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What is This?
Reducing Bedtime Disturbance and Night Waking Using Positive Bedtime Routines and Sleep Restriction

Kristin V. Christodulu and V. Mark Durand

The purpose of this study was to investigate behavioral interventions designed to reduce sleep difficulties in four young children with developmental disorders. Positive bedtime routines and sleep restriction were successful in eliminating bedtime disturbances and nighttime awakenings in four children with significant sleep problems. Positive bedtime routines included activities such as taking a bath, changing into pajamas, and reading a story. Sleep restriction involved reducing the number of hours each child slept while maintaining a consistent bedtime and wake-up time. Positive bedtime routines and sleep restriction also resulted in improved parental satisfaction with the child's behavior at bedtime, the child's sleep pattern, and the time it takes to put the child to bed at night.

Parents commonly report sleep disturbances in children with disabilities. Evidence suggests that the prevalence of sleep problems in this population is higher than in typically developing children (Richdale, Gavidia-Payne, Francis, & Cotton, 2000). For example, in a study of 214 children with severe mental retardation, 86% of children under 6 years of age, 81% of children 6 to 11 years of age, and 77% of children 12 to 16 years of age were reported to have a sleep disorder (Bartlett, Rooney, & Spedding, 1985). The chronic nature of sleep problems in children with disabilities has been demonstrated by Quine (1991), who completed a 3-year longitudinal survey of 200 children with severe mental retardation. At the initial assessment, 51% of the parents reported settling problems and 67% reported frequent night waking. Three years later, half of those with settling problems and more than two thirds of those with night waking still exhibited disturbances in sleep.

Not surprisingly, disruptive sleep patterns adversely affect family members as well as the child. Quine (1992) reported that parents of children with severe developmental difficulties and with sleep problems were more likely to experience additional family difficulties and exhibit symptoms of stress than were parents of children with severe developmental difficulties without sleep problems. Sleep complications may also intensify behavioral and psychological problems. For example, children with severe disabilities and with severe sleep problems exhibit significantly more daytime behavior problems than do children with severe disabilities who have only mild or moderate sleep problems (Durand, Gernert-Dott, & Mapstone, 1996; Durand, Mindell, Mapstone, & Gernert-Dott, 1995; Kennedy & Meyer, 1996).

Wiggs and Stores (1996) found that fewer than half of the children ages 5 to 16 years in their survey of those with severe disabilities and sleep problems had received any form of treatment, and medication was the treatment most widely used. Pharmacological interventions are commonly used to treat sleep disturbances in both adults and children (France & Hudson, 1993). Despite the frequent use of medication to treat sleep disorders, Richman (1985) reported that pharmacological treatments appear to have little long-term benefit on the sleep patterns of children. In fact, Edwards and Christophersen (1994) found that there have been few experimental investigations illustrating the sustained effectiveness of medication in treating sleep disorders in children.

An effective alternative to pharmacological treatment of sleep disorders is behavioral intervention. Several behavioral procedures have been successful in reducing disruptive sleep patterns in children, including extinction (France & Hudson, 1990), graduated extinction (Durand & Mindell, 1990; Mindell &
Durand, 1993), scheduled awakenings (Durand & Mindell, 1999), bedtime fading (Piazza, Fisher, & Sherer, 1997), and sleep restriction (Durand & Christodulu, 2003; Bootzin & Epstein, 2000). Positive bedtime routines, which are a series of relaxing activities that help children with the transition to sleep, have sometimes been successful in the treatment of sleep disorders, and generally include activities such as taking a bath, changing into pajamas, and reading a story. Milian, Mitchell, Berger, and Pierson (1981), for example, investigated the implementation of positive bedtime routines as an alternative to ignoring in an effort to reduce tantrum behaviors in three developmentally delayed children. Results revealed that positive routines increased cooperation at bedtime, reduced the number of minutes awake past the appropriate bedtime, and reduced the duration of in-bed crying.

