

# Empirically Supported Treatments in Pediatric Psychology: Bedtime Refusal and Night Wakings in Young Children

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**Objective:** To review the literature for empirically supported treatments for bedtime refusal and night wakings in young children.

**Methods:** An extensive review of the literature resulted in the inclusion of 41 studies that were evaluated according to the criteria established by the Task Force on Promotion and Dissemination of Psychological Procedures (1995).

**Results:** Evidence exists indicating that extinction and parent education on the prevention of sleep problems can be considered well-established treatments. Furthermore, graduated extinction and scheduled awakenings are probably efficacious treatments, with positive routines a promising intervention.

**Conclusions:** A discussion of effectiveness, treatment feasibility, cost-effectiveness, and methodological limitations of the studies is provided. Recommendations for future directions for research in the treatment of these two common sleep disorders are presented.

**Key words:** *children; sleep; sleep disorders.*

Of the behavioral problems frequently experienced by young children, a common concern is the sleep of infants and toddlers, primarily bedtime difficulties and frequent night wakings (McGarr & Hovell, 1980; Mindell, 1993). These sleep problems are experienced by approximately 20%–25% of children between the ages of 1 and 5 years (Bixler, Kales, Scharf, Kales, & Leo, 1976; Carey, 1974; Dollinger, 1982; Jenkins, Bax, & Hart, 1980; Lozoff, Wolf, & Davis, 1975; Richman, 1981; Richman, Stevenson, & Graham, 1975; Salzarulo & Chevalier, 1983) and are one of the most common complaints presented to pediatricians (Mindell, Moline, Zendell,

Brown, & Fry, 1994). These types of sleep disturbances also tend to persist, especially from infancy to later childhood (e.g., Abe, Ohta, Amatori, & Oda, 1982; Bernal, 1973; Clements et al., 1986; Jones, Ferreira, Brown, & Macdonald, 1978; Richman, Stevenson, & Graham, 1982; Salzarulo & Chevalier, 1983). Kataria, Swanson, and Trevathan (1987) found that 84% of their sample of children had persistence of sleep disturbances after three years. And Pollock (1992, 1994) reported in a long-term, longitudinal study that sleep problems were more likely at the ages of 5 and 10 in those children who had sleep problems before the age of 6 months.

Given the prevalence of sleep problems in young children, it is important to know what are appropriate and effective treatment strategies. We

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know that some common recommendations are ineffective. Some inappropriate suggestions include changing the child's diet or feeding schedule, consoling the parents with the notion that the child will outgrow the problem, or prescribing sedatives (Mindell et al., 1994). Changes in feeding schedules do not affect nighttime sleep and, as mentioned, children do not usually outgrow sleep problems (Macknin, Medendorp, & Maier, 1989). Furthermore, studies on the efficacy of drug treatments indicate their moderate results (e.g., Richman, 1985; Simonoff & Stores, 1987). Russo, Gururaj, and Allen (1976) treated 50 2- to 12-year-olds with diphenhydramine. The medication was significantly better than placebo in improving the children's sleep, but provided only moderate improvement. Other studies have found drug treatments to be of limited value, and sleep problems usually return once the medication is discontinued (e.g., Kales, Allen, Scharf, Kales, 1970; Richman, 1985). As stated by Jackson and Rawlins (1977), "[T]he problem of the sleepless toddler is not going to be solved by a three-minute consultation and a bottle of medicine."

To date, all published psychologically based treatment studies for early childhood sleep problems have primarily utilized behavioral strategies. Behavioral interventions are based on the belief that parents play an important role in maintaining bedtime difficulties and night wakings (e.g., Adair, Bauchner, Philipp, Levenson, & Zuckerman, 1991). For children with sleep problems, falling asleep is often associated with parental interventions, and the child may have difficulty returning to sleep until those conditions are reinstated.

The purpose of this article is to evaluate the efficacy of various behavioral interventions for sleep problems and establish which therapeutic approaches are empirically supported.

## Review of the Literature

To determine whether there are clearly documented successful treatments available for sleep problems in young children, a comprehensive review of the literature using PsychLit and MedLine, as well as reference lists from selected papers and review articles was conducted. Studies were included based on several selection criteria. First, the study must have as its primary focus treatment of sleep problems. A few studies were included, however, in which the focus of the paper was on another issue (e.g., evaluation

of the assessment measure utilized), but the basis of the project was a treatment study. Second, the focus of treatment must be on one of two behaviors of interest, bedtime problems (e.g., bedtime refusal, bedtime tantrums) and/or frequent night wakings. Last, the study must utilize as its sample children ages 5 and under. The several studies excluded from this review included elementary-age children or older and also happened to target special populations (e.g., Bramble, 1997; Piazza & Fisher, 1991a, 1991b; Piazza, Fisher, & Scherer, 1997). Age was limited to maintain consistency in the type of problems being treated. In all, 41 studies were selected.

Tables 1 through 5 present summary information on the 41 studies evaluated. Information is provided on the following variables: number of subjects, age and gender of subjects (most studies did not provide data on race and thus, if specified, it is included in the text), the precision of diagnostic criteria (poorly defined, moderately defined, or well defined), length of baseline, assessment measures, experimental design, treatment protocol (unclear, poorly documented, moderately documented, well documented) and any specifics of treatment, target behavior(s), presence of a control group, length of follow-up, and additional comments. The tables are organized by treatment technique. Thus, some papers are presented twice in the tables if two treatment techniques were compared in the study.

