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Cognitive–behavioral treatment for childhood sleep disorders

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Abstract

Sleep problems are very prevalent during childhood and may have adverse developmental impact. The efficacy of a number of cognitive–behavioral interventions for the most prevalent problems such as difficulty falling asleep and night-wakings has been repeatedly demonstrated with relatively rapid outcomes and high success rates. Preventive interventions in infancy have shown some promise in lowering the rates of sleep problems in infants of trained parents. Cognitive–behavioral interventions have also been proposed for childhood parasomnias (sleepwalking, night terrors, nightmares, and rhythmic behaviors), however, very limited research has been conducted to assess the efficacy of these interventions. Specific methodological issues, limitations and needs have been identified in the clinical literatures. These issues include: (a) integrating objective sleep assessment methods in clinical research; (b) identifying the specific curative factors of various effective interventions; (c) the absence of long-term follow-up studies for assessing relapse problems; (d) assessing the role of mode of delivery (i.e., professional consultation versus written information) in treatment efficacy; and (e) the need to expand the research on clinical interventions for the parasomnias.

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1. Introduction

Sleep disorders are very common during childhood. It is estimated that 20–30% of the children suffer from sleep problems during the first 3 years of life (Adair, Bauchner, Philipp, Levenson, & Zuckerman, 1991; Armstrong, Quinn, & Dadds, 1994; Johnson, 1991; Richman, 1981) and in later development (Blader, Koplewicz, Abikoff, & Foley, 1997; Johnson, 1991; Kahn, Van de Merckt et al., 1989; Kataria, Swanson, & Trevathan, 1987; Kerr & Jowett, 1994; Lozoff, Wolf, & Davis,

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1985; Morrison, McGee, & Stanton, 1992; Ohayon, Roberts, Zully, Smirne, & Priest, 2000; Owens, Spirito, McGuinn, & Nobile, 2000; Richman, 1987; Sadeh, Raviv, & Gruber, 2000; Simonds & Parraga, 1984; Thunstrom, 1999; Tikotzky & Sadeh, 2001). Studies have shown that sleep problems in early childhood are quite persistent and can last well into adulthood (Hauri & Olmstead, 1980; Kataria et al., 1987; Lam, Hiscock, & Wake, 2003; Zuckerman, Stevenson, & Bailey, 1987). Furthermore, disrupted sleep patterns in childhood have significant negative correlates such as family stress (Sadeh et al., 2000), compromised neurobehavioral functioning (e.g., Gozal, 1998; O'Brien et al., 2003; Sadeh, Gruber, & Raviv, 2002; Wolfson & Carskadon, 1998), difficult temperament (Carey, 1974; Sadeh, Lavie, & Scher, 1994; Schaefer, 1990; Weissbluth & Liu, 1983) behavior problems and psychopathology (Dahl, 1996; Lam et al., 2003; Morrison et al., 1992; Owens, Oipari, Nobile, & Spirito, 1998; Owens-Stively et al., 1997; Sadeh, 1996b; Sadeh et al., 2002). Although the links between sleep problems and their functional correlates could be bidirectional, it has been shown that direct and focused treatment for children's sleep problems could lead to improvement in other functional domains (Eckerberg, 2004; Gozal & Pope, 2001; Hiscock & Wake, 2002; Minde, Faucon, & Falkner, 1994; Mindell & Durand, 1993; Wolfson, Lacks, & Futterman, 1992).

Children's sleep problems have to be considered within the context of the family. Sleep problems in school age children have been associated with increased family stress (Sadeh et al., 2000). It has been demonstrated that successful intervention for childhood sleep problems could lead to improved well-being of the parents (Durand & Mindell, 1990; Eckerberg, 2004; Mindell & Durand, 1993; Wolfson et al., 1992). In addition, parental psychopathology has been associated with increased prevalence of childhood sleep problems (Gelman & King, 2001; Hiscock & Wake, 2001; Seifer, Sameroff, Dickstein, & Hayden, 1996; Van Tassel, 1985; Zuckerman et al., 1987). Therefore, interventions for children's sleep problems should include evaluation of parenting attitudes and skills and consideration of the best fit between appropriate interventions and the unique characteristics of the family.

