

## The Impact of Children's Sleep Problems on the Family and Behavioural Processes Related to their Development and Maintenance.

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### Abstract

The effects of sleep disturbance and sleep deprivation in adults have been well documented and include diminished performance on cognitive tasks such as reaction time, attention, concentration, and memory. The effects of disturbed sleep in children are not as well documented, and the impact that sleep problems may have on the developing brain is largely unknown. However, research has shown that in addition to the sleep disturbance, sleep problems in children can have a significant impact on daytime functioning. This impact can be further exacerbated where the child has an existing developmental disability. Sleep problems also impact upon the family, and parents who have a child with a sleep problem have higher levels of stress and marital dissatisfaction. This paper reviews the evidence regarding the effect of sleep problems on daytime functioning in children. The impact that such disturbances can have on parents and the family as a whole is also discussed, as well as the behavioural processes occurring within the family that contribute to the development and maintenance of sleep problems in children.

**Keywords:** *sleep problems; children; parents; behavioural factors; daytime functioning.*

### The Nature and Prevalence of Sleep Problems in Children.

#### Sleep Problems in Typically Developing (TD) children.

Many studies have examined the nature and prevalence of sleep problems in pre-school children, and sleep problems in this population are more common than in older children. For example, Richman (1981) examined sleep in a random sample of children aged between one and two years using a survey and sleep diary which was completed by parents for a two week period. It was found that 56% of the sample woke during the night at least once per week, while 24% woke two to four times per week and 20% woke five to

seven nights per week. Overall, 13 to 20% of the sample woke regularly and 6 to 10% had severe sleep disruptions. Similar results have been found in an Australian population. Armstrong, Quinn and Dadds, (1994) examined sleep in 3,269 Queensland children aged between one month and three years two months via parent questionnaire. The average prevalence of sleep problems reported by parents was 29%. Children up to six months of age had a 25% prevalence of sleep problems, whereas children aged 7 to 12 months had the highest prevalence, with 36% of parents reporting sleep problems. This figure decreased in children aged two to three years, with sleep problem prevalence reported to be 28%. It is clear nevertheless that sleep problems are still common at this age. Night waking (NW) was a significant problem in this sample with 3.4% of children being reported to have never slept through the night without requiring parental attention. Over 12% of 4 to 12 month olds were reported to wake and require parental attention three or more times every night, and at three years, 40.8% of children were still waking one to two times per night. Blum and Carey (1996) also found that settling problems and NW were common in a sample of pre-school children. A longitudinal study of 133 children was conducted and settling difficulties were reported in 50% of four-year-olds, while 20% of one- to two-year-olds woke more than five nights per week.

Although problems initiating and maintaining sleep are more commonly reported by parents of infants and toddlers, sleep problems may also persist into later childhood and in some cases until early adolescence (Sheldon, 2001). Some sleep problems, such as bedtime resistance, are thought to be more common in older children (Blader, Koplewicz, Abikoff, & Foley, 1997). In one of the few studies to employ both objective methods of sleep measurement and subjective ratings by parents Sadeh, Raviv and Gruber (2000) examined the sleep of 140 children (72 boys and 68 girls) aged between 7 and 12 years. Actigraphy was used to measure sleep objectively for four to five

nights. Daily sleep logs and a sleep questionnaire were also completed by parents. Results showed that the older children had more morning drowsiness and unplanned daytime naps. These results suggest that older children may not be getting enough sleep, and sleep deprivation may be common at this age. No significant age differences were found for those children classified as poor sleepers and no significant effects were found for age and sleep quality, suggesting that sleep quality may remain relatively stable throughout childhood.

The Sadeh et al. (2000) study also found that an average of approximately two wakings per night still occur in children who are school-aged. Thus, the number of wakings experienced by older children is very similar to that of infants and toddlers. Similar results have been reported by Blader et al. (1997), who examined the sleep of 972 5- to 12-year-olds via a sleep survey which was completed by parents. The survey consisted of 48 multiple-choice questions relating to the child's sleep and parent management of bedtime and sleep difficulties. The authors found that although most children began sleeping through the night after 12 months of age, the amount of NW showed continuity across this age range.