All studies were subjected to what will be called the Chambless criteria (Chambless & Hollon, 1998; Task Force on Promotion and Dissemination of Psychological Procedures, 1995) in order to evaluate whether a specific treatment technique is efficacious. According to these criteria, three decisions can be made. First, a technique is *well established* if at least two good between-group design experiments or a large series of single-case design experiments demonstrated efficacy. In addition, the effects must be demonstrated by two different investigators or investigatory teams. Second, if two experiments show that treatment is more effective than a waiting-list control group or the criteria for a well-established treatment are met but only by one investigator, then an intervention is deemed *probably efficacious*. And, last, if at least one well-controlled study and another less rigorously controlled study have been done, or two or more well-controlled studies with small numbers, or two or more well-controlled studies by the same investigator have been conducted, then the technique is considered a *promising intervention*.

In all, four specific interventions were exam-

ined: extinction, graduated extinction, positive routines, and scheduled awakenings. A fifth group of studies that use different packages of interventions, primarily as multicomponent treatment programs is also evaluated. And, last, parent education leading to prevention of sleep problems is reviewed. In this article, a discussion of the efficacy of each intervention as it relates to the Chambless criteria is first presented, followed by a consideration of effectiveness, treatment feasibility, and cost-effectiveness.

### **Extinction**

The first studies conducted on the treatment of early childhood sleep problems focused on the use of extinction. Extinction procedures for sleep problems involve having the parents put the child to bed at a designated bedtime and then systematically ignoring the child until a set time the next morning. The first study that used this technique was conducted by Williams (1958) with a 21-month-old girl. Her parents were instructed to put her to bed in a "leisurely and relaxed fashion," and then not to return to her even if she had a tantrum. Outcome was based on the duration of crying in minutes as reported by her parents. Since that time, additional studies have been conducted that include larger sample sizes and control groups (see Table 1).

Applying the Chambless et al. (1995) criteria leads to the conclusion that extinction is a *well-established* treatment, as treatment efficacy was found by three separate investigation teams in well-controlled, between-subject, randomized studies. Rickert and Johnson (1988) demonstrated that extinction is more effective than a control group in a study focused on night wakings. The 33 participants were recruited via newspaper advertisements. All were randomly assigned to one of three conditions: systematic ignoring, scheduled awakenings, or a control condition. In the systematic ignoring condition, upon hearing their children wake at night the parents were to initially check on their child's safety in a cursory fashion and then to ignore their child's cries for the duration of the night waking. No further checking was to be done by the parents. The results of this study were based on parental report via diaries with the inclusion of a reliability check by a second parent. Overall, extinction was more effective than a control group and led to quicker improvement than scheduled awakenings.

The second, larger-scale study was conducted by France and colleagues (France, 1992; France, Blam-

pie, & Wilkinson, 1991). In this study, the first 13 consecutive participants were assigned to extinction only. The following 22 were randomly assigned to either extinction plus trimeprazine or extinction plus placebo group. For all participants, the extinction program included a regular bedtime routine and the child was not attended to after being put to bed unless the parents deemed it absolutely necessary (as outlined in France and Hudson, 1990). Results were based on parental diaries, with the inclusion of a reliability check utilizing a voice-activated relay system (VOR) for a subset of subjects. Agreement between the parental recordings and the VOR was 91%. All subjects were successfully treated, with those in the extinction plus medication group having the quickest response. A follow-up study was conducted by France (1992), with all participants being re-evaluated between 6 and 30 months later and compared to 13 untreated and 15 normal sleep controls. Significant improvements were found at follow-up for the treated group, with no change in the untreated controls.

Two additional larger-scale studies were conducted by Seymour and colleagues. In their first study (Seymour, Bayfield, Brock, & During, 1983), they found that a multicomponent treatment program that included a set bedtime, bedtime routine, and ignoring of all crying was successful in significantly reducing sleep problems in 208 children. A within-subjects design was utilized, and diary comparisons between baseline and posttreatment indicated significant improvement in 78% of participants. In their second study, Seymour, Brock, During, and Poole (1989) randomly assigned 45 children to either standard treatment as described above, written information only, or a waiting-list control group. Children in the two intervention groups showed significant improvement over the children in the control group. No differences were found between the two intervention groups. Thus, parents who received written information only did as well as those who had additional therapist support.

Two other studies have also evaluated the effectiveness of extinction procedures for sleep problems. Rapoff, Christophersen, and Rapoff (1982) treated six children with sleep problems and compared their outcome to four nonproblem children. Treatment included a set bedtime and quiet bedtime routine, and then the parents were to ignore their child after they were put to bed. If the child came out of the bedroom, the parents were to "administer one swat and without talking, return their

**Table 1.** Summary of Literature on Treatment with Extinction

Article	Subjects	Diagnostic criteria	Baseline	Assmt measures	Experimental design	Treatment protocol	Target behavior	Control	Follow-up	Comments/outcome
Williams (1958)	1F 21 mos	—	none	diary	case history	none	Bedtime	none	2 yrs	Extinction effective in dec duration of crying at bedtime
Rapoff et al. (1982)	6 24–54 mos	mod defined	6–10 days	audiotape	multiple-baseline	well documented	Bedtime	—	7–15 mos	Effective for 50% of subjects
Seymour et al. (1983)	208 0–6 yrs M,F?	mod defined	4–7 days	diary; parent report	within-subject	well documented; 2 visits	Bedtime & night waking	none	6 mos	Effective for 78% of subjects
Chadez & Nurius (1987)	1 F 7 mos	—	6 days	diary; parent report	Single-subject: ABAB design	unclear	Night waking	—	47 days	Extinction effective only with cognitive restructuring for parents
Rickert & Johnson (1988)	33 6–54 mos 18m, 15F	mod defined	1 week	diary	between-group	well documented	Night waking	control/ sched awaken.	6 weeks	Extinction = scheduled awakenings > control; Extinction quicker results
Seymour et al. (1989)	45 9–60 mos 28M, 17F	well defined	none	diary; question	between-group	well documented; varied	Bedtime & night waking	wait-list control	3 mos	Compared written instruction to therapist-guided. Equally effective; both more than control
France & Hudson (1990)	7 8–20 mos 5M, 2F	well defined	1–8 wks	diary; quest; recording device	multiple-baseline	well documented; Daily contact	Night waking	—	3 mos; 2 yrs	Significant improvement in night wakings
France et al. (1991)/ France (1992)	45 7–27 mos 17M, 18F (10: sex unknown)	mod defined	2 weeks	diary	between-group	well documented; Every other day	Night waking	extinction + med/ placebo	6, 18, or 30 mos	Ext < effective than ext + drug; More effective than placebo

