Sleep Disorders in Children

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Many children experience some type of sleep problem. Often, these are transient problems with no long-lasting sequelae. But in certain cases, sleep problems may significantly impact on functioning and well-being. Sleep disorders in children can be classified into two major categories. Dyssomnias include those disorders that result in difficulty either initiating or maintaining sleep or involve excessive sleepiness. Parasomnias are disorders that disrupt sleep after it has been initiated but do not result in complaints of insomnia or excessive sleepiness. Even though sleep disorders in children are common, not enough is known. This article reviews the dyssomnias and parasomnias experienced by children, discusses methodological limitations of the studies reviewed, and presents future directions for research in this field.

Key words: children, sleep, sleep disorders, dyssomnias, parasomnias

Many children experience some type of sleep problem. Often, these are transient problems with no long-lasting sequelae. But for some children, sleep problems may have significant effects on their functioning and general well-being. What's more, a child's sleep problem may also affect other members of the family. Unfortunately, clinicians, researchers, and even parents often ignore the issue of sleep disorders in children. For example, parents are rarely concerned about an excessively sleepy child, and such problems may not receive attention until the child's sleep difficulties begin to interfere with his or her functioning, such as while at school.

Children are just beginning to be the focus of sleep research. To date, children have been the subject of less sleep research than have any other population. In the 1991 edition of Sleep Research (Chase, Lydic, & O'Connor, 1991), an annual compilation of published sleep literature, research involving children ages 5 to 12 accounted for only 7% of the 380 sleep studies done with humans, and studies involving toddlers ages 3 to 4 represented merely 3% of all sleep research conducted. Furthermore, although childhood sleep problems are gaining attention, there is still a wide disparity in the amount of coverage given to different disorders.

This article reviews the different sleep disorders that children experience and presents the research conducted on each sleep problem, primarily in the area of treatment. Although infants and adolescents are sometimes mentioned, the focus of this article is on children (including toddlers, preschoolers, and elementary school children). After a discussion of the prevalence of sleep problems, each type of sleep problem is examined. Next, sections on sleep problems in special populations and additional concerns are addressed. Finally, methodological concerns and future directions in the area of childhood sleep disorders are provided.

Prevalence

Recent surveys have found that about 25% of children between the ages of 1 and 5 years experience some type of sleep disturbance (Bixler, Kales, Scharf, Kales, & Leo, 1976; Jenkins, Bax, & Hart, 1980; Lozoff, Wolf, & Davis, 1985; Richman, 1981; Richman, Stevenson, & Graham, 1975). Children's sleep disturbances come in many different forms. Salzarulo and Chevalier (1983) interviewed the families of 218 children, ages 2 to 15, referred for pediatric or child psychiatric consultation, and found that sleep talking was quite common (32%), followed by nightmares (31%), waking at night (28%), trouble falling asleep (23%), enuresis (17%), bruxism (10%), sleep rocking (7%), and night terrors (7%). In Dollinger's (1982) survey of mothers referring their children to a university clinic, the most common sleep problems (among 3- to 15-year-olds) were sleep talking (53%), restless sleep and bedtime refusal (both 42%), and refusing to go to sleep without a night-light (40%). Other sleep problems included bad dreams (35%), difficulty in going to sleep (26%), crying out in sleep (16%), and nightmares (11%). Another study of healthy preadolescents, ages 8 to 10 years, found that 43% of the children were experiencing a sleep problem that had lasted more than 6 months (Kahn et al., 1989). Looking at specific sleep disorders, parasomnias were present in 29% of the children, with enuresis (2%), sleep walking (5%), and night terrors (6%) reported.

Sleep disturbances also tend to persist, especially from infancy to later childhood. Kataria, Swanson, and Trevathan (1987) found that 84% of their sample of children had persistence of sleep disturbances after 3 years. Bixler et al. (1976) reported that sleep problems in older children were often associated with sleep-waking disorders in the 1st year of life. Furthermore, the children who had early disorders of the
sleep-waking rhythm often had multiple sleep problems later. In a third study, Abe, Ohta, Amatomi, and Oda (1982), at 5-year follow-up, found significant interyear associations for such sleep disorders as bruxism, sleepwalking, night terrors, and enuresis. Of all of the behavior problems they assessed, sleep disturbances were of the most persistent group. However, sleep disturbances seen in early childhood are less likely to persist. For example, Klackenberg (1982a) reported that no more than 5–10% of sleep disturbances in later childhood and adolescence can be predicted from behavior at 4 years of age.

Diagnosis and Treatment

Sleep disorders in children are classified into two major categories, the dyssomnias and the parasomnias, as delineated by the International Classification of Sleep Disorders: Diagnostic and Coding Manual (ICSD; Diagnostic Classification Steering Committee, 1990). A listing of these disorders can be found in the Appendix. The dyssomnias include those disorders that result in difficulty either initiating or maintaining sleep or that involve excessive sleepiness. The dyssomnias are sleep disorders that are associated with disturbed sleep at night or impaired wakefulness. The parasomnias, on the other hand, are disorders that disrupt sleep after it has been initiated and are disorders of arousal, partial arousal, or sleep stage transitions. They are disorders that intrude into the sleep process but usually do not result in complaints of insomnia or excessive sleepiness. Note that these terms, as they are defined by the ICSD, differ slightly from their use in the American Psychiatric Association's (APA's; 1987) Diagnostic and Statistical Manual of Mental Disorders, third edition, revised (DSM-III-R). DSM-III-R defines dyssomnias as those sleep disorders in which the predominant disturbance is in the amount, quality, or timing of sleep, which can produce either insomnia or excessive sleepiness. The parasomnias are sleep disorders that involve an abnormal event occurring during sleep and in which the predominant complaint focuses on the disturbance, not on its impact on sleeping or wakefulness.