Another behavioral approach has been referred to as bedtime fading, a technique that can be used for bedtime disturbances. Bedtime fading involves selecting a time for bed when the child is likely to fall asleep with little difficulty and within 15 minutes. If the child falls asleep with little resistance, then the bedtime is set earlier in small increments until the desired bedtime is achieved. Piazza and Fisher (1991a) successfully used bedtime fading to treat insomnia in two children with special needs, a 6-year-old girl with attention-deficit/hyperactivity disorder and a 4-year-old girl with profound mental retardation. In another investigation, Piazza and Fisher (1991b) used bedtime fading with response cost (i.e., removing the child from bed and keeping him or her awake for 1 hour if sleep was not reached within 15 minutes of bedtime) to successfully decrease night waking in three children with profound mental retardation, ages 3 years, 4 years, and 13 years.

A similar approach to sleep difficulties, called sleep restriction, assumes that excessive time in bed exacerbates insomnia (Spielman, Saskin, & Thorpy, 1987). Sleep restriction involves restricting the amount of time in bed to the total amount of time asleep, thus reducing or eliminating time spent awake in bed. Initially, sleep is restricted to 90% of the average number of hours actually asleep each night. The amount of time asleep is then adjusted by 15 minutes for each successful week until the desired schedule is achieved. Spielman et al. (1987) evaluated the effectiveness of sleep restriction in reducing the sleep problems of 35 adults with chronic insomnia. Following an 8-week treatment program, participants showed statistically significant improvements in sleep latency, total awake time, sleep efficiency, and total sleep time. Furthermore, participant ratings of their overall sleep experience improved significantly. In a recent investigation, sleep restriction was successfully used to eliminate bedtime disturbances and reduce nighttime awakenings in two children with disabilities, a 4-year-old girl with autism and a 4-year-old girl with developmental delay (Durand & Christodulu, 2003).

The purpose of the study presented here was to investigate the effectiveness of positive bedtime routines and sleep restriction in reducing bedtime disturbances and nighttime awakenings in children with developmental disabilities. Although many behavioral interventions (e.g., bedtime routines, bedtime fading) have been investigated in children with developmental disabilities, few, if any, studies have investigated the effectiveness of sleep restriction in reducing bedtime disturbances and nighttime awakenings in this population.

Method

Participants

Four children with developmental disabilities were referred to the Albany (NY) Center for Autism and Related Disabilities for sleeping difficulties. After the initial referral, parents answered the Sleep Intervention Screening Questionnaire, designed for this study to assess the appropriateness of using sleep restriction as an intervention for their child’s sleep disturbance (see the appendix). Because there is no one best intervention, and intervention depends on the individual sleep problems and the needs of the family, the intervention screening questionnaire was designed to eliminate other treatment methods (i.e., graduated extinction) as possible treatment options and identify sleep restriction as the appropriate intervention for the current sleep disturbance. If parents answered “yes” to any of the questions on the Sleep Intervention Screening Questionnaire, it was assumed that their child was not a good candidate for graduated extinction or scheduled awakening, and sleep restriction would be considered the appropriate intervention. Parents who were identified as being good candidates for sleep restriction in their children (e.g., could not tolerate long periods of crying by their child) were selected for this study. The referred children reported a range of difficulties including bedtime disturbances, nighttime awakenings, and disrupted sleep schedules. All children were evaluated by a pediatrician to rule out any medical conditions that could be related to the sleep problem.