child to bed.” A multiple-baseline design across children was used, although the researchers were not able to wait for stabilization of behavior during the baseline period as scheduled appointments were made without knowledge of baseline behavior. The treatment was found to be effective for 50% of the families, as demonstrated by parent diary and audiotapes. And, finally, Chadez and Nurius (1987) successfully treated a 7-month-old with extinction, but only found treatment to be successful once they also targeted the parents’ response with cognitive restructuring. A quasi-reversal design indicated that extinction was successful only when supplemented with the parental intervention.

### **Graduated Extinction**

Extinction procedures can be quite stressful for parents. Many parents cannot ignore bedtime crying behavior long enough for the procedure to be effective or are not willing to allow their child to “cry it out.” Rather than having the child cry for extended periods, other studies have supported the use of a graduated extinction procedure. Although the term “graduated extinction” seems to be used for one specific treatment, it actually encompasses a variety of different techniques employed. Table 2 presents those studies that have employed graduated extinction. Under the Chambless criteria (1995), gradua-

**Table II.** Summary of Literature on Treatment with Graduated Extinction

Article	Subjects	Diagnostic criteria	Baseline	Assmt measures	Experimental design	Treatment protocol	Target behavior	Control	Follow-up	Comments/outcome
Rolider & Van Houten (1984)	3 24–30 mos 3M	poorly defined	5–15 days	diary	multiple-baseline	well documented; daily	Bedtime	—	70 days	Inc. duration to attend at bedtime; Effective for bedtime problems Not traditional grad. extinction
Pritchard & Appleton (1988)	31 9–42 mos 19M, 12F	well defined	6 days	diary	between-group	well documented; daily	Bedtime & night waking	control group	3 mos	Wait 10 or 20 min. before check; Effective
Adams & Rickert (1989)	36 18–48 mos 16M, 20F	mod defined	7 weeks	diary; reliability ck	between-group	well documented; weekly	Bedtime	control group	6 weeks	Checking technique; Equal to positive routine; more difficult for parents
Durand & Mindell (1990)	1F 14 mos	mod defined	3 weeks	diary, videotape	multiple-baseline	well documented; 2 sessions	Bedtime & night waking	—	9 mos	Checking technique; Effective
Lawton et al. (1991)	6 6–14 mos 2M, 4F	mod defined	2–5 weeks	diary; reliability ck	multiple-baseline	well documented; weekly	Bedtime & night waking	—	120 days	Dec duration of attention at bedtime/night wake; Improvements in 4/6 children; Decreased extinction burst
Mindell & Durand (1993)	6 18–52 mos 4M, 2F	well defined	2–4 weeks	diary, videotape	multiple-baseline simultaneous replication	well documented; 2 sessions	Bedtime & night waking	—	1 mos	Checking technique at bedtime; Treatment at bedtime generalized to night wakings
Sadeh (1994)	50 9–24 mos 28M, 22F	well defined	1 week	diary; actigraph	between-group	well documented; weekly	Night waking	none	3 week	Checking technique; Effective; Equal to parent cosleeping

ted extinction is considered *probably efficacious*, given there is one well-controlled, randomized study and a number of within-subject and multiple-baseline studies.

The one well-controlled, randomized study was conducted by Adams and Rickert (1989). Their study of 36 toddlers and preschoolers (33 Caucasian, 4 Hispanic) found both graduated extinction and positive routines to be equally effective in reducing bedtime tantrum activity. This group of children, who all exhibited bedtime tantrums, were randomly assigned to one of three groups: graduated extinction, positive routines, or control. Children were recruited from newspaper advertisements and advertisements posted in day-care settings. In the graduated extinction group, parents were to maintain their child's already established bedtime, but were not told to engage in a positive bedtime

routine. Parents were instructed to ignore bedtime tantrums for specified periods of time (the duration of time to check was tailored to the child's age and the duration that the parents believed that they could ignore their child). The checking procedure involved the parents comforting their child for 15 seconds or less. Graduated extinction, as well as positive routines, was significantly more effective than a control group. Results were based on parental report, with an independent rater of bedtime behavior.

Two other larger sample studies have been conducted. Pritchard and Appleton (1988) found graduated extinction effective in a study of 31 young children. All children were referred from a health visitor or a physician. The children were randomly assigned to either frequent visits (every 2–3 days) with the treating therapist or no scheduled visits

until 2 weeks later. The treatment program involved the development of a bedtime routine and waiting for 20 minutes before checking on the child at bedtime. When the child woke at night, the parents were to do an immediate cursory check and then respond every 10 minutes thereafter. The results indicated that significant improvements were found following treatment, with no differences between the two groups observed.

Sadeh (1994) also demonstrated the efficacy of graduated extinction. In his study, 50 infants were randomly assigned to a graduated extinction treatment or a co-sleeping intervention. Graduated extinction involved the parents waiting progressively longer periods of time prior to checking on their child. The co-sleeping program involved one of the parents sleeping in the child's bedroom for 1 week without having any other involvement with the child during the night. The results were based on parental diaries and actigraphy data. Parental data indicated that 60% of the children significantly improved and 52% showed significant improvement based on actigraphy recordings, with no significant differences between the two interventions. Unfortunately, no control group was incorporated into this study. An interesting finding was noted when comparing parental report to actigraphy, which was the primary focus of this study. A growing discrepancy between parental report and the objective measure of sleep was observed over time, with parents reporting fewer night wakings than were recorded objectively. This discrepancy appeared to be related to both the parents' tendency to report fewer wakings and by the finding that the infants were less likely to signal their parents when they woke up.