Difficulties settling to sleep and resistance to bed also seem to be problems common in school aged children. Blader et al. (1997) found that bedtime resistance was common, with 27% of children reported to have bedtime resistance at least three times a week. Sleep latency was also reported to be a problem, with 54% of children taking 30 to 60 minutes to fall asleep, and 20% of children taking more than one hour to fall asleep. Only 22% of the sample fell asleep within 30 minutes on most nights. NW was also common with 6.5% of parents reporting that their child woke during the night at least three nights per week. Twenty-seven percent of these children required between one and two hours to fall back to sleep after waking, and 3.7% spent two to three hours awake during the night on a regular basis. Approximately 17% of children were also difficult to wake in the morning and complained of being tired during the day.

Co-sleeping, where the child and parent sleep in the same bed, also commonly occurs in children with sleep problems. Cortesi, Gianotti, Sebatiani and Vagnoni (2004) found that 20% of children who co-slept had sleep-onset difficulties and 10% had frequent NW. This study also showed that although co-sleeping decreased with age, a significant number of older children were co-sleeping, with around four percent of 10- to 12-year-olds still engaging in this behaviour. On average, co-sleeping had an average duration of six years in this sample of 900 children aged 6 to 12 years. In summary, problems initiating and maintaining sleep, as well as co-sleeping, are the most common sleep

problems occurring in pre-school and school-aged children.

### **Sleep Problems in Children with Developmental Disabilities (DD)**

Sleep problems are more common and more severe in children with DD compared to TD children (Didden & Sigafos, 2001; Quine, 1991). Children with autism have been found to have a prevalence of sleep problems that is twice the rate observed in TD children (Polimeni, Richdale & Francis, 2005; Richdale, 1999). Children with intellectual disability have also been found to have a higher prevalence of sleep problems than TD children (Didden & Sigafos, 2001; Richdale, Francis, Gavidia-Payne & Cotton, 2000). However, the nature of sleep disturbances seen in children with DD are similar to those seen in TD children and include difficulties settling to sleep, NW and co-sleeping (Taira, Takase, & Sasaki, 1998; Wiggs & Stores, 2004). It has been suggested that the higher rate of sleep problems found in children with DD may be due to existing behaviour problems such as self-stimulatory behaviour, neurological problems resulting in difficulties with sleep-wake (SW) regulation, medical problems, and higher levels of psychiatric problems such as anxiety (Mindell & Owens, 2003). However, only a small body of research has examined sleep problems in children with DD, therefore the factors contributing to the higher prevalence of sleep problems in children with DD remains unclear and is likely due to multiple factors.

### **The Impact of Sleep Problems on Child Daytime Behaviour**

As well as causing both parents and child significant distress at bedtime and throughout the night, sleep problems in children can impact significantly on their daytime functioning. Sleep problems are related to difficult temperament in infants and behaviour problems and psychopathology in older children (Sadeh, Gruber & Raviv, 2002). Children who have sleep problems are more likely to experience daytime behaviour problems than children who do not have sleep problems. Chronic irritability, attention problems, and hyperactivity are associated with inadequate sleep (Blum & Carey, 1996).

### **The Impact on Child Cognitive Functioning**

The effect of sleep deprivation in adults has been the focus of considerable research. A number of studies have found that in adults sleep deprivation can result in deficits in cognitive performance including reductions in reaction time, attention, concentration and memory (e.g., Kingshott, Cosway, Deary & Douglas, 2000; Schulz & Salzarulo, 1997). The effects of disturbed sleep in children are not as well documented, and the impact that sleep problems may have on the developing brain is largely unknown.

In one of the few studies to examine the relationship between sleep and cognitive outcomes in children, Dearing, McCartney, Marshall and Warner (2001) conducted a longitudinal study measuring sleep, cognitive, and language functioning in 62 children at 7, 19, 24, and 36 months of age. It was found that children who had more rhythmic sleep patterns at 7 and 19 months of age had better mental development scores at 24 months and better language scores at 36 months. Children who developed a rhythmic sleep pattern at a younger age also had better mental development and language scores when they were older. These results suggest that entrainment of the SW circadian rhythm may have an underlying role in the regulation or development of higher-order processes such as cognition. Further, these results suggest that sleep patterns early in life may have consequences for subsequent cognitive and behavioural development.