Rebecca was a 5-year, 11-month-old girl diagnosed with CHARGE association, a heterogeneous condition that affects several organ systems, including the eyes, ears, nose, heart, and genitals. Rebecca attended a self-contained class in a local primary school and received occupational and physical therapy, speech therapy, and adaptive physical education. Rebecca was reported to have had difficulty initiating and maintaining sleep since infancy and experienced frequent nighttime awakenings and bedtime disturbances. Rebecca’s behavior during nighttime awakenings included vocalizing happily, kicking the wall beside her bed, playing either quietly or noisily, and turning on her bedroom light. In addition to frequent nighttime awakenings, Rebecca also displayed bedtime disturbances that were characterized by a resistance to going to bed, including playing quietly with toys either in or out of bed, getting out of bed and turning on the light, and occasionally kicking the wall next to the bed or kicking her mattress.
The second participant was Elise, a 2-year, 6-month-old girl diagnosed with pervasive developmental disorder not otherwise specified, sensory integration disorder, and hypotonia. Elise attended a playgroup designed to facilitate social skills three mornings per week and received speech therapy and occupational therapy two times per week. Elise’s family reported that she had had sleeping difficulties since infancy, and that her current problems were bedtime disturbances and nighttime awakenings. Elise’s behavior during nighttime awakenings included screaming, rolling on the floor, pinching herself, banging her head, and crying. In these instances, Elise’s parents usually put her into bed with them, then returned her to her room after she had fallen back to sleep. In addition to the frequent nighttime awakenings, Elise also displayed severe bedtime disturbances that lasted 2 to 3 hours. Elise’s bedtime disturbances were characterized by screaming, jumping, running and throwing her body into the wall, banging her head, and climbing and jumping.

Another participant, Joey, was a 2-year, 9-month-old boy diagnosed with immune deficiency (IgA). Joey attended nursery school two mornings per week. Joey’s sleeping difficulties had been present since birth. He was born with ankyloglossia, a condition in which the piece of tissue underneath the tongue is either tight or short. In part as a result of his physical problems, Joey had feeding difficulties and cried continuously. Frenotomy, or surgery to correct this condition, was performed when Joey was 5 months old. Joey’s behavior during nighttime awakenings included getting out of bed and looking or calling for Dad, turning on his bedroom lights, asking for a drink, crying, and kicking his legs. In addition to frequent nighttime awakenings, Joey also displayed numerous bedtime disturbances that lasted one half hour to 2 hours and included restlessness, getting out of bed, kicking his legs in the air, crying, throwing toys, pushing, hitting, and saying “no.” Joey’s parents reported that Joey needed a person next to him, usually his father, to fall asleep.

The final participant in the study, Colin, was 3 years 11 months old at the start of this study and was diagnosed with autism. Colin attended an intensive applied behavior analysis (ABA) program in a self-contained school. Colin experienced frequent nighttime awakenings and bedtime disturbances. Colin’s behavior during nighttime awakenings varied from calm to agitated and hyperactive. Sometimes Colin would sleep in his parents’ room, and other times his mother would take him back to his room and lie in bed with him. Because Colin was frequently awake for the remainder of the night when he woke, he often watched television downstairs during the night. In addition to the nighttime awakenings, Colin also displayed bedtime disturbances, which varied in duration from 15 minutes to 2 1/2 hours. Colin’s bedtime disturbances were characterized by a difficulty going to sleep at night that included having tantrums, getting out of bed, and coming out of his room.

**Measures**

At an initial interview, the parents completed the *Albany Sleep Problems Scale* (Durand, 1998), a 46-item questionnaire designed to assess type and severity of sleep disturbances, and the Parental Sleep Satisfaction Questionnaire, created for this study to assess parental satisfaction with the child’s current sleep pattern. The parents completed daily sleep charts and bedtime behavior logs about their children.

**Procedure**

A multiple baseline across participants (Barlow, Hayes, & Nelson, 1984) procedure was used to evaluate the effects of intervention on each child’s sleep patterns.

**Assessment.** At an initial interview, the nature of the sleep study was explained to the parents and parental consent to participate was obtained. At this time, parents completed the *Albany Sleep Problems Scale* and the Parental Sleep Satisfaction Questionnaire. Then the investigator interviewed the parents to determine the type of sleep disturbance and its frequency, duration, and intensity. Additionally, the child’s sleep habits, bedtime routines, sleepwalking and sleep terrors (non-REM sleep disturbances), sleep schedules, and behavior during bedtime disturbances and nighttime awakenings were also recorded.