Other smaller-scale studies have also demonstrated the efficacy of graduated extinction. In the first study ever published on this technique (Rolder & Van Houten, 1984), a multiple-baseline design was used with three children. Treatment involved the parents waiting a specified period of time before going in to pick up their child. The initial duration was based on baseline measures of how long the parents usually waited before responding to their child. Every 2 nights, the waiting period was increased by 5 minutes. In this study, the graduated extinction procedure gave parents time to practice ignoring their child's cries. The extinction aspect of this treatment occurred after the parents were ignoring their child's cries long enough that the child fell asleep.

Lawton, France, and Blampied (1991) treated

seven children with graduated extinction, also employing a multiple-baseline design. A set bedtime and bedtime routine were established for each child. Their use of graduated extinction was a different modified extinction technique. The average duration of the time each parent typically attended to their child at bedtime was determined for each child. Treatment involved the parents reducing this attending time by one seventh every 4 days so that by 28 days no attention was being given. During the second phase of treatment, following these initial 28 days, the parents were not to respond to their child between bedtime and a set waketime, unless it was deemed absolutely necessary. Treatment was successful for significantly reducing the frequency and duration of night wakings in three of the six children, with a fourth having a significant reduction in the duration of night wakings.

Mindell and Durand (Durand & Mindell, 1990; Mindell & Durand, 1993) presented two studies supporting the efficacy of graduated extinction. In their first study (Durand & Mindell, 1990), a graduated extinction technique was employed that involved the parents waiting progressively longer periods of time, in 5-minute increments, before checking on their child. Each subsequent night the first period to wait was increased by five minutes, with the longest period being 20 minutes. This single-subject study, involving a 14-month-old girl, employed a multiple-baseline design across problem. First, night wakings were successfully treated, followed by treatment of bedtime problems. The second study (Mindell & Durand, 1993) used a similar graduated extinction technique for six children, as well as included a set bedtime and bedtime routine. In this study, all children were treated for bedtime problems first in a multiple-baseline across-subjects design. They found that successful treatment of bedtime problems also led to generalization of treatment for night wakings for five of the six subjects. That is, when the children were taught to fall asleep on their own at bedtime, a decrease in the incidence of night wakings occurred concurrently. All data presented in these two studies were based on parental sleep diaries, validated by video and audiotape.

### **Positive Routines**

Only three studies have been conducted on the use of positive bedtime routines (see Table 3). Positive routines involve the parents developing a set bed-

**Table III.** Summary of Literature on Treatment with Positive Bedtime Routines

Article	Subjects	Diagnostic criteria	Baseline	Assmt measures	Experimental design	Treatment protocol	Target behavior	Control	Follow-up	Comments/outcome
Milan et al. (1981)	3 2–15 yrs 2M, 1F	poorly defined	5 days	diary; reliability ck	ABC replication	well documented	Bedtime	none	1–2 yrs	Severely handicapped population
Adams & Rickert (1989)	36 18–48 mos 20M, 16F	mod defined	7 weeks	diary	between-group	well documented; weekly	Bedtime	control group	6 weeks	Equal to grad extinct; easier for parents
Galbraith et al. (1993)	45 5–72 mos 28M, 17F	mod defined	unclear	diary	within-subject	mod documented	Bedtime & night waking	none	2–18 mos	70% success rate; 62% at follow-up

time routine of calm activities that the child enjoys. Positive routines can be considered a *promising intervention* according to the Chambless criteria (1995), as one larger well-controlled study has found this treatment technique to be efficacious.

Adams and Rickert (1989), as discussed above, randomly assigned 36 toddlers and preschoolers who exhibited bedtime tantrums to one of three groups: positive routines, graduated extinction, or control. Positive routines involved changing the child's bedtime to his or her naturally occurring bedtime and engaging in four to seven enjoyable behaviors prior to bedtime. If a tantrum occurred, the parent was to end the routine and tell the child it was time for bed. This paper, however, did not state what the parents were instructed to do if the child tantrumed after bedtime. In addition, the child's bedtime was systematically moved earlier until it coincided with the desired bedtime. This study demonstrated that positive routines were equal in effectiveness to graduated extinction and more effective than the control group.

Milan, Mitchell, Berger, and Pierson (1981) conducted the first study of positive routines with three severely handicapped children (ages 2, 4, and 15; 1 Black, 1 Hispanic, 1 Caucasian), in a within-subject design. The behavior of focus was severe bedtime tantrums, as reported by parents and with reliability checks by observers. All three children significantly improved with treatment; however, no experimental control was included in this study.

And, last, Galbraith, Pritchard, and Hewitt (1993) reported that positive routines were effective in the treatment of 45 young children, although no control group was included in this study. This study also employed a within-subjects design, with outcome based on parental diaries.

### **Scheduled Awakenings**

Scheduled awakenings involve the parent awakening and consoling the child approximately 15 minutes before a typical spontaneous awakening. Scheduled awakenings are then faded out. Data indicate that scheduled awakenings as a treatment of night wakings are *probably efficacious* (see Table 4). In the only large sample study conducted ( $N = 33$ ), as described above, scheduled awakenings were found to be more effective than a control group and equally effective as systematic ignoring, although it took longer to institute change (Rickert & Johnson, 1988).

Earlier studies by the same investigators were also conducted. The first study (Johnson, Bradley-Johnson, & Stack, 1981) employed a multiple-baseline design across participants for three children ages 12 months or less. Elimination of crying was apparent for the two children whose parents followed through on the treatment recommendations. The parents of the third baby had problems implementing scheduled awakenings and withdrew from the study. In the second study (Johnson & Lerner, 1985), 12 young children were treated within a multiple-baseline across-subjects design. Compliance to the procedure ranged from 10% to 97%, with a mean of 77%. A significant association was found between parental compliance and the effectiveness of treatment.