Before addressing the cognitive-behavioral treatment of sleep problems in children it is important to highlight the fact that some common sleep problems (e.g., frequent night wakings), could result from or exacerbate by underlying neurological or physiological problems such as milk allergy (Kahn, Mozin, Rebuffat, Sottiaux, & Muller, 1989; Kahn et al., 1987), colic (Weissbluth, Davis, & Poncher, 1984), reflux, breathing problems (Carrol & Louglin, 1995; Gaultier, 1999), and periodic limb movement disorder (Picchietti & Walters, 1996). The preliminary assessment of a child's sleep problem should consider the potential involvement of such disorders and specific evaluation should be completed when they are suspected.

Research on behavioral interventions for childhood sleep disorders has generally demonstrated very positive outcomes, particularly in early childhood (see Kuhn & Elliott, 2003; Kuhn & Weidinger, 2000; Mindell, 1999; Owens, France, & Wiggs, 1999; Ramchandani, Wiggs, Webb, & Stores, 2000, for reviews). The combination of prevalent problems with promising interventions should encourage the establishment of clinical services for childhood sleep disorders and further research in this area.

This review: (a) introduces the common sleep problems seen in infants and children for which cognitive-behavioral interventions have been employed and assessed; (b) describes specific interventions and their evaluation studies; and (c) highlights methodological and clinical issues emanating from the literature that require farther research and discussion.

2. Review of treatment approaches

According to DSM-IV sleep disorders are divided into two main categories: Dyssomnias and Parasomnias (American Psychiatric Association, 1994). Dysomnias refers to disorders of initiating or maintaining sleep and to those related to excessive sleepiness. These disorders include Primary Insomnia, Primary Hypersomnia, Narcolepsy, Breathing-Related Sleep Disorder, and Circadian Rhythm Sleep Disorder. Parasomnias are disorders manifested in unique behaviors or physiologic phenomena occurring during sleep or sleep–wake transitions. The cognitive–behavioral interventions are mainly relevant to the Primary Insomnia disorders although some non-pharmacological interventions have been developed for other disorders as well.

The next two sections (settling and night waking/bedtime refusal and nighttime fears) have much in common and the main factor differentiating between these entities is the age and the developmental status of the child. Clinical interventions also tend to vary with the age of the child. However, it is important to note that there is significant overlap between settling problems in early childhood and bedtime refusal in older children and that nighttime fears, which are more common in older children, could also trigger settling and night waking problems in infants and toddlers.

2.1. *Settling and night-waking problems in early childhood*

The settling and night-waking problems are the most prevalent problems of the Primary Insomnia category. These disorders are also known as disorders of initiating and maintaining sleep (DIMS) or as “Nonorganic Insomnia” according to the ICD-10 classification (World Health Organization, 1992). A settling problem could be described as a persistent pattern of resistance to go to sleep or difficulty in falling asleep. In young children, this problem is usually manifested in an extended process of sleep initiation (e.g., lasting more than 30 min) that includes crying, refusal to go to, or stay in, bed, repeated demands from caregivers and significant disruptions to family life. Night-waking problems are presented as multiple and/or prolonged night-wakings. Unfortunately, specific criteria for the definition of settling and night-waking problems have yet to be established (for elaborated discussion see Gaylor, Goodlin-Jones, & Anders, 2001; Sadeh, 1996a, 2004; Tikotzky & Sadeh, 2001).

Cognitive–behavioral treatment for bedtime refusal and night-wakings in early childhood is based on working with the parents (or other caregivers) on changing their sleep-related interactions with their infants or toddlers and thus leading to a behavioral change in the child’s sleep patterns. This treatment has two main components: (a) modifying parental cognitions (expectations, interpretation, and emotions) vis-à-vis their child’s sleep-related behaviors, needs, and responses; and (b) modifying parental behaviors and responses to the child in an attempt to modify the child’s learned responses, expectations and behaviors. The cognitive component receives less explicit attention in the literature than the behavioral component, although clinicians often address parents’ cognitions considering it essential for the success of the behavioral component. Parental interactions are often influenced by their cognitions and interpretations of the child’s sleep-related behavior (Morrell, 1999). Many parents experience great difficulties modifying their bedtime interactions with their children because they perceive such new approach as neglectful, abusive or inappropriate. These negative interpretations are often associated with very strong negative emotions such as guilt, shame, and anger that serve as negative reinforcers for any change in parenting behavior (Morrell, 1999). It has been shown that

educating expectant parents and changing their cognitions could lead to positive effects on the early evolutions of the infant sleep–wake patterns (Wolfson et al., 1992).