**Baseline.** After the initial interview, parents were given daily sleep charts and bedtime behavior logs and were instructed on their completion. The following types of information were recorded by parents: consistency of the child’s sleep schedule; variability in bedtime and wake-up time; presence of bedtime disturbances, frequency and duration of disturbances, and behavior during disturbances; presence of nighttime awakenings, frequency and duration of awakenings, time of awakenings, and behavior during awakenings; frequency and duration of naps. Baseline was staggered across participants so that intervention began when data were stable for each child.

Rebecca’s sleep schedule appeared to be inconsistent. The time she was put in bed varied from 9:00 p.m. to 11:45 p.m. and the time she awoke ranged from 4:00 a.m. to 9:00 a.m. Additionally, Rebecca exhibited frequent bedtime disturbances and numerous nighttime awakenings. Nighttime awakenings occurred one to seven times per week and varied in duration from 50 minutes to 9 hours per week. Nighttime awakenings occurred most frequently between 3:00 a.m. and 4:00 a.m. Rebecca also napped inconsistently.

Elise’s sleep schedule also seemed irregular. The time she was put in bed varied from 7:00 p.m. to 10:00 p.m. and the time she awoke ranged from 5:00 a.m. to 8:20 a.m. In addition, Elise exhibited severe bedtime disturbances and frequent nighttime awakenings. Nighttime awakenings occurred from one to three times per night and varied in duration from 10 minutes to 6.25 hours. Elise napped inconsistently: periodically in the car for 20 to 40 minutes and irregularly at home for 30 minutes to 90 minutes.
Joey’s sleep schedule varied. The time he was put in bed ranged from 8:00 p.m. to 9:30 p.m. and the time he awoke ranged from 5:00 a.m. to 7:30 a.m. In addition, Joey exhibited numerous bedtime disturbances and frequent nighttime awakenings. Nighttime awakenings occurred from one to three times per night and varied in duration from 5 minutes to 2 hours. Joey napped every day at the babysitter’s house. Nap time was generally from 12:30 p.m. to 1:30 p.m., but became later and more variable toward the end of baseline.

Colin’s sleep schedule was unpredictable. The time he was put in bed varied from 9:00 p.m. to 12:15 a.m. and the time he awoke ranged from 3:30 a.m. to 9:30 a.m. In addition, Colin exhibited periodic bedtime disturbances and severe nighttime awakenings. Nighttime awakenings occurred 8 to 12 times per week and varied in duration from 52 minutes to 3 hours per week. Nighttime awakenings occurred most frequently between 3:00 a.m. and 4:00 a.m. Colin napped every day in the car for 5 to 20 minutes at 4:30 p.m. on the way home from school.

Positive Bedtime Routine. Each child’s intervention began with the implementation of a positive bedtime routine. Parents were instructed to construct a routine that they could follow each evening prior to bedtime using the following general guidelines (from Durand, 1998).

1. Make the last 30 minutes before bedtime a regular routine.
2. Include activities such as dressing for sleep, washing, and reading.
3. Keep the order and timing of the activities about the same each night.
4. Do not include activities that could cause conflict for your child (e.g., picking out clothes for school, organizing papers).
5. Avoid television watching during this time, which can interfere with sleep.
6. Avoid extending the time for the bedtime routine (e.g., “Just one more story? Pleeease!!”).

During the initial intervention phase (i.e., positive bedtime routines), parents were instructed not to get into bed with their child or let their child get into bed with them at bedtime or during a nighttime awakening. If the child did get out of bed, either at bedtime or during a nighttime awakening, the child’s parents immediately returned him or her to bed, told him or her to go to sleep, and left the child’s room.