The effects of sleep deprivation on neurobehavioural and cognitive functioning have also been examined in school-aged children. Ishihara (2002) found that when sleep was restricted (shortened) for two hours in three children aged 7, 9, and 13 years, sleepiness during the morning and evening of the following day increased significantly in all three children. In a recent study by Sadeh, Gruber, & Raviv (2003) the sleep of 77 children aged 9 to 12 years was manipulated with children being randomly allocated to a sleep restriction condition (where sleep was shortened by at least 30 minutes of total regular sleep time), or a sleep extension condition (where sleep was extended for at least 30 minutes according to total regular sleep time). The authors reported that children in the sleep restriction condition had significant neurobehavioural impairment on reaction time, memory, and continuous performance tasks on the following day compared to the sleep extension group, which showed improvements in neurobehavioural functioning (NBF).

The results of Ishihara (2002) and Sadeh et al. (2003) demonstrate that even small to moderate amounts of sleep loss from 30 minutes to 2 hours can result in significant impairments and disturbance to daytime functioning. However, Allen (2003) has questioned the validity of the findings of Sadeh et al. (2003), suggesting that a more conservative statistical evaluation of these data is appropriate and would show no significant differences in NBF following sleep restriction. Nevertheless, Allen (2003) agrees that the results of the study demonstrate significant improvements in NBF in children who experienced sleep extension for 30 minutes.

In an earlier study, Sadeh, et al. (2002) examined sleep using actigraphic recordings for five consecutive nights in a sample of 135 children aged 7 to 12 years. NBF was evaluated using a battery of standard neuropsychological tests including a finger tapping task, a simple reaction time task, a continuous performance task, digit symbol substitution, and other

memory and learning tasks. Child behaviour was also measured using a parent completed checklist. In this study fragmented sleep was associated with both difficulty in behavioural inhibition and sustaining attention. These associations were more pronounced in younger children. Good sleepers also performed better than poor sleepers on continuous performance and digit symbol substitution. However, no relationships were found between sleep and the more simple tasks such as motor speed, reaction time, and memory. Behaviour problems were more common in poor sleepers compared to good sleepers. The results of this study suggest that poor sleep can result in a significant cognitive deficit (particularly in relation to complex tasks), and behaviour problems, and that such deficits may have a more detrimental impact on younger children.

The relationships identified in TD children regarding sleep problems and daytime behaviour have also been reported in children with DD (Richdale et al., 2000; Schreck, Mulick & Smith, 2004; Wiggs & Stores, 1996). These children often have pre-existing behavioural, cognitive and learning problems, therefore sleep problems in children with DD may result in even more severe disturbance and may exacerbate existing daytime behaviour problems and cognitive impairments (Didden, Korzilius, vanAperlo, vanOverloop & deVries, 2002).

### **The Impact on Child Academic Performance and School Adjustment**

Disturbance to cognitive functioning as a result of sleep problems also impacts on school adjustment. Bates, Viken, Alexander, Beyers & Stockton, (2002) examined sleep and preschool adjustment in a community sample of 202 children for one month using daily diaries and interviews. Information regarding sleep was obtained from mothers and information regarding preschool adjustment was provided by teachers. A consistent pattern of better preschool adjustment and lower family stress in children who had more regular sleep patterns was observed. It was also found that the amount of sleep per night was related to child behaviour, with less sleep associated with more behaviour problems. Disrupted sleep in these children correlated with poor preschool adjustment even after factors such as family stress and family management practices were taken into account. This study shows that children who were identified by their mothers as having a sleep problem were also identified by the independent observations of teachers as having poorer preschool adjustment.