Only one other study by an independent investigator was done on scheduled awakenings. McGarr and Hovell (1980) successfully used scheduled awakenings with a 3-month-old infant. The basis of their scheduled awakenings was to provide parental attention for increasing periods of sleep, and thus the mother was instructed to wake and soothe her

**Table IV.** Summary of Literature on Treatment with Scheduled Awakenings

Article	Subjects	Diagnostic criteria	Baseline	Assmt measures	Experimental design	Treatment protocol	Target behavior	Control	Follow-up	Comments/outcome
McGarr & Hovell (1980)	1F 3 mos	poorly defined	15 days	diary	ABAB (brief reversal)	well documented	Night waking	none	55 days	Effective
Johnson et al. (1981)	3 9–12 mos 2M, 1F	mod defined	10–15 days	diary	multiple-baseline; return to baseline	well documented	Night waking	—	5–7 weeks	Effective; compliance problem for one
Johnson & Lerner (1985)	12 6–30 mos 9M, 3F	mod defined	1–4 weeks	diary	multiple-baseline	well documented	Night waking	—	2–3 mos	Effective; 77% compliance
Rickert & Johnson (1988)	33 6–54 mos 18M, 15F	mod defined	1 week	diary	between-group	well documented	Night waking	control/ extinction	6 weeks	Scheduled awakenings = extinction > control; Extinction quicker results

baby after progressively longer periods of sleep. Although a return to baseline was instituted for 3 days approximately 1 month into the treatment, this study is essentially a case study indicating the utility of scheduled awakenings.

#### **Additional Treatment Studies**

Another group of studies is included in this review. These are additional studies evaluating the efficacy of treatment for bedtime problems and night wakings in young children. Although most of the interventions were behavioral, including such techniques as extinction, graduated extinction, or positive bedtime routines, varied approaches were recommended or the exact intervention(s) was unclear. Several of the studies noted that the specific technique utilized was matched to the needs of the family. Unfortunately, those needs were not specified.

It is not appropriate to delineate whether this group of studies meets the criteria for empirically supported therapies; however, it is important to provide a synopsis of these studies in a review of all treatment studies conducted in this area (see Table 5).

Only one study in this grouping incorporated a control group and used a large sample size. In this study (Scott & Richards, 1990), 90 children were randomly assigned to an advice and support group, a written information only, or written information control. In addition, 30 children without sleep problems were recruited as a comparison group. The booklet provided information on various solutions

to night waking problems, providing both advantages and disadvantages of each. No specific solution was emphasized. One solution provided was modifying parental expectations and attitudes toward their infant's sleep, which was stated to be as effective as behavior modification techniques. The results indicated no significant differences in night wakings between the three groups, and all problem sleepers were waking more frequently than the sleep comparison group at follow-up. The authors concluded that support and advice do not lead to changes in sleep problems in young children and that this study supports the notion that sleep problems are "persistent and very resistant to change." It should be noted, however, that although this is a well-designed study, nonspecific recommendations may not lead to significant changes in parental behavior and thus treatment would be ineffective.

In contrast, Weymouth, Hudson, and King (1987) evaluated the efficacy of an advice booklet. Three separate studies were conducted and evaluated diminishing clinical contact. Overall, they found that parents can be successful in the treatment of their child with the use of a booklet on a self-administer basis, with some parents requiring additional clinical support. The first two studies ( $N = 5$  and  $5$ ) used a multiple-baseline approach, with the final study ( $N = 10$ ) a within-subjects design.

Other large-scale within-subject studies have been conducted. Jones and Verduyn (1983) reported an 84% success rate in the treatment of 19



**Table V.** Summary of Literature on Treatment with Behavior Management

Article	Subjects	Diagnostic criteria	Baseline	Assmt measures	Experimental design	Treatment protocol	Target behavior	Control	Follow-up	Comments/outcome
Weissbluth (1982)	1F 7 mos	—	105 days	diary	case report	mod documented; unclear	Sleep prob	none	55 days	Change in sleep schedule effective
Jones & Verduyn (1983)	19 4–59 mos 14M, 5F	well defined	1 week	diary	case reports	mod documented; varied	Sleep prob	none	6 mos	Varied beh techniques; 84% improvement
Largo & Hunziker (1984)	52 2–36 mos 30M, 22F	mod defined	10–14 days	diary	within-subject	well documented; 1–3 visits	Sleep prob	none	3 mos	Varied beh techniques; 85% effective
Sanders et al. (1984)	4 2.5–4 yrs M/F?	mod defined	6–14 days	diary; direct observ	multiple-baseline	well documented; daily contact	Bedtime & night waking	—	2 mos	Tx package = stimulus control, ignoring, contingency mgmt, reinforcement; Highly effective
Richman et al. (1985)	35 12–48 mos M/F?	well defined	2 weeks	diary; parent report	within-subject	poorly documented; max 6 tx sessions	Sleep prob	none	4 mos	Varied beh techniques; Outcome based on consensus whether target reached
Weymouth et al. (1987)	20 13–42 mos 13M, 7F	well defined	7–30 days	diary; parent report	multiple-baseline for 10 Ss	mod documented; varied by study	Bedtime & night waking	—	3 mos	Varied beh techniques; 3 studies, varied therapist contact; Written material + minimal contact led to moderate improvement
Schaefer (1987)/ Schaefer (1990)	100 6 mos–3 yr 54M, 46F	well defined	none	parent report	within-subject	2–3 sessions	Night waking	none	6 mos	Varied beh techniques; 80% maintained improvement
Scott & Richards (1990)	120 1–18 mos 76M, 44F	mod defined	none	diary	between-group	mod documented; 3 tx sessions at 3 wk intervals	Night waking	control group	3 mos	Varied beh techniques; 4 groups: booklet & support; booklet only; no intervention; normal control gp. Tx found ineffective
Minde et al. (1993)/ Minde et al. (1994)	28 12–36 mos 17M, 11F	well defined	1 week	diary, video	within-subject	poorly documented; varied	Bedtime & night waking	none	6 mos	Tx unclear; 83% maintained improvement at FU; study on assessment of sleep