Sleep Restriction. Following implementation of bedtime routines, sleep restriction programs were added to the intervention plans. Sleep restriction involved restricting the amount of time the child was in bed to 90% of the total amount of time that the child slept. Each child’s sleep diary was used to estimate the number of hours that the child slept, on average, each night. The mean number of hours actually asleep each night was then multiplied by approximately 0.9, to get 90% of the time, which was the number of hours the child would sleep with the new schedule. The child’s bedtime and/or the time the child was awakened in the morning was adjusted for the new schedule. If the child remained awake in bed, he or she was removed from bed and was engaged in a relaxing activity until he or she appeared tired. If the sleep disturbances were eliminated or significantly reduced for 1 week, the bedtime was set 15 minutes earlier.

Following the procedure above, Rebecca’s intervention began with the implementation of good sleep habits and positive bedtime routines. During baseline, Rebecca slept a mean of 8.63 hours per night. The introduction of a sleep restriction program reduced the number of hours Rebecca slept each night to 7.5 hours. To accommodate the new sleep-restricted schedule, Rebecca’s bedtime was moved to 11:00 p.m. and her wake-up time was set for 6:30 a.m.

Elise’s intervention also began with the implementation of good sleep habits and positive bedtime routines. During baseline, Elise slept a mean of 7.71 hours per night. To accommodate the new sleep-restricted schedule, Elise’s bedtime was moved to 11:30 p.m. and her wake-up time was set for 6:30 a.m.

Like Elise and Rebecca, Joey’s intervention began with the implementation of good sleep habits and positive bedtime routines. During baseline, Joey slept a mean of 9.81 hours per night. Unfortunately, Joey became ill during the bedtime routines phase of the intervention and did not participate in the sleep restriction. Sleep restriction was offered to him and his family at a later time.

Like the other children, Colin’s intervention began with the implementation of good sleep habits and positive bedtime routines. After a few days of the routine phase of intervention, however, Colin’s mother reported that she was unable to implement the bedtime routines because Colin’s behavior at bedtime was too disruptive, and he repeatedly got out of his bed and came out of his room. Therefore, the sleep restriction program was immediately added to Colin’s treatment plan. During baseline, Colin slept a mean of 9.15 hours per night. The introduction of a sleep restriction program reduced the number of hours Colin slept each night to 8.0 hours. To accommodate the new sleep-restricted schedule, Colin’s bedtime was moved to 11:00 p.m. and his wake-up time was set for 7:00 a.m.

Assessing Data Integrity. A physical activity monitor, generally referred to as an actigraphy monitor, was used to sample the reliability of parental reporting of child sleep patterns. The actigraphy monitor used in this investigation was the ActiTrac (IM Systems, Baltimore, Maryland), a small, lightweight (1.2 oz), waterproof, wristwatch-style monitor. The ActiTrac monitor contains a biaxial piezoelectric accelerometer sensor to record physical motion in two planes. Rebecca was selected to wear the ActiTrac monitor on her nondominant hand, 24 hours per day. Rebecca was selected for the data sampling because Joey, Elise, and Colin all displayed resistance to wearing the monitor. Data
about the sleep–wake cycles were obtained by using the ActiScore sleep scoring software program in conjunction with the ActiTrac. Reliability of parental reporting of the child’s sleep difficulties was assessed by comparing data obtained from the ActiTrac to information reported by the parents on the child’s daily sleep charts and behavior logs. Parental report of the time the child fell asleep at night, the time the child woke in the morning, and the time and duration of nighttime awakenings was compared with ActiTrac recordings of the sleep–wake cycle. Parental reporting of the time Rebecca fell asleep at night and the time she awoke in the morning was consistent with ActiTrac monitoring approximately 83% of the time. Parental reporting of Rebecca’s nighttime awakenings was consistent with ActiTrac monitoring approximately 67% of the time. In this case, the ActiTrac monitor registered more brief nighttime awakenings than Rebecca’s parents reported on the sleep diary prior to intervention.

**Results**

**Total Sleep Time**

Total sleep time, which was obtained from data reported by parents, decreased for three of the four children following implementation of the sleep intervention program. Rebecca was sleeping approximately 3 hours less, Elise was sleeping approximately 1 1/2 hours less, and Colin was sleeping approximately 1/2 hour less than during baseline. Only Joey was sleeping approximately the same number of hours he had slept each night during baseline.