Similar relationships have also been found in school-aged children. Paavonen et al. (2002) examined the relationship between sleep problems and behavioural and emotional problems in a sample of 5,813 children aged eight to nine years. These children were administered the Children's Depression Inventory

which is a self-report measure, and parents and teachers completed a questionnaire regarding child psychiatric symptoms. Questions regarding sleep from each of the measures were then examined. Teacher reports of psychiatric symptoms were higher in children with severe sleep problems, indicating that sleep problems may be associated with psychiatric problems at school. Boys with sleep problems were likely to have school attendance problems, internalising problems, and hyperactivity. Girls with sleep problems were more likely to demonstrate both internalising and externalising problems. Children's self reports of sleep problems were associated with more internalising problems, whereas parent reports of sleep problems were found to be associated more with externalising problems.

A more recent study has reported on a group of 16 six-year-old children who failed to progress to first grade compared to 13 age-matched controls. The children who failed to qualify for promotion to first grade had more sleep problems which included variable SW schedules, difficulty falling asleep, reduced sleep efficiency, and an increased number of NW. These children also had poorer concentration, attention, and higher levels of nervousness and irritability (Afek, Lam, Suraiya, Ravid, & Pillar, 2004).

Little information is available regarding the relationship between sleep problems and school adjustment in children with DD, however it is likely that as with TD children, sleep problems in children with DD are likely to adversely influence school adjustment and academic performance.

### **The Impact on Subsequent Child Development**

Research has shown that sleep problems are predictive of disturbances in cognitive and behavioural functioning later in life (Sheldon, 2001). In an innovative study, Gregory and O'Connor (2002) examined parent reports of sleep, emotional, and behaviour problems longitudinally: Four hundred and fifty children aged four to five were followed over an 11 year period. The Child Behavior Check List (CBCL) was used to measure child behaviour and sleep problems at ages 4, 7, 9, 10, 11, 12, 13, 14 and 15 years. The CBCL contains subscales which measure anxiety/depression, attention, and aggression and the subscales can be divided into internalising and externalising problems. A sleep problems scale was also developed from a number of items on the CBCL. It was found that sleep problems decreased over time, but that individual differences in children remained moderately stable over time. Sleep problems also correlated with behavioural problems including anxiety/depression, aggression, and attention problems across the 11-year age period, with evidence that the correlation between sleep problems and anxiety/depression increased with age.

One of the most important findings of the Gregory and O'Connor (2002) study was that sleep problems at age four predicted behaviour and emotional problems at later ages, and were equally predictive of anxiety/depression, aggression, and inattention. The reverse was not found however (i.e., that behaviour problems predicted sleep problems) except for attention problems. These findings provide the strongest evidence to date that disruption of sleep early in life can predict disturbances in behaviour and affect later in childhood. The mechanisms involved in this relationship are still unknown. It is possible that sleep problems early in life may disrupt biological or cognitive development which results in a higher risk of developing behaviour problems later in childhood. Alternatively, sleep problems may be an early indication of a developing psychopathology or neurological problem. Although this study relied solely on parent reports of sleep and behaviour, and limited information was collected regarding the nature of sleep problems in the sample, this is the first study to demonstrate a link between early sleep problems and the development of behavioural and emotional problems in later childhood.

The relationship between sleep problems and daytime functioning over time has also been investigated in a sample of 614 children with a mean age of five years. These children were evaluated at baseline and an average of 14 months later using a sleep questionnaire and the Strengths and Difficulties Questionnaire. Sleep problems were associated with higher scores on total behaviour difficulties and emotional problems at both baseline and follow-up. NW was also associated with more conduct problems at follow-up (Smedje, Broman & Hetta, 2001). This indicates that behaviour problems which may be related to sleep problems can persist for significant periods of time and that the impact of chronic sleep disturbance may be quite severe.

Despite good evidence that sleep problems can have a negative impact on children's development, a number of the studies examining these relationships in children share common limitations. First, the majority of studies have relied on subjective data regarding sleep and behaviour, mainly involving parent reports; and second, as the majority of these studies are correlational in nature, there is limited information about the direction of causation of sleep problems and daytime behaviour problems. Whilst some studies have failed to find a relationship between sleep problems and daytime functioning in children, the majority of the research evidence nevertheless indicates that children with sleep problems are at increased risk for behavioural difficulties during the day, as well as cognitive and affective impairments.