From a behavioral perspective, one of the basic tenets is that settling problems and frequent night wakings are related to excessive parental bedtime involvement and rewarding behaviors. Therefore, some of the most common interventions are based on various modes of extinction. It is assumed that excessive efforts of the parents to calm their children and help them fall asleep impede the development of self-soothing skills and thus the child is more likely to require parental help every time he or she wakes up during the night. Bedtime interactions with parents are very rewarding and provide positive feedback that maintains dependence on parents. Research has shown that infants who rely on their parents during the settling process are more likely to have night-waking problems (e.g., Adair et al., 1991).

A number of extinction methods have been described and implemented in the treatment of early childhood settling and night-waking problems. These methods include the “standard” extinction and variations of graduated extinction. Other methods that are based on different rationales have also been suggested.

Standard Extinction (also called unmodified extinction) is based on totally ignoring the child after bedtime has been initiated (France, Blampied, & Wilkinson, 1991; Reid, Walter, & O’Leary, 1999; Rickert & Johnson, 1988). It is believed that after the child protests for a while, the exhaustion and the consistent absence of the rewarding parental presence will lead to self-soothing and sleep onset. Standard extinction has been demonstrated as an effective treatment for settling and night-waking problems in clinical research (France & Hudson, 1990; Reid et al., 1999; Rickert & Johnson, 1988; Seymour, Brock, During, & Poole, 1989). However, certain limitations of the method have also been highlighted in the literature. These limitations include compliance difficulties (e.g., Reid et al., 1999) and higher likelihood of post-extinction response bursts that may lead to relapse (Kuhn & Elliott, 2003).

Graduated Extinction methods are based on the same rationale of standard extinction: withdrawal of parental involvement in the sleep initiation process. However, these methods are more gradual and “allow” parents to visit the child at certain intervals and offer minimal help and reassurance (Douglas & Richman, 1988; Ferber, 1985). According to the “Checking” or “Minimal Checks” method, after the child is put to bed, if he or she continues to protest and cry, the parents should visit at specific intervals (e.g., every 5 min). These visits should be very short, their purpose being to show parental presence, and to provide the child with minimal assistance (e.g., returning to a sleeping position, providing a pacifier) and then to leave the room immediately. Ferber (1985) recommends gradually increasing the intervals between visits. The efficacy of the graduated extinction methods has been established in clinical research (e.g., Adams & Rickert, 1989; Durand & Mindell, 1990; Hiscock & Wake, 2002; Mindell & Durand, 1993; Reid et al., 1999; Sadeh, 1994). Furthermore, graduated extinction has been associated with better compliance and less stress than standard extinction (Reid et al., 1999).

Scheduled Awakenings is a different approach with a less well-understood rationale (Johnson & Lerner, 1985; Rickert & Johnson, 1988). The method consists of 1) learning the child’s baseline schedule of spontaneous awakenings and 2) instructing the parents to awaken the child a short time (e.g., 15 min) before the anticipated spontaneous awakenings. The child is then quickly encouraged to resume sleep. This procedure is followed with progressive increments of the intervals between induced awakenings thus leading to extended periods of consolidated sleep. For example, when a few days of awakening the child every 90 min reduce the number of spontaneous awakenings, the parents may extend the interval and awaken the child every 2 h. The scheduled awakenings approach received some support from

clinical research (Johnson & Lerner, 1985; Rickert & Johnson, 1988). Low parental compliance with the implementation of this method appears to be its major limitation.

Faded bedtime is another approach that is particularly relevant when the child is expected to go to sleep at a time that is not consistent with his or her natural tendency. The procedure involves changing, usually delaying, the child's bedtime to be consistent with the child's natural tendencies (i.e., when the child shows signs of increased fatigue and sleepiness) and adding calming and enjoyable activities prior to bedtime. When a smooth bedtime ritual has been established, the bedtime may be gradually advanced to an earlier hour if needed. Limited research has demonstrated the efficacy of these methods (Adams & Rickert, 1989). Faded bedtime with response cost is a similar method, in which bedtime is advanced only if the child falls asleep easily. If the child is having difficulty falling asleep, then bedtime is delayed further. The method is similar to sleep restriction that is used in the treatment of insomnia in adults (Morin, Culbert, & Schwartz, 1994). It is believed that sleep restriction enhances the physiological drive to sleep and facilitates the capacity to fall sleep. Indeed, research in school-age children have shown that delaying bedtime and the resultant sleep restriction lead to increased sleepiness at bedtime and shorter reported sleep latency (Sadeh, Gruber, & Raviv, 2003). Another experimental study demonstrated that severe sleep restriction in school age children lead to shorter sleep latencies on the Multiple Sleep Latency Test, indicating a stronger physiological drive to sleep (Randazzo, Muehlbach, Schweitzer, & Walsh, 1998). The faded bedtime with or without response cost has been shown to be effective in a number of studies (Ashbaugh & Peck, 1998; Piazza, Fisher, & Moser, 1991; Piazza & Fisher, 1991a, 1991b; Piazza, Fisher, & Sherer, 1997).