 Dyssomnias

Narcolepsy. Children experience several sleep problems that are classified as dyssomnias. One such disorder is narcolepsy, which is characterized by excessive sleepiness often presenting itself as repeated episodes of naps or lapses into sleep of short duration throughout the day (Diagnostic Classification Steering Committee, 1990; Guilleminault, 1986, 1987; Miller, Nelson, & Hajdukovic, 1987). Another common symptom that is unique to narcolepsy is cataplexy, which involves the sudden loss of bilateral muscle tone after the occurrence of strong emotions (e.g., laughter, elation, or anger). This loss of muscle tone can be as minor as a mild sensation of weakness involving facial sagging or slurred speech or can be as severe as complete postural collapse. The duration of cataplexy typically lasts from a few seconds to several minutes, with complete and immediate recovery. Narcolepsy occurs in approximately 0.03–0.16% of the population, with onset typically not occurring until adolescence. This disorder has been rarely diagnosed in preteenaged children, although Kotagal, Hartse, and Walsh (1990) described the markers of narcolepsy in 4 children in this age group. There is no known cure for narcolepsy, so treatment focuses on the management of this disorder. Treatment for narcolepsy often involves medications such as tricyclic antidepressants or stimulants (Wittig, Zorick, Roehrs, Sackelsteel, & Roth, 1983). Daytime sleepiness is often managed with central nervous system stimulants, such as pemoline, methylphenidate, or dextroamphetamine. The symptoms of cataplexy may be treated with tricyclics (e.g., desipramine or imipramine), which are REM suppressors (Reite, Nagel, & Ruddy, 1990). However, Bootzin and Chambers (1990) have recommended that drug treatment be contraindicated in children younger than 10 years of age who experience narcolepsy. Unfortunately, most studies done on pharmacological treatments for narcolepsy involve adults; few studies include children.

Obstructive sleep apnea. A second dyssomnia often found in children is obstructive sleep apnea. This disorder involves repetitive episodes of upper airway obstruction during sleep, often causing a reduction in blood oxygen saturation (Diagnostic Classification Steering Committee, 1990; Guilleminault, Korokbin, & Winkle, 1981). These apneic episodes cause frequent arousals and brief awakenings throughout the night. Most people with apnea are unaware of these occurrences. In comparison with adults, in which apneic episodes are often associated with snoring and are easy to identify, diagnosis in children is more difficult (Brouillette, Fernback, & Hunt, 1982). Children with this disorder may be excessively sleepy during the day. They may exhibit daytime mouth breathing, difficulty swallowing, or poor speech articulation. During sleep, these children may snore or may have agitated arousals or unusual sleep postures. The mean age at diagnosis for children with sleep apnea is 7 years (Mauer, Staats, & Olson, 1983), and it is more common in boys (Guilleminault & Anders, 1976). Children who are morbidly obese (greater than 150% ideal body weight) are also at increased risk for sleep apnea (Mallory, Fiser, & Jackson, 1989). For children with sleep apnea, the most common form of treatment involves surgery to remove the airway obstructions (e.g., Guilleminault & Dement, 1988). Tonsillectomy or adenoidectomy relieves symptoms in about 70% of all child cases. Other treatments are also recommended, including weight loss and the use of pharmacological agents (Roth, Roehrs, & Zorick, 1988). Furthermore, nasal continuous positive airway pressure (CPAP) has been found to be extremely successful in the treatment of obstructive sleep apnea in adults (e.g., He, Kryger, Zorick, Conway, & Roth, 1988; Isa & Sullivan, 1986) and has been suggested as an appropriate treatment for some children with sleep apnea (Guilleminault, Riley, Powell, Simmons, & Nino-Murcia, 1985). Further systematic, controlled studies are needed to address the utility of CPAP for pediatric obstructive sleep apnea.

Adjustment sleep disorder. Unlike narcolepsy and obstructive sleep apnea, which are physiologically based, other dyssomnias are often environmentally related. Four such disorders—adjustment sleep disorder, limit-setting sleep disorder, sleep-onset association disorder, and nocturnal eating (drinking) syndrome—are commonly found in children. First, adjustment sleep disorder is a form of insomnia related to emotional arousal caused by acute stress, conflict, or an environmental
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change (Diagnostic Classification Steering Committee, 1990). It is often seen in children after a move or before the first day of school. The duration of such a sleep problem is often days; thus, few studies have explored treatments for this disorder, because these problems often resolve naturally over time. In some cases, often associated with ongoing stressors, this form of sleep disturbance may last as long as several months. If treatment is sought, psychological therapies typically focus on the disrupting events. With resolution of the precipitating event, the sleep problems typically dissipate, with sleep returning to baseline.

Limit-setting sleep disorder. The second such environmentally related disorder, limit-setting sleep disorder, involves difficulty in initiating sleep, typically characterized by stalling or refusing to go to bed (Diagnostic Classification Steering Committee, 1990; Ferber, 1987, 1989). Limit-setting sleep disorder incorporates what is often called childhood insomnia. Of the childhood population, 5–10% experience this sleep disorder, which is often as much a problem for the caretaker as it is for the child. For example, parents of children who have bedtime difficulties often experience increased depressive symptomatology, decreased marital satisfaction, and increased anxiety (Durand & Mindell, 1990). This disorder is typically alleviated once limits are set by the caretaker and is highly amenable to behavioral treatments such as graduated extinction (Mindell, 1990; Rickert & Johnson, 1988; Rolider & Van Houten, 1984) and the establishment of bedtime routines (Weissbluth, 1982).