**Bedtime Disturbances**

Prior to intervention, Rebecca exhibited a mean of 4.22 bedtime disturbances per week (range 2–7); at follow-up, the disturbances had decreased to a mean of 0.00 per week (range 0). Further, the mean duration of bedtime disturbances decreased from 245.00 minutes per week (range 75–420) prior to intervention to 0.00 minutes per week (range 0) at follow-up. Before treatment, Elise exhibited a mean of 6.62 bedtime disturbances per week (range 2–7); at follow-up, the disturbances had decreased to a mean of 0.50 per week (range 0–1). In addition, the mean duration of Elise’s bedtime disturbances decreased from 848.77 minutes per week (range 435–1,525) prior to intervention to 30 minutes per week (range 0–60) at follow-up. Prior to intervention, Joey exhibited a mean of 6.50 bedtime disturbances per week (range 4–7); at follow-up, the disturbances had decreased to a mean of 2.5 per week (range 2–3). Also, the mean duration of Joey’s bedtime disturbances was decreased from 232.14 minutes per week (range 85–295) prior to intervention to 75 minutes per week (range 75) at follow-up. Before treatment, Colin exhibited a mean of 3.10 bedtime disturbances per week (range 1–6); at follow-up, the disturbances had decreased to a mean of .50 per week (range 0–1). Further, the mean duration of Colin’s bedtime disturbances decreased from 88 minutes per week (range 15–420) prior to intervention to 22.50 minutes per week (range 0–45) at follow-up. Figure 2 illustrates the frequency of bedtime disturbances for each child. All four children showed a reduction in both the frequency and duration of bedtime disturbances following implementation of the sleep intervention program.

**Night Waking**

Prior to intervention, Rebecca exhibited a mean of 3.44 nighttime awakenings per week (range 1–7); at follow-up, they were reduced to a mean of .05 per week (range 0–1). Further, the mean duration of nighttime awakenings decreased from 291.11 minutes per week (range 50–545) prior to intervention to 10 minutes per week (range 0–20) at follow-up. Before treatment, Elise exhibited a mean of 8.27 nighttime awakenings per week (range 4–12); at follow-up, they were decreased to a mean of 4.00 per week (range 4). In addition, the mean duration of nighttime awakenings decreased from 681.85 minutes per week (range 280–1,180) prior to intervention to 277.50 minutes per week (range 275–280) at follow-up. Prior to intervention, Joey exhibited a mean of 9.29 nighttime awakenings per week (range 8–12); at follow-up, they were reduced to a mean of 1.50 per week (range 1–2). Also, the mean duration of nighttime awakenings decreased from 92.36 minutes per week (range 52–180) prior to intervention to 7.5 minutes per week (range 5–10) at follow-up. Before treatment, Colin exhibited a mean of 1.70 night wakings per week (range 0–4); at follow-up, they were reduced to a mean of 1.00 per week (range 0–2). Further, the mean duration of nighttime awakenings decreased from 258.35 minutes per week (range 0–562) prior to intervention to 120 minutes per week (range 0–240) at follow-up. Figure 2 illustrates the frequency of nighttime awakenings for each child. Following implementation of the sleep intervention program, all four children showed a reduction in both the frequency and the duration of nighttime awakenings.