children with sleep problems. Individualized treatment programs were developed that emphasized consistency in parental response and behavior modification strategies. Extinction was not recommended in this study given the difficulty parents have instituting such a treatment strategy. Results were based on parental diary. Largo and Hunziker (1984) employed similar strategies by emphasizing parental education about sleep issues with 52 children and achieved success with 85% of their children. Again, the results were based on parental diaries. Richman (1985) reported significant improvement in 77% of 35 children treated with varied behavioral strategies. Results were based on parental report, and the authors reported that the children were a highly selected group, with only half of all the referred children entering treatment. Schaefer (1987, 1990) noted successful treatment of 81 of 100 children treated with a brief behavioral intervention. And, last, Minde and colleagues (Minde, Faucon, & Falkner, 1994; Minde, Popiel, Leos, Falkner, Parker, & Handley-Derry, 1993) noted significant improvement in 83% of 28 children treated with behavioral management techniques, including a specific bedtime routine, graduated extinction, and in some cases a shaping technique. Interestingly, it was recommended that the fathers institute treatment, which occurred in all but five families. As the focus of their study was on the assessment and impact of sleep problems, no control group was included.

All the other studies evaluating the efficacy of behavioral interventions for bedtime problems and night waking were conducted as case studies or within-subject designs. Weissbluth (1982) successfully treated a 7-month-old girl by modifying her sleep schedule. And Sanders, Bor, and Dadds (1984) developed a treatment package that included stimulus control, ignoring, contingency management, and reinforcement for four young children. Significant improvements in sleep behaviors, both at bedtime and for night wakings, were reported.

### **Parent Education as Prevention**

An interesting offshoot of treatment for already existing sleep problems is the use of parent education to prevent the development of sleep problems in infants. And, in fact, parent education meets the criteria for a *well-established* empirically supported treatment. Three large studies have demonstrated the efficacy of parent education for the prevention

of sleep problems (see Table 6). Wolfson, Futterman, and Lacks (1992) randomly assigned 60 first-time parents enrolled in childbirth classes to a sleep training group or a control condition. The training group received four training sessions, two prenatally and two postbirth. Utilizing parental diary data, they found at age 6–9 weeks, infants in the parent training group slept significantly better than children in the control condition. The parents of these children also reported greater parental competence.

Adair, Zuckerman, Bauchner, Philipp, and Levenson (1992) also demonstrated the efficacy of an education prevention program based on behavioral strategies. One hundred and sixty-four consecutive infants presenting at a 4-month health visit comprised the intervention group and were compared to 128 historical controls. At 9 months, the control group was twice as likely to wake during the night compared to the intervention group. All results were based on parental diaries and report.

And, last, Kerr, Jowett, and Smith (1996) found that parents of 3-month-olds who were provided information about sleep issues had significantly fewer sleep problems at 9 months than a control group. The 169 children were randomly assigned to the intervention or control group. The parental intervention was provided both verbally by a researcher, with the addition of written materials. The results were based on a parental interview.

### **Additional Issues**

In evaluating the efficacy of any specific treatment, a number of other issues should also be considered (Chambless & Hollon, 1998). Three such issues, effectiveness, treatment feasibility, and cost effectiveness, will be discussed as they relate to the treatment of pediatric sleep problems.

#### **Effectiveness**

An important issue when evaluating the efficacy of a treatment intervention is whether a treatment is effective (Chambless & Hollon, 1998). That is, does a treatment work in actual clinical practice, rather than just in a research setting? Chambless and Hollon recommend that the effectiveness of a treatment program be considered only after it has been shown to be efficacious in controlled research settings. Interestingly, although not all behavioral in-

**Table VI.** Summary of Literature on Prevention of Sleep Problems

Article	Subjects	Diagnostic criteria	Baseline	Assmt measures	Experimental design	Treatment protocol	Target behavior	Control	Follow-up	Comments/outcome
Wolfson et al. (1992)	60 prenatal M/F?	well-defined	——	diary	between-group	well documented; 4 sessions	Bedtime & night waking	control group	7–11 weeks	Varied beh techniques; Prevention study; Education of behavioral strategies was effective
Adair et al. (1992)	292 4 mos 159M, 133F	well defined	——	diary; quest	between-group	mod documented; written advice	Bedtime & night waking	historical control	——	Prevention study; Tx = Bedtime routine and put child down partially awake Intervention parents provided sleep info at 4 mos of age; Evaluation conducted at 9 mos
Kerr et al. (1996)	169 3 mos M/F?	well defined	——	parent report	between-group	poorly documented; 1 session; written info	Bedtime & night waking	control group	6 mos	Tx unclear; Prevention study; Intervention parents provided sleep info at 3 mos of age; Evaluation conducted at 9 mos

interventions discussed here have been demonstrated to be well established, many studies have gone on to demonstrate the effectiveness of a multicomponent behavioral treatment program for bedtime problems and night wakings in young children in a clinical setting. Table 7 presents these studies.

Only one study in this grouping, however, utilized an experimental design that included a control group. The aim of the study by Weir and Dinnick (1988) was to evaluate whether trained health visitors in the community could apply behavioral techniques to help parents manage their child's sleep problems. In their study, 27 families were assigned to an experimental group and 24 to a control group. Surprisingly, at 6-month follow-up, no differences in sleep problems were found between the two groups.