Several case studies have focused on limit-setting sleep disorder. One early report by Williams (1959) described a single case study of a 4-year-old child who had temper tantrums at bedtime. His behavior was rapidly extinguished after his parents stopped responding to his tantrums. Wright, Woodcock, and Scott (1970) successfully used a positive bedtime routine and extinction approach for a 3-year-old child who had tantrums at bedtime. Another case study of a 13-year-old boy demonstrated the efficacy of relaxation training and reduction of parental attention (Anderson, 1979). Last, Weil and Goldfried (1973) demonstrated the effectiveness of self-relaxation for bedtime insomnia in an 11-year-old girl.

Larger scale studies also have researched the treatment of bedtime problems. Richman, Douglas, Hunt, Lansdown, and Lever (1985) found improvement in 77% of the 35 children, between the ages of 1 and 5 years, that they treated with behavioral methods. Their treatment was individualized for each child but typically included use of positive reinforcement for desired behaviors, elimination of parental attention to the child when the child awoke after bedtime, shaping of an earlier bedtime, and a bedtime routine. In this study, it was unclear how many of the subjects were not infants. Also, there were some methodological concerns about this study, including lack of a control group and reliance on parental report and therapist ratings as outcome measures. A study of 6 children between the ages of 24 months and 54 months had mixed results (3 children improved, 1 child remained the same, and 2 children became worse) after a behavioral treatment that included the establishment of a bedtime and a bedtime routine, extinction of crying at bedtime, and mild punishment for being out of bed (Rapoff, Christophersen, & Rapoff, 1982). Again, it is unclear how many of these children were not infants. Adams and Rickert (1989), in a study of 36 toddlers and preschoolers, found both positive bedtime routines and graduated extinction to be equally effective in reducing bedtime tantrum activity. Both treatments were significantly more effective than a control group.

Last, a few studies have been done on the efficacy of pharmacological treatments. Russo, Gururaj, and Allen (1976) treated fifty 2- to 12-year-olds with diphenhydramine. The medication was significantly better than placebo in improving the children's sleep. However, other studies have found drug treatments to be of limited value (e.g., Kales, Allen, Scharf, & Kales, 1970; Richman, 1985). As stated by Jackson and Rawlins (1977), "the problem of the sleepless toddler is not going to be solved by a three-minute consultation and a bottle of medicine" (p. 509).

Bedtime problems can also be related to children's nighttime fears. These nighttime fears are the most common fears experienced by children. Connell, Perseby, and Sturgess (1987) discussed the effective use of psychotherapy with 6 children (ages 10 to 12 years) who had phobic reactions to sleep after the death of a relative or friend. King, Cranston, and Josephs (1989) successfully used emotive imagery, a variant of systematic desensitization, with 3 children with excessive fears at bedtime. Two large, controlled studies also have been conducted in this area. Graziano and Mooney (1980) successfully treated bedtime fears with the use of relaxation training, self-instructions, guided imagery, and token reinforcement in a group of seventeen 6- to 12-year-olds. In comparison with a waiting-list control group, the treated children had significantly fewer bedtime problems at posttreatment. Furthermore, at 2 1/2- to 3-year follow-up, maintenance of improvement, without additional treatment, was demonstrated in 92% of the children (Graziano & Mooney, 1982). This study was replicated by McMenamy and Katz (1989) with five 4- to 5-year-olds. Again, the use of relaxation training, self-instruction, imagery, and coping skills training was effective in reducing nighttime fears and inappropriate bedtime behavior. In contrast, a recent study by Friedman and Ollendick (1989) involved a multiple-baseline design across subjects to examine the efficacy of a multicomponent treatment package for reducing nighttime fears in 6 children. Their results were positive, in that the disruptive bedtime behavior was reduced in 5 of the 6 children. However, detailed analysis of the data showed that for those children with extended baseline, improvement preceded treatment. The authors argued that improvements might not have been a direct result of treatment, but rather might have been related to such variables as parent and child reactivity to home monitoring or maturation.

Sleep-onset association disorder. The third disorder common in children, sleep-onset association disorder, which is primarily a disorder found only in childhood, occurs when sleep onset is impaired by the absence of a certain set of objects or circumstances, be it the presence of a bottle or a pacifier or being rocked to sleep (Diagnostic Classification Steering Committee, 1990; Ferber, 1987; Richman, 1981). When these objects or circumstances are present, sleep is normal. However, when these objects or circumstances are not
present, sleep is disturbed and can result in sleep-onset difficulties and frequent night wakings. To understand this disorder, note that waking during the night is normal and that most children are able to return to sleep easily. However, some children are unable to return to sleep until the conditions for sleep are reestablished. In children ages 6 months to 3 years, this disorder occurs in approximately 15–20% of the population. After age 3, the prevalence does decrease but may be maintained in some children. Behavioral interventions have been successful in treating sleep-onset association disorder (Rickert & Johnson, 1988; Schaefler, 1990). Mindell (1990) demonstrated that by implementing a behavioral program at bedtime, involving a positive bedtime routine and graduated extinction, generalization occurred to reduce frequent night wakings. Other studies have found support for parent interventions (e.g., Jones & Verduyn, 1983; Milan, Mitchell, Berger, & Pierson, 1981; Richman et al., 1985), and a recent study supported the use of written parent instructions with or without therapist support (Seymour, Brock, During, & Poole, 1989). However, one recent study did find night-waking problems in infancy to be persistent and resistant to change (Scott & Richards, 1990, p. 101). In this study, no difference was found in the night-waking behavior of 60 infants after written advice with therapist support or written advice only in comparison with no intervention. The written advice included general background knowledge about sleep in infants, emphasized modifying parental expectations about sleep, and provided the advantages and disadvantages of various behavior modification strategies to night-waking problems.