**Parental Satisfaction Data**

Overall parental sleep-satisfaction scores were calculated for each child during baseline, intervention, and at follow-up. Scores could range from 6 to 36, with a low score indicating less satisfaction with the child’s sleep and a high score indicating greater satisfaction with the child’s sleep. Rebecca’s mean score on the Parental Sleep Satisfaction Questionnaire (PSSQ) increased from 11.71 (range 10–15) prior to intervention to 24.00 (range 24) at follow-up. Prior to intervention, Elise’s mean score on the PSSQ was 6.67 (range 6–7) which increased to 24.00 (range 24) at follow-up. Joey’s mean score on the PSSQ increased from 11.71 (range 10–15) prior to intervention to 24.00 (range 24) at follow-up. Before treatment, Colin’s mean score on the PSSQ was 14.00 (range 12–16) which increased to 28.00 (range 28) at follow-up. Following implementation of the sleep intervention program, parents of all four children reported an increase in satisfaction with their child’s sleep. At 1-month follow-up, parents of all the children reported further increases in satisfaction with their child’s sleep.
FIGURE 1. Frequency of bedtime disturbances.
FIGURE 2. Frequency of nighttime awakenings.
Discussion

Positive bedtime routines and sleep restriction were successful in eliminating bedtime disturbances and in reducing nighttime awakenings in four children identified as having significant sleep problems. The results of the investigation support the use of behavioral interventions for the treatment of sleep disturbances in children with developmental disabilities. Positive bedtime routines and sleep restriction also resulted in an improvement in parental satisfaction with the child’s behavior at bedtime, the child’s current sleep pattern, and the time it takes to put the child to bed at night. Parents reported a decrease in the severity of their child’s sleep disturbance and indicated that it was easier to put their child to bed at night.

In this investigation, both positive bedtime routines and sleep restriction were used to reduce sleep disturbances. This combination of interventions was selected because it is typical for professionals to recommend a combination of these approaches. Positive bedtime routines was selected as an intervention because introducing structure and consistency at bedtime is an important aspect of establishing good sleep habits (Durand, 1998). It also helped to control for differences across families in how they handled bedtime. Sleep restriction was selected as an intervention based on parental responses to the Sleep Intervention Screening Questionnaire. It is unlikely that any single treatment will be effective with all children, and the effective management of sleep disturbances will often involve a combination of treatments tailored to meet the needs of the child. Because of the design of the present study, the separate effect of sleep restriction alone cannot be determined. A recent study conducted by Durand and Christodoulou (2003), however, introduced sleep restriction alone as an intervention following baseline. Results of this study demonstrated the effectiveness of sleep restriction in reducing the bedtime and nighttime sleep problems of two children with disabilities.

Sleep restriction is more advantageous than behavioral procedures because it prevents long periods of crying and often does not increase behavior problems. Conversely, graduated extinction procedures require listening to periods of crying and can result in an increase in behavior problems (Durand, 1998). Social validity data obtained in the investigation support the use of sleep restriction as an intervention for sleep disturbances. The parents of the children in this investigation found the intervention to be both easy and practical to implement.

This investigation introduced a new assessment tool, the Sleep Intervention Screening Questionnaire, which was designed to assess the appropriateness of using sleep restriction as an intervention for a child’s sleep disturbance. Because there is no one best intervention, and intervention depends on the individual sleep problems and the needs of the family, the intervention screening questionnaire was designed to match the ability of the family with an appropriate treatment. In addition to determining the nature of the sleep disturbance, the items on this questionnaire were designed to identify parents who were amenable to sleep restriction as an intervention. This is an important consideration because parent compliance is an essential component of a successful sleep intervention program.

Data obtained from the study participants using the ActiTrac monitor revealed that parents were accurate in recording the time their child fell asleep at night and the time their child woke in the morning, but appeared to be less accurate in recording their child’s nighttime awakenings.

Evidence exists for the validity of actigraphic monitoring for pediatric assessment of sleep patterns and sleep problems (Sadeh, Lavie, Scher, Tirosh, & Epstein, 1991). A main advantage of the actigraphic device is that it is able to monitor sleep in the home environment for several consecutive days and nights. It is also easy to operate, precise, relatively inexpensive, and does not disturb the child’s sleep. The main disadvantage, however, is that it does not provide data regarding sleep stages and breathing during sleep (Dagan et al., 1997). Although there are numerous advantages of using actigraphic monitoring in investigating sleep, and evidence of the validity of actigraphic monitoring in typically developing children, few studies have investigated the use of actigraphic monitoring in children with disabilities. In the present investigation, difficulties were encountered in getting the children to wear the monitoring device. Sadeh et al. (1991) found that attaching the monitor to the child’s leg is less disturbing to the child than attaching it to the hand. Also, attaching the monitor after sleep onset has been suggested for children who are reluctant or who have an exaggerated interest in the monitor.