All the other studies used within-subject designs or presented case studies. Crawford, Bennet, and Hewitt (1989) reported on one health visitor's records after having received training in the treatment of sleep problems. In all nine cases, resolution or significant improvement of the sleep problem occurred as based on parental diaries and report. Another study by Roberts (1993), a health visitor, reported on her experiences treating 88 children

with sleep problems. She reports that a successful outcome was achieved for 84% of these children. It is unclear, however, what was the basis of these results, whether it was parental report or her clinical evaluation.

Three of the studies focused on a group treatment approach. Balfour (1988) provided a group approach run by a psychologist and health visitor. Parental diaries and maternal report indicated improvement in all six children's sleep behaviors. Carpenter (1990) conducted group treatment of six weekly sessions for young children's sleep problems. The sessions were conjointly run by a psychologist and a health visitor. According to sleep diaries and maternal report, 73% of the 30 children improved following treatment. Again, no control group was included in this study. Szyndler and Bell (1992) also used a group treatment approach for young children's sleep problems. Significant improvements were found in 24 of the 25 families treated, as measured by sleep diaries. Again, no control group was included.

The last study, by Hewitt and Galbraith (1987), reported on the positive response of parents to a 1-evening parenting class on sleep behaviors in infants. No results were presented in this study and

**Table VII.** Summary of Literature on Effectiveness of Behavioral Strategies in the Treatment of Sleep Problems

Article	Subjects	Diagnostic criteria	Baseline	Assmt measures	Experimental design	Treatment protocol	Target behavior	Control	Follow-up	Comments/outcome
Hewitt & Galbraith (1987)	45 3–9 mos M/F?	mod defined	—	quest	none	poorly documented; 1 session	Sleep problems	none	none	Parents pos about sleep educ
Balfour (1988)	6 >1 and <5 M/F?	mod defined	1 week	diary; parent report	within-subject	mod documented; 7 weekly tx sessions	Bedtime & night waking	none	5 weeks	Varied beh techniques; Parental report supported efficacy of group approach
Weir & Dinnick (1988)	51 4–54 mos 25M, 26F	mod defined	none	diary, question	between-group	mod documented; health visitor appts	Bedtime & night waking	control group	6 mos	Varied beh techniques; Evaluated efficacy of health visitors as therapists; Unclear exact technique; Treatment group > control group
Crawford et al. (1989)	9 7–39 mos 3M, 6F	poorly defined	1 week	diary	within-subject	mod documented; weekly	Bedtime & night waking	none	none	Varied beh techniques; Effective
Carpenter (1990)	30 <5 yrs M/F?	poorly defined	1 week	diary	within-subject	mod documented; 6 visits	Bedtime & night waking	none	1 mo	Varied beh techniques; Effective for 73%
Szyndler & Bell (1992)	25 1–4 yrs M/F?	mod defined	1 week	diary	within-subject	poorly documented; 6 weekly meetings	Bedtime & night waking	none	none	Tx unclear; Group treatment
Roberts (1993)	88 6–72 mos 51M, 37F	mod defined	1 week	diary	within-subject	mod documented	Bedtime & night waking	none	none	Varied beh techniques; Report on eff. of a sleep clinic over 2 year period; 84% success rate

no data were collected on the children's sleep pre- or postintervention. The parents, however, did report that the class was useful.

An additional component related to effectiveness is that the etiology of sleep problems may affect treatment choices and needs to be considered by clinicians when devising treatments. None of the studies reviewed here considered etiological factors, although this issue is likely to be important in developing treatment plans and the resulting efficacy of any intervention. For example, an appropriate treatment intervention may be quite different for a child with poor sleep associations versus a child whose sleep problems are related to difficulties in the parent-child relationship.

### **Treatment Feasibility**

A second important factor discussed by Chambless and Hollon (1998) is treatment feasibility, which encompasses the issues of patient acceptance and compliance. These issues do need to be considered in pediatric sleep problems. As discussed, extinction meets the criteria for a well-established treatment for bedtime problems and night wakings in young children. However, this treatment is probably the least acceptable option for parents and is expected to lead to the lowest level of parental compliance. Only one study formally noted an attrition rate related to the use of extinction. In the study by Rickert and Johnson (1988), 5 of the original 50 families

whose homes were visited refused to participate because they were assigned to the extinction condition, and a number of parents declined involvement in the study on original contact when they learned that their child may be assigned to an ignoring condition. The parents were concerned about the possible effects of treatment on emotional development and considered ignoring their child's cries to be an unacceptable treatment. The researchers were surprised by the severity of the parental resistance to systematic ignoring. Anecdotal evidence also supports the notion that parents are often resistant to the suggestion that parents let their child "cry it out." Thus, when choosing a treatment program to recommend, it is important for practitioners to weigh the evidence of what is known about the efficacy of specific treatments for sleep problems, that is, the weight of evidence for extinction, against parental concerns about such a treatment program. It is interesting that graduated extinction, which has less research support than extinction, is the one that is most widely recommended in parenting books for sleep issues (e.g., Ferber, 1985; Mindell, 1997).

As with extinction approaches, there have also been some problems with parental compliance with scheduled awakenings. This is presumably because it is difficult to convince parents to wake a sleeping child and because it requires the parents to awaken during the night to institute treatment (Johnson et al., 1981; Johnson & Lerner, 1985).

### **Cost-Effectiveness**

Cost-effectiveness, that is, treatments that cost the least are likely to be preferred as long as there is no difference in outcome, is another important consideration. Surprisingly, several studies have evaluated this issue in pediatric sleep problems. Pritchard and Appleton (1988) found no difference in outcome between treatment that included treatment visits every 2–3 days versus no visits for 2 weeks. Another consideration is whether written information alone can be an effective treatment strategy. Written information obviously is less costly than either individual or group treatment. Several studies have compared written information to direct therapist contact. Two studies found no difference between the outcome of written information only versus direct therapist contact (Scott & Richards, 1990; Seymour et al., 1989), although the former study found little effectiveness for any treatment. Weymouth et al. (1987) also found the

use of written information in a self-administered manner to be successful, although some parents required additional clinical support. This area warrants further study. An interesting question is whether there is a differential need for written advice versus therapist contact based on the severity of the sleep problem or the psychological well-being of the family. More needy parents or those with additional problems may require more individualized attention than written information can provide.