Nocturnal eating (drinking) syndrome. The last disorder in the group of sleep problems known as the dyssomnias is nocturnal eating (drinking) syndrome. This condition, which is similar to sleep-onset association disorder, “is characterized by recurrent awakenings, with the inability to return to sleep without eating or drinking” (Diagnostic Classification Steering Committee, 1990, p. 101). This disorder is common in infancy and early childhood, when children require nursing or drinking a bottle to fall asleep. Bed-wetting may also be excessive and can cause increased night wakings. Treatment strategies for this disorder involve the gradual removal of the eating or drinking behavior. For example, in one study (Mindell, 1990), children were given fewer and fewer ounces of milk per night at bedtime until no longer receiving any. With the removal of the drinking behavior, frequent night wakings were eliminated. This disorder occurs less often in children over the age of 3 than do the other dyssomnias.

Parasomnias

Although many children do experience one of the dyssomnias, the predominant sleep disorders found in children are classified as parasomnias. These include confusional arousals, sleepwalking, sleep terrors, nightmares, sleep bruxism, and sleep enuresis.

Confusional arousals. Confusional arousals occur almost universally in children before the age of 5 years (Ferber, 1985) and are much less common in older children. Confusional arousals are characterized by confusions during and after arousals from sleep, mainly occurring in the first part of the night (Diagnostic Classification Steering Committee, 1990). The child is often disoriented and shows slowed speech and slowed response to commands or questions. This confusional behavior may last from several minutes to hours. Typically, treatment is not recommended, and children outgrow this sleep problem. Little research has been done in this area.

Sleepwalking. The second parasomnia common in children is sleepwalking. Chronic sleepwalking is experienced by approximately 1–6% of children, with as many as 15% of all children having at least one such episode (Anders, 1982; Broughton, 1968; Diagnostic Classification Steering Committee, 1990; Soldatos & Lugaresi, 1986). The behavior may range from simply sitting up in bed to walking. The child is often difficult to awaken and, on awakening, appears confused. Sleepwalking is most prevalent in children between the ages of 4 and 8 years and usually spontaneously disappears after adolescence. The frequency of the behavior can vary from infrequently to several times a week. Sleepwalking can be exacerbated or induced by fever, sleep deprivation, and some medications, such as lithium, prolixin, and desipramine (Klackenberg, 1982b). Other precipitating conditions are a distended bladder or external stimuli, such as noise. Little research has studied treatments for sleepwalking in children. Typically, parents are told to safety proof the house—for example, to make sure that all doors leading outside the house are locked. Otherwise, parents are reassured about their child's sleepwalking and informed that sleepwalking is usually a benign, self-limited maturational occurrence (Berlin & Qayyum, 1986). The one study that was conducted in this area involved a 7-year-old boy referred for somnambulism that was accompanied by nightmares, crying, and talking in his sleep (Clement, 1970). Initial treatment with insight-oriented therapy proved to be ineffective. A behaviorally oriented conditioning procedure was next instituted, which involved waking the child on sleepwalking. The behavioral treatment led to a significant reduction in sleepwalking frequency. Unfortunately, this case study presented only preliminary data on the effectiveness of an awakening procedure for sleepwalking. More controlled experimental studies need to be conducted.

Sleep terrors. A third parasomnia, sleep terrors, occurs in about 3–6% of all children (Broughton, 1968; Soldatos & Lugaresi, 1987). Sleep terrors, also known as night terrors or fear nocturnus, “are characterized by a sudden arousal from slow wave sleep with a piercing scream or cry, accompanied by autonomic and behavioral manifestations of intense fear” (Diagnostic Classification Steering Committee, 1990, p. 147). Sleep terrors usually happen within 2 hours of sleep onset and are characterized by agitation (DiMario & Emery, 1987). The child is often unresponsive to attempts at soothing and may be confused and disoriented if awakened. Sleep terrors are most common in children ages 4 to 12 and tend to resolve by adolescence. Other than sleep enuresis, sleep terrors are the only parasomnia that happens more commonly in boys than in girls, instead of being equally distributed across the sexes. Night terrors have a genetic component (Kales, Soldatos, & Kales, 1980) and are considered a disorder of impaired arousal (Broughton, 1968). There are several theories regarding the etiology of sleep terrors, with early studies claiming a psychogenic basis, though this has not been supported recently.
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(Kales, Kales, et al., 1980). In a study of 900 children, 6 to 12 years old, the prevalence for this disorder decreased with increasing age, supplying evidence for the maturational and developmental nature of sleep terrors (Vela-Bueno et al., 1985). Other studies have also found night terrors to be more common in younger children (e.g., Simonds & Parraga, 1982). In contrast, Agrell and Axelsson (1972) proposed a relationship between enlarged adenoids and sleep terrors. To study this hypothesis, 23 children who experienced frequent sleep terrors underwent adenoidectomy. At follow-up, 22 of the children had complete cessation of sleep terrors.