Parental Presence is another promising method (Sadeh, 1994), although the research on this method has been very limited. This method assumes that for many children (and parents) separation anxiety is a key factor in the presenting sleep problems. Therefore, the parents are guided to sleep in the child's room for a designated period (7–10 days) from bedtime to rise time with no further interactions with the child. The parents are instructed that if their child cries or protests for an extended period they should limit their intervention to helping the child return to a sleeping position. It is assumed that if anxious children receive constant assurance that their parents are nearby, they would be able to soothe themselves to sleep and their sleep would become more consolidated. Parental presence was found to be as effective as the standard checking method, using objective and subjective sleep measures (Sadeh, 1994).

Combined approaches. The literature includes studies that have used multiple methods including regularizing bedtime, extinction, rewards, fading and parental education (Largo & Hunziker, 1984; Richman, Douglas, Hunt, Lansdown, & Levere, 1985; Seymour et al., 1989). These studies reported promising results with more versatile behavioral packages with no specific comparison between their specific components.

2.2. *Bedtime refusal and nighttime fears in preschool- and school-age children*

Bedtime refusal and nighttime fears are symptoms of several DSM-IV diagnostic categories, including Primary Insomnia, Separation Anxiety Disorder, Generalized Anxiety Disorder and Posttraumatic Stress Disorder (American Psychiatric Association, 1994).

In many families, bedtime highlights issues of separation from the parent and from the social activities in the house. Bedtime may also present the challenge of staying alone in the dark and coping with nighttime fears (King, Ollendick, & Tonge, 1997). Recent studies have shown that nighttime fears are very prevalent among otherwise healthy children. For instance, 73.3% of children between 4 and 12

years of age report nighttime fears (Muris, Merckelbach, Ollendick, King, & Bogie, 2001). Scary dreams may also become a source of nighttime fears (Muris, Merckelbach, Gadet, & Moulaert, 2000). Nighttime fears are considered normal phenomena when they are transient and time limited. When nighttime fears persist for an extended period or when they cause significant distress to the child, clinical assessment and intervention should be considered.

Co-sleeping. Nighttime fears and separation anxieties could often be reduced with parental presence near the child's bed at bedtime or during the process of falling asleep. Many parents use this approach spontaneously while others allow the child to co-sleep in the parents' bed (Johnson, 1991; Rath & Okum, 1995). It appears that parental presence near the child's bed (or co-sleeping in the child's bedroom) is a very common parental response that is believed to produce a positive outcome in many cases. However, research on this specific element of intervention is lacking. The efficacy of this approach has only been demonstrated in infants and toddlers (Sadeh, 1994). In this study, parents were guided to let the child know that they will sleep next to his or her bed throughout the night and to avoid other communication and interactions once the lights were turned off. If the child responded by crying and protest, the parents were instructed to try to help him or her resume a sleeping position. These brief interventions should be initiated only after at least 5 min of persistent crying or protest. Parents were recommended to follow this procedure for a week and then gradually, and according to the child's response, withdraw from this co-sleeping arrangement or sustain it only during the sleep initiation process if needed.

Allowing the child to sleep in the parents' bed in response to nighttime fears may be effective in many cases (Johnson, 1991), but it could also serve as a reward and perpetuate the problem or lead to persistent co-sleeping problem for parents who are not interested in long term co-sleeping arrangement.