### The Impact of Child Sleep Problems on Parents and Family

Often when sleep problems in children are brought to the attention of medical professionals, it is because of the impact that the child's sleep is having on parental sleep. Robinson and Richdale (2004a) found that parents of children with DD who reported that their child had a sleep problem were more likely to have their own sleep disturbed by the child. In addition to disturbed sleep, high levels of stress are observed in parents of children who have sleep problems (Crowe, Clark, & Qualls, 1996). Mothers may be at greater risk of the negative effects of children's sleep problems compared to fathers. For example, mothers of children with autism have been found to have higher stress levels than fathers, as they are more often the primary caregiver (Moes, Koegel, Schriebman, & Loos, 1992). Wiggs and Stores, (2001) found that treatment of sleep problems in children with severe intellectual disability and challenging daytime behaviour resulted in significant reductions in maternal stress and increases in mothers' ability to cope, however the same was not found for paternal stress or coping.

Gregory et al. (2004) found that maternal depression and family disorganisation are related to sleep problems in children. Bates et al. (2002) also found that that family stress may contribute to disorganised sleep patterns in children. Allik (2006) found that in children with autism, mothers' mental health was related to child behaviour: both hyperactivity and conduct problems as well as prosocial behaviour. However, paternal health was not found to be associated with any of the child behaviours measured.

One factor that may mediate the relationship between parent well-being and children's sleep problems is parent coping style. For children with a DD, Wiggs and Stores (1998) found that coping styles were important in parent perceptions of their child's sleep. Parents who were identified as having a child with a sleep disturbance, but who did not consider the child's sleep to be a problem had lower stress levels, higher perceived control over their child's sleep, and less negative reactions to stress than mothers who did recognise their child's sleep as a problem. This suggests that parents who have higher stress and external locus of control may be more likely to be negatively affected by their child's sleep problem. Robinson and Richdale (2004b) also found that parents who do not perceive their child's sleep as problematic have better perceived control over their child's behaviour.

In summary, paediatric sleep disturbances can result in family distress due to parental sleep deprivation and higher levels of parental stress. Children with sleep problems are also more likely to have challenging daytime behaviour, with cognitive impairment, internalising and externalising behaviour problems being more commonly found in children with sleep

disturbances. These daytime behaviour problems may have an additional adverse influence on family functioning and parental wellbeing. However, the relationships between paediatric sleep problems, child daytime behaviour difficulties, and parent well-being are not well understood. It is not known whether these relationships are causal, bi-directional, or related to other factors. It may be that common behavioural processes operate to maintain both sleep problems and daytime behaviour problems in children. It is also known that parental factors play an integral role in the behavioural processes related to development of sleep problems in children.

### Behavioural Processes Involved in the Development and Maintenance of Sleep Problems in Children.

France and Blampied (1999) have described the 'behaviour trap' where the child is reinforced for signalling to the parent at bedtime and during NW. The parent is also reinforced for providing reassurance and attention to the child in order to avoid child distress, as child distress often leads to parent distress and anxiety (Blampied & France, 1993). Therefore, both parent behaviour and child behaviour interact to maintain inappropriate sleep behaviours, and thus maintaining the sleep problem. Any attempt by parents to cease attending to their child typically results in an extinction burst, where periods of crying and distress increase in frequency and/or intensity. If parent attention is provided during the extinction burst, this is equivalent to intermittent reinforcement which makes the sleep problem likely to persist, and increases the likelihood of severe crying and infant distress occurring in the future (France, Blampied, & Henderson, 2003). This association between parent and child behaviour is depicted in Figure 1.

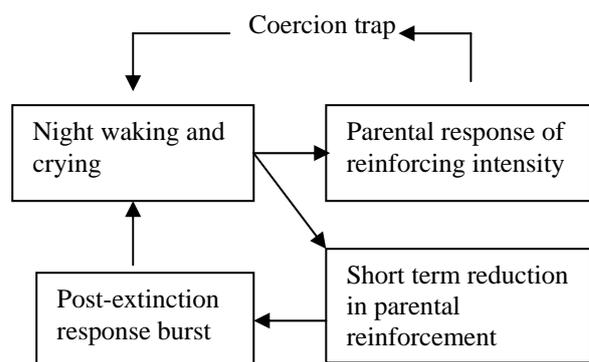


Figure 1: The relationships between parent and child behaviour that contribute to the maintenance of child sleep problems (from France et al., 2003).