There are few broad-scale investigations on the treatment of sleep terrors, although several case studies exist in the literature. Kellerman (1979) treated a 3-year-old girl with acute lymphocytic leukemia (ALL), who presented with a 1-month history of persistent, recurring night terrors. Behavioral analysis and treatment, including positive reinforcement, systematic desensitization, and reduction of parental attention, led to significant reductions in night terrors. Kellerman (1980) also successfully treated a 5-year-old boy with a 7-month history of sleep terrors, using similar techniques. Sometimes, pharmacological treatment of sleep terrors has been successful. Glick, Schuhman, and Turecki (1971) treated 3 children, between the ages of 8 and 11, with diazepam (Valium). In all three cases, a reduction in sleep terrors was evident. However, in two of the cases, relapse occurred when the drug was stopped, and recovery occurred again when the medication was resumed. A second study (Fisher, Kahn, Edwards, & Davis, 1973) also found diazepam to be effective in the treatment of night terrors. Popovicic and Corfaria (1983) treated 15 hospitalized children, 6 to 15 years old, with a short-acting benzodiazepine, midazolam. Midazolam was found to suppress night terrors in all but 1 child during a 2-day course of the medication, in comparison with baseline. Cameron and Thyer (1985) also reported the successful treatment of sleep terrors in a 19-year-old girl with alprazolam, a triazolobenzodiazepine. Other drug treatments have also been recommended. Reite et al. (1990) suggested a low dose of a tricyclic for severe cases. They recommended that a low dose of imipramine or desipramine be given to children with frequent and severe night terrors for about 6 weeks. They reported that after withdrawal of the drug, many children stayed symptom free. However, this was not supported by experimental studies done in this area (e.g., Fisher et al., 1973; Glick et al., 1971). The use of medications to treat sleep terrors is controversial. Some individuals (e.g., Weissbluth, 1984) have argued strongly against the use of drugs as a treatment for sleep terrors. And, last, as mentioned above, Agrell and Axelsson (1972) significantly reduced sleep terrors after adenoidectomy in a group of 23 children. Unfortunately, no further studies have been done that replicate the benefits of adenoidectomy for children with sleep terrors.

Nightmares. Nightmares occur in about 10-50% of all children between the ages of 3 and 6 years (Diagnostic Classification Steering Committee, 1990). After a gradual onset, nightmares typically decrease in frequency over time. A small percentage of children will continue to have nightmares throughout adolescence and even possibly into adulthood (Diagnostic Classification Steering Committee, 1990). Nightmares occur during periods of REM sleep, in contrast to sleep terrors, which happen during slow-wave sleep earlier in the night. Nightmares are typically associated with fears of attack, falling, or death (Kales, Soldatos, & Caldwell, 1980). Treatment strategies for nightmares have focused on anxiety reduction, often combined with other behavioral strategies such as systematic desensitization (Cavior & Deutsch, 1975) or response prevention (Roberts & Gordon, 1979). One 13-year-old girl was successfully treated for nightmares with reinforcement and anxiety management techniques (Kellerman, 1980). For most families, reassurance that nightmares are part of normal child development is beneficial and all that is necessary, especially to decrease the likelihood that the child will be treated as though psychologically disturbed.

Sleep bruxism. Sleep bruxism, which involves grinding or clenching the teeth during sleep, occurs in over 50% of normal infants, with the average age of onset at 10 months (Diagnostic Classification Steering Committee, 1990; Kravitz & Boehm, 1971). Adult-related bruxism usually begins at age 10-20 years. Bruxism may cause dental problems, such as abnormal wear of the teeth or periodontal tissue damage, and may also be related to headaches or jaw pain. The research to date on bruxism is primarily with adult populations. Studies have found bruxism to be amenable to electromyography (EMG)-activated biofeedback. This has been shown in naturalistic studies (e.g., Kardachi & Clarke, 1977), laboratory studies (e.g., Piccione, Coates, George, Rosenthal, & Karzmar, 1982; Wagner, 1981), and in comparative studies of feedback alarms with other treatment approaches (e.g., Casas, Beemsterboer, & Clark, 1982; Kardachi, Bailey, & Ash, 1978). An excellent review of the use of biofeedback for bruxism in adults is provided by Cassisi, McGlynn, and Belles (1987). Also, a thorough review of dental approaches to bruxism is presented by McGlynn, Cassisi, and Diamond (1985). Additionally, stress management approaches have been effective in the treatment of bruxism (Casas et al., 1982). Unfortunately, few studies, if any, have researched the efficacy of treatment programs for bruxism in children.

Sleep enuresis. The final parasomnia often found in children is sleep enuresis, or bed-wetting. Enuresis is diagnosed when persistent bed-wetting occurs after age 5 (Diagnostic Classification Steering Committee, 1990; Schmitt, 1982). Estimates show that bed-wetting occurs in 30% of 4-year-olds, 10% of 6-year-olds, 5% of 10-year-olds, and 3% of 12-year-olds. The spontaneous rate of cure after age 6 is about 15% per year (DeJonge, 1973). Primary enuresis, that is, those who have had a continuous enuretic condition, comprises 70-90% of all cases of the disorder. Secondary enuresis, in which the child has had at least 3-6 months of dryness, comprises the remaining 10-30% of all cases. Boys are more likely to experience this problem (up to age 10, about 50% likelier).

Many studies have researched various aspects of enuresis, including diagnosis (see Butler, 1991, for an excellent review of the establishment of a working definition for nocturnal enuresis), assessment, and treatment. Enuresis is undoubtedly the most well-studied sleep disorder of children. Several behavioral treatments have had proven high success rates (Azrin, Sneed, & Fox, 1974; Dokey, 1977; Feldman, 1983; Weir, 1982). The most popular and effective technique is the bell-and-pad system, which sounds a bell when bed-wetting
occurs. This method was developed by Mowrer and Mowrer in 1938. Reported success rates for this technique have been as high as 75% (Forysthe & Redmond, 1974; Fraser, 1972), with the best results in children over 7 years (McClain, 1979). Other conditioning approaches have also been used (e.g., Whelan & Houts, 1990), such as bladder training (McClain, 1979; Troup & Hodgson, 1971), hypnosis (Olness, 1975), and dietary control, for example, a reduction in caffeine intake (Bond, Ware, & Hoelscher, 1990). Comprehensive treatment programs have also been developed for the treatment of enuresis. Scharf and Jennings (1988) instituted such a program, incorporating five methods: bladder-stretching exercises, stream interruption, counseling for motivation and responsibility, visual sequencing, and conditioning therapy. Ninety-one percent of children entering their multimethod treatment program showed significant improvements. Azrin and Thienes (1978) also developed a successful multimethod behavior modification program, involving four basic procedures: a nightly waking schedule, positive practice, an alarm activated by wetness, and cleanliness training. This study, as well as others (e.g., Bollard & Nettelbeck, 1982), included a nightly waking schedule as a component of their multimethod treatment program and believed it to be a crucial part of treatment. This belief was based on the theory that enuretic children might have a sleep-arousal problem. That is, enuretic children sleep more soundly and are more difficult to arouse (Whelan & Houts, 1990). However, recently, Whelan and Houts demonstrated that adding a waking schedule to full-spectrum home training (FSHT) did not produce increased benefits over FSHT alone. Thus, they did not find support for the sleep-arousal theory just discussed.