Combined CBT Techniques. The development of cognitive-behavioral interventions for nighttime fears has followed the general direction of interventions for fears, phobias and anxiety in children (Compton, Burns, Helen, & Robertson, 2002). These interventions are based on multiple techniques including self-control-training, desensitization, muscle relaxation, breathing exercises, positive imagery training, positive self-statements and positive reinforcement. The efficacy of these methods has been demonstrated in the literature in case studies and in a limited number of controlled studies. Most of the reports are based on a combination of techniques or treatment components and therefore the distinct importance of each component is difficult to assess.

The most extensive study on the treatment of nighttime fears was conducted by Graziano and Mooney (1980, 1982) who followed-up the treatment of 17 children (age range: 6.2–12.3 years) with intense nighttime fears and compared them to 16 children (age range: 6.0–13.5 years) in a randomized, waiting list control group (who received treatment 5 weeks later than the treatment group). The intervention was based on self-control training, relaxation techniques, positive imagery and self-statements. An additional important component was the provision of rewards for positive nocturnal "brave" behaviors. Significant improvement was reported for the intervention group and this improvement was maintained for most of the children more than 2.5 years later. Giebenhain and O'Dell (1984) used a multiple baseline design with 6 fearful children (3–11 years of age) to assess the efficacy of parent training in cognitive-behavioral methods that included desensitization, reinforcement, and verbal self-control statements to overcome children's fear of the dark. They reported reduced fear behavior following 2 weeks of treatment with maintenance of the positive results in follow-ups after 3, 6 and 12 months. Ollendick, Hagopian, and Huntzinger (1991) used a multiple baseline design to evaluate a two-phase treatment of two fearful girls. The initial phase of treatment included only self-control and cognitive components and

a second phase that included rewards for successful nights. They reported a minor improvement during the first phase (self-control only) and marked improvement following the introduction of reinforcement. The authors concluded that the inclusion of reinforcement significantly facilitates the efficacy of interventions based on self-control.

Other small studies have further demonstrated the efficacy of desensitization (King, Cranstoun, & Josephs, 1989), training children to replace their fear responses with fear-incompatible responses and operant reinforcement (Kellerman, 1980), and a combination of relaxation training, positive imagery, self-talk, and parental reinforcement (McMenamy & Katz, 1989).

2.3. Parasomnias

Parasomnias, which means “around sleep”, are a group of undesired, episodic physiological phenomena that occur during sleep or during the transition from sleep to partial wakefulness. Common parasomnias include sleepwalking (somnambulism), sleep talking, confusional arousals, nightmares, sleep terrors, intense body rocking and head banging. They are very common as discrete episodes during childhood and usually decrease in prevalence with age. For instance, Klackenberg, analyzed data from a longitudinal study and found 40% incidence of sleepwalking in children 4 to 16 years of age (Klackenberg, 1987). However, only 2–3% reported frequency of at least one episode a month. Night terrors were reported in 3.5% of the sample (only when the children were relatively young, up to 7 years of age). Rhythmic behaviors were reported in more than 50% of the sample during the first year of life with the rate gradually dropping to 5% at 5 years of age. The prevalence of sleepwalking appears to increase in early childhood, peaking to 16.7% at 12 years of age and then gradually dropping below 10% in adolescence (Klackenberg, 1987).

When these behaviors become very frequent or intense and disrupt the well-being of the child or the family, assessment should be considered. This assessment should include ruling out other primary sleep disorders (e.g., sleep-disordered breathing, restless leg syndrome, or nocturnal seizures) because these disorders might underlie, trigger or mimic sleep terrors and sleepwalking and their treatment may resolve the parasomnias (Guilleminault, Palombini, Pelayo, & Chervin, 2003).

The research on cognitive-behavioral interventions for the parasomnias has been very limited and includes a number of case studies. For instance, three case report studies have shown that a scheduled awakenings is an effective intervention for childhood sleep walking and sleep terrors (Durand, 2002; Durand & Mindell, 1999; Frank, Spirito, Stark, & Owens-Stively, 1997; Lask, 1988; Tobin, 1993). These case studies (some with multiple-baseline design) have shown that systematic awakenings of the child prior to anticipated sleep walking or night terror episodes led to a drop in the frequency of these parasomnias or to their total elimination. Parents are instructed to awaken the child every night 15–30 min before the anticipated night terror or sleep walking event. This procedure should be followed for a few (5–7) successive nights. Although the results of these clinical interventions were positive, the mechanisms by which scheduled awakenings affect arousal disorders in children is still unclear and their classification as a CBT approach is questionable. Clement (1970) reported positive outcomes following the treatment of a 7-year-old boy who had recurrent nightmares and sleepwalking. This single case reports was based on psychodynamic and behavioral rationale of breaking the association between aggressive feelings and sleepwalking. The treatment was based on waking up the boy every time he showed early signs of the somnambulistic episode and using symbolic methods for the child to express his, assumingly suppressed, anger and

aggressive feelings. This approach to treatment and the links between sleepwalking episodes and emotional regulation and expression of aggressive feelings during wakefulness have not been systematically studied.