And, last, group treatment strategies may be an appropriate cost-effective alternative to individual treatment. Several of the studies reported in this paper used group treatment and found it to be effective (Balfour, 1988; Carpenter, 1990; Szyndler & Bell, 1992). No studies, however, have compared the outcome of individual versus group treatment, and thus it is premature to make any conclusions about the cost-effectiveness of a group approach.

### **Methodological Concerns**

There are a number of methodological problems with both the studies reviewed in this article and the attempt to apply the Chambless criteria to this group of studies. The primary methodological concern is the reliance on parental report to evaluate treatment outcome. The preference of Chambless and Hollon (1998) is for studies to use multiple methods of assessment rather than solely rely on self-report. However, the majority of studies conducted on pediatric sleep disorders base their findings exclusively on parental report by use of sleep diaries or questionnaires. Obviously, these measurements are subjective. There are conflicting conclusions as to the validity of parental sleep diaries. A few studies have used objective measures of sleep, such as videotape or audiotape, to evaluate the reliability of sleep diaries (e.g., France & Hudson, 1990; Mindell & Durand, 1993; Rapoff et al., 1982). Most of these studies did provide support for the validity of parental report. For example, France and Hudson incorporated a voice-activated relay system into their study and found an agreement of 91% with parental diaries. In the study by Mindell and Durand, parent diaries highly correlated ( $r = .88$  to  $.94$ ) with videotape recordings. Sadeh (1994), though, included actigraphy measures on all of his subjects and found discrepancies between this objective measure and parental diaries. Sadeh found that many of the children in his study continued to

awaken at night after treatment but went back to sleep on their own without requiring parental intervention or letting their parents know that they were awake. In addition, it appears that parents report fewer awakenings over time as they become exhausted with the routine of completing sleep logs (Sadeh, 1996). In sum, though sleep diaries have clinical merit (e.g., presenting a more accurate picture to parents of the severity of a sleep problem, demonstrating change), their use as the sole measure of treatment outcome may erroneously inflate improvement rates.

Another methodological concern is the lack of long-term follow-up. The best long-term follow-up was presented by France (1992), who conducted follow-up at 30 months for some of their children and by Milan et al. (1981) who followed their three children up to 2 years. Most studies, however, report a follow-up of several weeks to 6 months (e.g., Adams & Rickert, 1988; Seymour et al., 1989), with a few studies following children for longer (e.g., Durand & Mindell, 1990). Given the population being studied, it is important to evaluate improvements in sleep problems beyond the end of treatment. Many sleep problems tend to persist, possibly even beyond adolescence into adulthood, so evaluation of the impact of treatment should be assessed for a longer period. Furthermore, sleep problems may dissipate for a period of time, only to return later.

Another important methodological issue is the attempt to evaluate each distinct behavioral intervention in isolation and apply the criteria for empirically supported treatments. As presented here, it appears that each behavioral strategy is a distinct technique that can be evaluated on its own merits. However, in looking more closely at each study, one finds that many are evaluating each intervention as a part of a larger multicomponent treatment package that incorporates several similar elements. The two most common are the inclusion of a set bedtime and having parents establish a bedtime routine, issues that most clinicians believe are essential and lend a platform to any other intervention suggested. Thus, although conclusions were drawn about the efficacy of specific treatments here, caution should be exercised.

## Recommendations

The most important recommendation that can be made is that more large-sample, well-controlled

studies are needed to further support the efficacy of the behavioral interventions reviewed here. The result of such efforts may be that additional treatments can be added to the list of interventions that are well-established. Further studies are especially needed to evaluate the effectiveness of graduated extinction, scheduled awakenings, and positive bedtime routines. Each of these interventions is currently considered probably efficacious or a promising intervention, but are likely to meet the criteria for being well-established with additional research.

Further research is also needed to study the best treatment strategy for particular individuals, especially comparing children who have bedtime problems only, those who have night wakings only, and those with both types of sleep problems. Furthermore, little evidence has been provided as to the efficacy of specific individual components within treatment packages. Many of the treatment studies provided have utilized multicomponent treatment packages. For example, many of the studies using extinction and graduated extinction included recommendations for a set bedtime and a bedtime routine (e.g., Mindell & Durand, 1993). Thus, a question that remains is what is the most parsimonious treatment to effectively reduce a particular sleep disorder. By considering specific aspects of a typical multicomponent treatment package, we may be able to develop treatment plans that are the most acceptable to parents and the simplest to implement. For example, the establishment of a set bedtime and bedtime routine may be all that is necessary for some young children without requiring the use of extinction or graduated extinction. Already a positive bedtime routine, in and of itself, is a promising intervention and some may argue is the root to the effectiveness of extinction treatment programs. Without further research, the importance of different aspects of each treatment component is unknown.

## Conclusions

This article provides a review of every treatment study that has been published on the treatment of bedtime problems and frequent night wakings in young children. Overall, two behavioral treatment programs can be considered well-established. The first, extinction, although supported by the literature, raises concerns about its feasibility, especially in light of the lack of willingness of parents to ignore their child's cries. The second treatment pro-

gram is parent training during the prenatal and newborn period to prevent the development of sleep problems. Two additional treatments are considered probably efficacious, graduated extinction and scheduled awakenings. And, last, positive bedtime routines are a promising intervention. Overall,

the research supports the efficacy of behavioral interventions for sleep problems in young children, although more studies are needed.

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