In some cases of enuresis, tricyclic antidepressants are used (Kales, Soldatos, & Kales, 1980). Studies show that imipramine can be successful in controlling enuresis in up to 70% of cases when taken regularly (Bindeglass & Dec, 1978). However, on withdrawal from the medication, few children stay dry. Because of imipramine's potential cardiotoxic effects and the high relapse rate after withdrawal, it is often not recommended for use over long periods of time (Scharf & Jennings, 1988). Another drug that has been used with success is desmopressin (DDAVP), an analogue of the antidiuretic hormone vasopressin (e.g., Miller, Goldberg, & Atkin, 1989; Warady, Alon, & Hellerstein, 1991). Desmopressin has similar success rates to imipramine but almost always leads to relapse after discontinuation of the medication. Approximately 70% of cases, though, have persistent resolution of bed-wetting when maintained on desmopressin, with minimal side effects. Given that desmopressin is much more expensive and has higher relapse rates than other treatments, it may be the treatment of choice when used on a short-term, or as needed, basis (e.g., overnight camp or staying at a friend's house). Overall, the results from the studies discussed above indicate that enuresis is highly amenable to treatment and should be considered a treatable condition.

Special Populations

Within the child population, there are special subpopulations that call for particular attention when considering sleep disorders. First are mentally handicapped children. These children have higher rates of sleep disorders in comparison with normal populations (Clements, Wing, & Dunn, 1986; Hamaguchi, Hashimoto, Mori, & Tayama, 1989; Hewett, 1970; Richman et al. 1975) and require special services. For example, Bartlett, Rooney, and Speeding (1985) found that 80% of parents reported that their mentally handicapped child experienced sleep difficulties. Overall, 56% of the children had mild problems, and 23% had severe problems. The sleep problems experienced were similar in nature to those affecting normal children but appeared to last longer. DeMeyer (1979) reported that in a population of autistic children, at an average age of 5 1/2 years, 49% of the children continued to experience severe sleep problems. These sleep problems cause undue stress for the caregivers of these children, especially when the child experiences night wakings (Clements et al., 1986). Given that sleep problems are often highly amenable to behavioral techniques, intervention for these families may reduce nocturnal stress and, therefore, improve the quality of family life. A few studies have investigated the effectiveness of treatment programs for specific sleep disorders in this population. Milan et al. (1981) successfully treated an emotionally disturbed, severely handicapped 4-year-old child for bedtime temper tantrums. A positive bedtime routine was effective in inducing the child to go to bed voluntarily and eliminated the tantrum behavior. Milan et al. found that a positive-routine procedure was easier for parents to implement than an extinction approach and, thus, was more likely to be used. Wolf, Risley, and Mees (1964) described the successful treatment of an autistic child's sleep problems by simply closing the child's bedroom door. The relationship between the parent's behavior and the child's sleep problems was demonstrated when the child returned to having bedtime problems after the mother returned to baseline behavior. Another 6-year-old autistic child was successfully treated for bedtime problems with a gradual reduction of parent contact over a 2-month period (Howlin, 1984). And, finally, Piazza and Fisher (1991) treated 4 developmentally disabled children with long-standing, multiple sleep disturbances. A faded bedtime procedure with response cost increased nighttime sleep, decreased excessive daytime sleep, and decreased night wakings. The studies discussed above indicated that sleep disturbances in mentally handicapped children could be successfully treated with behavioral approaches. Furthermore, Marcus, Keens, Bautista, von Pechmann, and Ward (1991) found that children with Down's syndrome frequently had obstructive sleep apnea syndrome, which might contribute to their often seen, but typically unexplained, pulmonary hypertension. Improvements were observed in a group of these children after tonsillectomy and adenoidectomy.

Another group of children in which sleep problems may be implicated are those children labeled as hyperactive. For example, Bergman (1976) described a 7-year-old boy who was misdiagnosed as hyperactive when, in fact, he had a significant sleep disorder. Instead of his being placed on Ritalin, his problems were successfully treated by focusing on his sleep difficulties. Furthermore, some studies have reported disturbed sleep to be associated with attention-deficit hyperactivity disorder (ADHD; APA, 1987). Kaplan, McNicol, Conte,
and Moghadam (1987) documented that a sample of children, ages 3 and 6 years, identified as hyperactive had significantly more sleep problems than matched controls. These clinically reported sleep problems in ADHD children, however, have not been supported by polysomnographic evidence (e.g., Bushby, Firestone, & Pivik, 1981). Greenhill, Puig-Antich, Goetz, Hanlon, and Davies (1983) studied 9 children with ADHD. Of these 9 children, 57% were reported by their parents to have restless sleep. However, no difference in these children’s sleep architecture was found on polysomnographic recordings in comparison with matched controls. In addition, comparing a group of 17 preadolescent boys with conduct disorder with normal boys, no differences were found using standard sleep summary measures (Cobie et al., 1984). However, automated measures revealed striking differences in delta activity. The studies reported here indicate that further studies using objective techniques with larger samples are needed to answer questions about whether children with disorders such as ADHD and conduct disorder differ from normals in their sleep.