2.3.1. *Nightmare disorder*

The main diagnostic criteria for Nightmare Disorder (American Psychiatric Association, 1994) is repeated awakenings from sleep with recall of terrifying dreams that usually involve threats to survival, safety and self-esteem. Very young children may not be able to produce verbal recall but usually appear disoriented and non-communicative. On awakening from these scary dreams, the child rapidly becomes oriented and usually responds well to parental comfort. A variety of cognitive-behavioral methods have been used to treat nightmares in children (Cavior & Deutsch, 1975; Krakow et al., 2001; Maurer & Schaefer, 1998; Palace & Johnston, 1989; Pellicer, 1993; Roberts & Gordon, 1979). These methods included systematic desensitization, imagery rehearsal, relaxation techniques, extinction and eye movement desensitization. These brief interventions yielded positive outcomes although most of the conclusions are based on case reports or studies with limited control.

2.3.2. *Rhythmic behaviors*

During the transition to sleep most infants and young children exercise self-soothing rhythmic behaviors (Klackenberg, 1987). When body rocking or head banging becomes very intense and potentially self-injurious, treatment is often sought. However, reports on treating intense body rocking and head banging are very scarce (Balaschak & Mostofsky, 1980; Golding, 1998; Strauss, Rubinoff, & Atkeson, 1983). These case studies describe a variety of cognitive-behavioral treatment components including immediate feedback when head banging occurs, rewarding the child for nocturnal periods with no head banging, and negative or aversive contingencies to head banging episodes.

2.4. *Early intervention and prevention*

A number of studies have demonstrated the potential of early intervention and prevention programs in facilitating the development of healthy sleep patterns (Kerr, Jowett, & Smith, 1996; Pinilla & Birch, 1993; Wolfson et al., 1992; Wolfson, 1998). These programs are based on educating parents about the development of sleep and about behavioral principles that prevent the development of early sleep problems.

For instance, Wolfson et al. (1992) studied the effects of four training sessions with expectant parents on the evolving sleep patterns of their infants at 6–9 weeks of age. The trained parents received information on how to expand the intervals between feedings during the night, how to help the infant discriminate between day and night, how to encourage self-soothing and related topics. The control group received similar attention without the specific sleep-related training. The results showed that the infants of the trained parents slept better than those of parents in the control group at 6–9 weeks of age. However, these differences were not found in a follow-up at 20 weeks of age. Kerr et al. (1996) conducted a similar study, educating parents of 3-month-old infants about sleep and settling methods. When the infants were 9 months of age, a significantly smaller percentage of the infants of the trained parents had settling and night-waking problems in comparison to the infants of the control parents.

2.5. Behavioral interventions as adjunct to the treatment of sleep disordered breathing

In addition to direct interventions for difficulties initiating and maintaining sleep during childhood, cognitive-behavioral methods have been used to facilitate the compliance of children with medical treatment for sleep disordered breathing, such as obstructive sleep apnea. This disorder is medically treated by surgical removal of the blocking tissues (most commonly adenoids and tonsils) (Carrol & Loughlin, 1995) or with the use of continuous positive airway pressure (CPAP) therapy (Marcus et al., 1995). CPAP therapy is based on providing ventilation with positive pressure that overcomes the occlusions of the airways. The treatment requires the child to attach a breathing mask and use it continuously during sleep. This treatment does not resolve the problem but it significantly improves sleep. Having a young child sleep with a facemask every night is a challenging task and compliance is a significant problem (Koontz, Slifer, Cataldo, & Marcus, 2003; Marcus et al., 1995). Recently, it has been demonstrated that behavioral intervention could facilitate the compliance with continuous positive airway pressure (CPAP) therapies in children with obstructive sleep apnea (Koontz et al., 2003). This behavioral intervention was based on gradual exposure to CPAP-related equipment (e.g., playing with the mask, wearing the mask, keeping the mask attached) and positive reinforcement for appropriate interactions and behaviors.