The present investigation demonstrated the effectiveness of positive bedtime routines and sleep restriction in eliminating bedtime disturbances and in reducing nighttime awakenings in four children with developmental disabilities. The results of this investigation are consistent with the findings of Morin et al. (1999), who reviewed 48 treatment studies and found that several well-defined nonpharmacological interventions produce reliable and durable changes in the sleep of individuals with chronic and primary insomnia. An extremely robust finding across behavioral treatment studies, which is also consistent with the results of this investigation, is that changes in sleep parameters following treatment are well maintained at short- (3 month) and intermediate- (6 month) range follow-up (Morin, Culbert, & Schwartz, 1994; Murtagh & Greenwood, 1995).

An interesting finding in this investigation was the return of Elise’s sleep disturbances to baseline levels with the withdrawal of treatment during a family vacation in the sleep restriction phase of intervention. Reimplementation of the sleep restriction program resulted in decreases in both bedtime disturbances and nighttime awakenings. While reintroduction of the sleep intervention program resulted in an improvement in Elise’s sleep pattern, it is important to consider the possibility that her sleep problems
may return in the future. Many children are biologically vulnerable to having disturbed sleep patterns and will continue to remain vulnerable despite successful intervention. The sleep intervention programs may not have cured the children’s sleep difficulties, per se, but instead made it easier for the children to adapt to a regular sleep schedule.

At completion of the intervention, three of the four children were sleeping fewer than the average number of hours they slept each night during baseline. Although the quantity of the three children’s sleep decreased over the course of treatment, the quality of their sleep improved. Prior to treatment, the children’s sleep was interrupted by multiple nighttime awakenings and frequent bedtime disturbances. Following treatment, their sleep was not disturbed by bedtime or nighttime difficulties. Although the amount of time the children were sleeping at the completion of the intervention was below that which would be considered developmentally appropriate for children their age, the children did not experience any adverse effects.

In summary, the results of the present investigation support the use of sleep restriction, in conjunction with positive bedtime routines, for the treatment of sleep disturbances in children with developmental disabilities. Additionally, the parents of the children in this investigation found the interventions to be both easy and practical to implement. Future research in this area should include an investigation of the separate effect of sleep restriction on reducing sleep disturbances, and continued examination of the use of actigraphic monitoring in the evaluation of sleep patterns and sleep disturbances in children with and without developmental disabilities.

ABOUT THE AUTHORS
Kristin V. Christodulu, PhD, is the director of the Center for Autism and Related Disabilities at the University at Albany, State University of New York. Her research interests include autism and related disabilities, sleep disturbances in children with disabilities, and peer victimization. V. Mark Durand, PhD, is the dean of the College of Arts and Sciences at the University of South Florida, St. Petersburg. His current interests include the development of assessments, interventions, and prevention strategies for challenging behavior. Address: Kristin V. Christodulu, University at Albany, Department of Psychology, 1400 Washington Ave., Albany, NY 12222.

REFERENCES
APPENDIX

Sleep Intervention Screening Questionnaire

Child's name: ____________________________ Date: ______________

1. Does your child engage in disruptive and/or injurious behavior at bedtime or during a nighttime awakening that is too disruptive to ignore?  
   Yes  No

2. Would it be difficult or impossible for you to listen to your child's cries for an extended period of time?  
   Yes  No

3. Is it important to you and/or your family to alleviate the current sleep problem without experiencing an increase in behavior problems at night?  
   Yes  No

4. Are you, or another member of your family, willing to stay up later at night or get up earlier in the morning to implement a sleep intervention program?  
   Yes  No