Children with ADHD may also have sleep problems that contribute to behavioral and academic abilities. For instance, one 10-year-old girl with attention-deficit disorder was found to also have a long-term history of sleep difficulties (Dahl, Pelham, & Wierston, 1991). Following treatment for her sleep problems, improvements were seen in her interactions with peers, on teacher ratings, and in classroom performance. For this child, attention-deficit symptoms persisted, but there was a significant reduction in these problems following improvement in her sleep. Again, further research is needed to study whether some children identified with certain disorders, such as hyperactivity, have solely a sleep problem or also have a sleep disorder that exacerbates their symptoms.

A third population of concern are hospitalized children. Children who are hospitalized for various reasons typically develop more problems sleeping (Beardslee, 1976; Prugh, Staub, Sands, Kirschbaum, & Lenihan, 1953; White, 1990; White, Powell, Alexander, Williams, & Conlon, 1988), and hospitalization also often exacerbates preexisting sleep difficulties (Anders & Weinstein, 1972). Hagemann (1981) found that hospitalized children, ages 3 to 8 years old, lose one fifth to one fourth of their normal sleep time because of a delay in sleep onset. Several studies have explored means to reduce sleep difficulties in hospitalized children. Surprisingly, White, Williams, Alexander, Powell-Cope, and Conlon (1990) found that children were more distressed and had longer latency to sleep onset when parents were present at bedtime or when children listened to a parent-recorded story compared with those children who listened to a stranger-recorded story at bedtime or had no intervention (White et al., 1990). They suggested that hospitalized children might have more difficulties falling asleep at night when reminders of home were present. These data are in contrast to popular opinion. A survey of 400 psychiatrists, conducted by Pietropinto (1985), found that 44% believed that mothers should sleep in a hospitalized child’s room whenever possible. Other suggestions to help hospitalized children sleep include instructing the nursing staff to institute more structured bedtimes for the children and to modify the hospital environment (e.g., dimmed lights, reduced noise, and television off) to reduce interferences with sleep. There have been some preliminary data on the use of mild sedatives for hospitalized children experiencing sleep problems. In one study (Besana, Fiocchi, de Bartolomeis, Magno, & Donati, 1984), 40 hospitalized children (ages 2 years to 13 years), who needed a sedative treatment for nervousness and agitation, were administered Niaprazine, an anhistaminiliclike compound with marked sedative properties. In comparison with placebo, the Niaprazine led to significant improvements in latency to sleep onset and duration of sleep.

Not only do hospitalized children have difficulties with sleep, but so may children with chronic illnesses. One study (Miser, McCalla, Dothage, Wesley, & Miser, 1987) found that nearly half of children presenting with newly diagnosed malignancy experienced sleep disturbances resulting from pain. Sleep is also often disturbed in conjunction with vaso-occlusive crisis (VOC) pain in children with sickle-cell anemia (Dinges et al., 1990). Mindell, Spirito, and Caraskadon (1990), however, found few differences between chronically ill children and healthy children in terms of significant sleep problems (e.g., insomnia or night wakings) but did find that chronically ill children got less sleep throughout the day and night. Furthermore, these children had later bedtimes, woke earlier in the morning, and took fewer naps.

Finally, children with specific acute medical conditions such as severe burns also may have significant sleep disturbances. For example, children who have burn injuries often experience nightmares (Noyes, Andreasen, & Hartford, 1971; Tarnowski, Rasnake, & Drabman, 1987). One study (Roberts & Gordon, 1979) successfully treated a 5-year-old child who was having nightmares and night terrors secondary to burns over 30% of her body. Nightmares were eliminated within a 2-week period through the use of response prevention and systematic desensitization. Unfortunately, few studies have targeted sleep problems related to other medical conditions. In summary, more research is needed that focuses on the special problems of mentally handicapped and medically ill children.

Additional Concerns

A concomitant problem to sleep disorders in children is the stress that it causes the family. Studies on the impact of sleep problems in infancy show that parents of infants with sleep disorders typically are more anxious and depressed (e.g., Durand & Mindell, 1990). Following amelioration of these young children’s sleep problems, significant positive effects on the parents do occur, such as decreased depressive symptomatology and increased satisfaction with their marriage (e.g., Adams & Rickert, 1989; Durand & Mindell, 1990). Similar problems are expected in families of older children in which sleep problems continue; however, this concern has not been extensively studied.

For school-age children, sleep problems may begin to interfere with other aspects of their life. Children who are excessively sleepy during the day may have difficulty concentrating in school and may be considered a behavior problem in the classroom. Kahn et al. (1989) found that 21% of preadolescents identified as poor sleepers had failed 1 or more years of school. In addition, more of these children experienced school
achievement difficulties than children without sleep problems, despite spending an equal amount of time on homework. As discussed earlier, some children may even be misdiagnosed as hyperactive (e.g., Bergman, 1976). Some sleep disorders also interfere with social functioning, especially for an older child who continues to be enuretic. The child is often embarrassed about the problem and will avoid situations in which he or she will not be sleeping at home (e.g., sleeping at a friend’s house or camping out). For these children, sleep disorders have moved out of the bedroom and have become a problem in daily life.