The results indicated that children participating in the behavioral intervention have significantly improved their compliance from baseline to post-treatment, whereas children who failed to participate in the behavioral intervention showed the opposite tendency. Notwithstanding the limitations of this study, it does suggest that behavioral intervention might facilitate compliance with CPAP treatment as has been shown with other medical procedures (e.g., Slifer, Tucker, & Dahlquist, 2002).

3. Methodological issues

One of the major methodological issues in evaluating the efficacy of treatments for childhood sleep disorders is the method used to assess sleep-wake patterns. In many domains of cognitive-behavioral treatments, the target behavior can only be quantified by subjective reports of the individual (or caregivers). However, sleep patterns can also be assessed by objective means that allow exact quantification of the baseline sleep problem (e.g., how many times the child awakens during the night) and how it changes over the course of treatment. Modern technologies (e.g., time-lapse video and actigraphy) allows non-intrusive continuous monitoring for extended periods in the natural sleep setting of the child (Anders, 1980; Anders, Halpern, & Hua, 1992; Anders & Sostek, 1976; Sadeh, 1994, 1996a; Sadeh, Lavie, Scher, Tirosh, & Epstein, 1991; Thoman & Acebo, 1995). Unfortunately, these methods, which have been adopted by developmental sleep researchers, are rarely adopted in the evaluation of clinical interventions. In addition to providing objective data on treatment efficacy, such methodology can shed light on questions such as “What really changes following behavioral interventions such as extinction for frequent night-wakings?”, “Does sleep really improve or does the child develop self-soothing skills and require less parental help during the night?”. One intervention study has shown, using actigraphy, that both processes do actually occur (Sadeh, 1994). Sleep improves gradually as manifested in gradual decrease in night-wakings identified by actigraphy, but the more immediate and pronounced process is that these children learn to soothe themselves to sleep. Thus, the sharp decrease in night-wakings reported by parents is

probably linked to the fact that parents are less likely to be aware of night-wakings of their self-soothing child.

Actigraphic studies have also demonstrated the significant discrepancy between parental reports and objective data on children's night-wakings (Sadeh, 1994, 1996a; Sadeh et al., 1991; Tikotzky & Sadeh, 2001). Furthermore, based on the comparison between actigraphic and parental sleep diaries it has been concluded that parents may lose motivation or get tired of the "bookkeeping" involved in completing daily logs in extended follow-up studies using diaries they may tend to miss reporting on each and every night-wakings, and this process by itself could lead to inflated treatment effects (Sadeh, 1994).

It has been established that cognitive-behavioral interventions for sleep problems lead to a rapid and significant clinical improvement. However, most of the treatment outcome literature is based on a very short follow-up assessment period, mostly within weeks or a few months after treatment (Mindell, 1999). It has been recently argued that relapse is relatively common following brief clinical interventions for a variety of disorders and that a positive response after a few sessions is very common but not necessarily a lasting one (e.g., Westen, Novotny, & Thompson-Brenner, 2004). These seemingly recurrent findings in the clinical research of brief interventions are intriguing. Clinical research on interventions for childhood sleep problems should, therefore, address the issue of relapse more systematically by including long-term follow-up.

Another important methodological question is related to the fact that many different treatment approaches yield very promising treatment results. This may indicate that there are important common (overt and covert) elements that lead to positive results (e.g., emotional support to parents, withdrawal of parental involvement). To better understand the essential curative factors, outcome and research should directly compare therapies that differ in distinct key elements. In addition, process research could provide complimentary information and help identify additional therapeutic elements (see Shirk & Russell, 1996, for a review on process research and its potential contribution).

