treatments for adults. These treatments include special focus on reducing excessive physiological reactivity that may be a biological feature or a response to emotional stress and anxiety. This is achieved by using relaxation techniques and sleep restriction to create more physiologic pressure for sleep. Another important feature is related to negative cognitions associated with

sleep (if I do not fall asleep I will fail in school) that increase the psychological stress, prevent sleep and contribute to the vicious cycle that maintains that insomnia. These treatments also include coping with other, more general sources of worry (e.g., school performance, social adjustment). Research on interventions for insomnia in older children and adolescents has been very limited and most of the literature in this area is based on adults [90,91,108].

5. Conclusions

Cognitive-behavioral interventions for early childhood insomnia have received strong empirical support. In addition to their positive effects on children's sleep problems, they also were found to improve the functioning and well-being of parents. However, most of the research in this field has focused on settling problems and night-waking problems of infants and toddlers. Future research is needed to establish the efficacy of CBT for older children and adolescents.

Another issue that has received only limited attention is the long-term consequences of behavioral interventions based on minimizing parental nighttime involvement. Questions pertaining to the possible effects of these interventions on child-parent attachment and the child's sense of security should be addressed.

A methodological limitation of clinical research in pediatric sleep is that it has focused almost entirely on families from middle-upper socioeconomic status. It remains to be examined whether the positive results of these interventions are applicable to ethnic minority families and to low-income families [72]. Because socio-cultural factors may significantly influence parental perceptions and sleep-related practices, clinicians should adapt cognitive-behavioral interventions to promote infant sleep within the specific socio-cultural context of the family [17,109,110].

Conflict of interest

The authors have no conflict of interest to disclose.

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