Conclusions and Future Directions

There are a number of methodological problems with many of the studies reviewed in this article. For example, the bulk of the research conducted on sleep disorders in children are case studies (e.g., Anderson, 1979; Bergman, 1976; Connell et al., 1987; Friedman & Ollendick, 1989; McNemany & Katz, 1989; Rolider & Van Houten, 1984). Furthermore, most treatment studies reviewed did not use a control group but, rather, treated all children with a specific disorder (e.g., Graziano & Mooney, 1980; Piazza & Fisher, 1991; Richman et al., 1985). This situation is especially common in areas such as narcolepsy, bruxism, nightmares, and sleep terrors. The primary exception to the statement above are studies evaluating the efficacy of medications for sleep disorders (e.g., Besana et al., 1984; Richman, 1985). One study by Russo et al. (1976) did evaluate a clinical trial of Benadryl Eluril using a 2-week, double-blind, placebo-controlled crossover design in a group of 50 children. The other area of exception is sleep enuresis (e.g., Whelan & Houts, 1990), which is a disorder that has been extensively studied. More rigorously controlled research in an experimental situation is needed for almost all other types of children’s sleep disorders.

Another methodological concern is the lack of long-term follow-up in most studies. The best long-term follow-up was presented by Graziano and Mooney (1980, 1982) on nighttime fears in young children. They conducted follow-up for a group of 40 children at 2 1/2 to 3 years. Most studies, however, reported a follow-up of several weeks to 3 months (e.g., Adams & Rickert, 1989; Glick et al., 1971; Seymour et al., 1989), with 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, there is the possibility that sleep problems may dissipate for a period of time, only to return later. This issue needs to be addressed in future studies in this area.

An additional concern about the studies reviewed is the subjectivity of much of the data. Many studies based their findings on either the child’s self-report or parental report (e.g., King et al., 1989; Milan et al., 1981; Richman et al., 1985; Russo et al., 1976; Scott & Richards, 1990). Few studies have used objective measures of sleep, specifically polysomnography. As found by Greenhill et al. (1983), polysomnographic findings do not always correlate with other measures of sleep.

Research has demonstrated the limitations of relying on self-report to make diagnoses and document outcome. The majority of studies that have investigated the correspondence between self-report and more objective measures have been conducted with adults (e.g., Bootzin & Engle-Friedman, 1981). It is expected that though correlations found between adult self-report and objective recordings are relatively good (Kelly & Lichstein, 1980), an even lower association between parental report and children’s sleep would be found. Support for this hypothesis can be found in one study investigating the sleep of children between the ages of 9 and 12 (Csikszentmihalyi & Graef, 1975). Although parents were fairly accurate reporters of events that occurred when they were with their child, they were poor reporters of events that occurred during the night when they were not with their child. Others (e.g., Ragins & Schachter, 1971) have also demonstrated that parents vary considerably in the accuracy of their reports, both in interview situations and with daily recordings. In summary, though sleep diaries have clinical merit (e.g., presenting an accurate picture to parents of the severity of a sleep problem and demonstrating change), their use is a serious methodological problem in most research conducted on sleep disorders.

Finally, there are a number of areas in which further research is necessary. For one, research into the etiological factors of many of the disorders mentioned is needed. There are very few controlled studies on the etiology of specific sleep disorders in children. There has been some postulation, for example, that sleep disturbances are the result of impaired arousal and that sleep enuresis may be related to a sleep-awakening problem. Genetic factors have been implicated in sleep enuresis and narcolepsy. In addition, anxiety has been mentioned as an etiological factor of some of the parasomnias, including sleep terrors and nightmares. However, definitive studies of the causes of these disorders have not been conducted and are still necessary. Such studies quite likely would find multiple interacting etiological factors involved in most of the childhood sleep disorders.

Another area of focus should be on the treatment of childhood sleep disorders. There are a number of treatment strategies available to clinicians for sleep disorders in children. Some sleep disorders, such as obstructive sleep apnea or narcolepsy, may require surgery or medication. Other sleep problems (e.g., sleep enuresis, limit-setting sleep disorder) appear to be quite amenable to behavioral techniques. Further research is needed to study the best treatment strategy for particular individuals. Also, little evidence has been provided as to the efficacy of specific individual components within treatment packages. Many of the case studies and treatment studies provided used multicomponent treatment packages. A question that remains is, what is the most parsimonious treatment that is needed to effectively reduce a particular sleep disorder? In addition, there are many sleep problems in which little, if any, treatment research has been done. For example, adjustment sleep disorder, bruxism, sleep terrors, and nightmares all require study, as these problems are quite common and little is known about treatment issues. For many disorders, treatments that are used are derived from treatment strategies used with adults. However, no empirical data support their use with children. Such research is needed and
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should incorporate other treatment strategies that have never been used with children such as biofeedback and paradoxical instruction. Research is also necessary regarding whether treatment of some sleep problems is warranted. For example, reassurance to parents of children who have sleep terrors or who sleepwalk may be the most appropriate option. It may only be necessary to allay the parents' concerns and have the parents take precautions against potential injury.

In summary, if these concerns are addressed in future literature, the understanding of sleep disorders in children will advance significantly, as will the ability to diagnose and treat children with sleep problems. At present, whereas a large percentage of children have diagnosable sleep disorders, it is often not until there are severe difficulties in school that these disorders are identified and then treated. This results in problems not only for the child but also for other members of the child's family. As reviewed in this article, sleep disorders in children are just beginning to be understood.

References


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Appendix

Sleep Disorders in Children

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Hill Appointed Editor of the Journal of Counseling Psychology, 1994–1999

The Publications and Communications Board of the American Psychological Association announces the appointment of Clara E. Hill, PhD, University of Maryland, as editor of the Journal of Counseling Psychology for a 6-year term beginning in 1994. As of January 1, 1993, manuscripts should be directed to

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Manuscript submission patterns for the Journal of Counseling Psychology make the precise date of completion of the 1993 volume uncertain. The current editor, Lenore W. Harmon, PhD, will receive and consider manuscripts until December 31, 1992. Should the 1993 volume be completed before that date, manuscripts will be redirected to Dr. Hill for consideration in the 1994 volume.