3.1. Means of delivery

Principles and knowledge based on cognitive-behavioral approaches could be delivered by different means. Interventions could rely on clinical sessions with professionals (e.g., psychologists, pediatricians), or paraprofessionals (e.g., healthcare visitors), or could be delivered through written material (parental guides, books and magazines). A few studies addressed the issue of mode of delivery and compared the effects of clinical sessions delivered by a therapist with intervention based on information booklet (Montgomery, Stores, & Wiggs, 2004; Scott & Richards, 1990; Seymour et al., 1989). These studies found that both approaches were equally effective in comparison to control groups. These results raise very important issues related to healthcare delivery and seriously challenge the traditional therapist-based interventions. Therapist-based interventions are expensive to the healthcare system and cannot reach many potential families in need. In contrast, written guides and information are inexpensive and could be delivered to wider populations, including those who live in remote areas. Popular books written by professionals for parents (e.g., Douglas & Richman, 1988; Ferber, 1985; Mindell, 1997; Sadeh, 2001; Weissbluth, 1999) provide accessible information and intervention guidelines that have been adopted by many parents. Indeed, one survey demonstrated that a very high proportion of parents adopt methods presented in the media (childcare TV programs, parenting books and magazines) and utilize them with impressive rates of success (Johnson, 1991). Interestingly, the results of this study also suggested that parents are more likely to seek information about sleep from

relatives, friends, or books and magazines than from professionals. Recently, the efficacy of Internet-based interventions for insomnia in adults has been demonstrated (Strom, Pettersson, & Andersson, 2004). If supported by scientific data, the Internet could become an additional powerful interactive mode of delivery of intervention for sleep disorders in children.

Finally, although empirical support has been provided for cognitive-behavioral interventions for sleep problems in infants and children, the limitations and biases embedded in establishing interventions on the basis of current scientific approaches should not be overlooked (for a thorough review of this topic see Westen et al., 2004).

4. Summary and conclusions

The efficacy of cognitive-behavioral interventions for childhood sleep disorders has been repeatedly demonstrated in controlled studies and clinical case reports (France & Hudson, 1993; Kuhn & Elliott, 2003; Mindell, 1999; Owens et al., 1999; Ramchandani et al., 2000). Specific interventions for specific sleep problems have gained the status of established evidence-based interventions (Kuhn & Elliott, 2003; Mindell, 1999). The issue that received most attention pertains to settling problems and night-wakings in infants and toddlers. This topic has been extensively studied with an impressive volume of well-controlled and informative clinical studies. It appears that clinical research of all other sleep problems and in other age ranges is still very limited.

Further research is needed to establish evidence-based interventions, to understand the specific “curative” factors of each intervention, and to discern when different modes of delivery should be utilized. The issue of specificity of treatment is of major importance for clinical research, particularly in light of the fact that different approaches, based on different rationales, have yielded good outcomes.

Another important issue that has not received proper attention is the long-term effects of treating sleep problems in early childhood. The literature provides ample evidence to the links between sleep problems and compromised neurobehavioral functioning and psychopathology in children. However, there is no substantial evidence for the long-term benefits of treating sleep problems in early childhood. With very few exceptions, most follow-up studies on behavioral interventions have been limited to 6–12 months after the interventions (Mindell, 1999). The relatively fast positive outcome and the relief to the child and the family provide good rationale for the interventions. Still, an understanding of the long-term consequences of non-treated sleep problems or insufficient sleep in early childhood is very important. Is there a critical period in child development during which sleeplessness adversely affects the sleepless brain in an irreversible manner, thus leading to pathological long-term consequences? Does treating sleep-disturbed infants protect them from such irreversible damage? The literature also suggests that sleep problems in early childhood are very persistent and that adult insomnia often has its origins in early sleep problems (Hauri & Olmstead, 1980; Kataria et al., 1987; Lam et al., 2003; Zuckerman et al., 1987). This raises the possibility that treating sleep problems in early childhood could prevent insomnia in adulthood, but this possibility is yet to receive empirical support.

Another point that deserves more attention is the role of addressing parental cognitions about their child's sleep and bedtime interactions. Most of the literature on the clinical research in this field focuses on the role of behavioral interventions per se. Very limited attention has been paid to underlying parental cognitions and how they may affect the etiology and persistence of the sleep problem, or compliance with implementing behavioral interventions. I believe that clinicians in this field are aware

of and address the strong cognitions, emotions, and resistance that extinction-based procedures trigger in many parents. It is surprising that the cognitive-behavioral literature on treating sleep problems in children rarely addresses the issues associated with modifying parental cognitions so that they would become more receptive to changing their own behaviors. Consequently, clinical research has not addressed the efficacy of any interventions aimed at modifying parental cognitions. This is not the case in the adult insomnia literature in which the important role of CBT in modifying dysfunctional cognitions has been demonstrated (Edinger, Wohlgenuth, Radtke, Marsh, & Quillian, 2001; Morin, Blais, & Savard, 2002). Future clinical reports and research should echo these issues and systematically scrutinize them.

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