This behaviour trap is inherent in two paediatric sleep disorders. Limit-setting Sleep Disorder (LSSD) and Sleep-onset Association Disorder (SOAD) result in difficulties initiating and maintaining sleep. As outlined previously, settling and night waking difficulties are among the most common sleep problems observed in TD children and those with DD and are key features of these two disorders. The diagnostic criteria for LSSD and SOAD are presented in Tables 1 and 2 respectively. LSSD occurs when children resist or refuse going to bed by coming out of the bedroom and/or making requests or excuses for why they cannot sleep (e.g., monsters, need to go to the toilet, etc.). The parent fails to set limits for bedtime and the child's stalling or bedtime refusal can result in sleep-onset delays. These delays commonly occur at bedtime, but can also occur after NW. It is estimated that between 5 and 10% of children experience this sleep disorder (American Academy of Sleep Medicine (AASM), 2001).

SOAD is where sleep onset occurs within a normal time when particular conditions are present, however is delayed when these same conditions are not present. For many children, parent participation may be involved in sleep onset in the form of rocking, rubbing, or even parent presence in the child's bed. It is normal for children to wake briefly during the night, typically every one to four hours, and these sleep-onset associations may also need to be present after each NW in order for the child to return to sleep (AASM, 2001). This sleep disorder may result in parental sleep loss due to attending to the child after NW, or co-sleeping. This sleep disorder is thought to affect between 15 to 20% of children and is more common in children under three years of age.

Both LSSD and SOAD occur due to learned behaviours and as these two disorders affect 20 to 30% of children, they are among the most commonly occurring sleep disorders in children. Milder forms of these two disorders, which do not meet diagnostic criteria may also occur and may still cause significant distress to parents and their child.

There is some research evidence to suggest that children with such behaviourally based sleep problems may experience poorer daytime behaviour than children experiencing physiologically based sleep difficulties. Research conducted by Owens et al. (1998) examined differences in sleep and daytime behaviour in a group of children with Obstructive Sleep Apnoea Syndrome (OSAS) and a group of children with behaviourally-based sleep problems (LSSD or SOAD). One hundred and fifty-two children aged 2 to 12 years were included in the study. Parents of these children completed a number of questionnaires regarding sleep and daytime behaviour. Results showed that the OSAS group had significantly lower problem scores for externalising behaviour compared to the behavioural sleep disorders group. The OSAS group slept significantly longer

(approximately two hours longer per night on average) and had fewer behaviour problems at bedtime.

These results show that behaviourally-based sleep problems can be associated with greater disturbance compared to physiologically-based sleep problems, and are related to more behaviour problems at bedtime and during the day. This indicates that daytime behaviour problems seen in children with sleep problems are influenced by factors other than just disturbed sleep. It is possible that children who have more difficult behaviour during the day may also exhibit difficult behaviour at bedtime and during NW. These behaviours may reflect a general limit-setting problem in parenting practices which influences both daytime and bedtime behaviour. The results of Owens et al. (1998) suggests that the effects on daytime behaviour that have been observed in children with sleep problems may not be due solely to lack of sleep and highlights the potential importance of behaviour management techniques for the treatment of sleep problems in children. (For a review of behavioural intervention for settling and NW problems in TD children see Mindell, 1998 or Kuhn & Elliot, 2003 and for children with DD see Richdale & Wiggs, 2005).

Behavioural intervention for sleep may result in improvements in daytime behaviour. Minde, Faucon, and Falkner (1994) examined the effect of a brief behavioural intervention for sleep problems on daytime behaviour. They compared a group of 28 TD children aged 12 to 36 months who had sleep problems, to an age and gender matched control group of 30 children without sleep problems. Daytime behaviour data were collected via direct observation of mother-child interactions before and after treatment. Not only did the children's sleep improve after treatment, there were also lower levels of behaviour problems after treatment in the 'poor sleepers' group. Mother-child interactions also improved after treatment with less irritability and negative behaviour, and improved social skills and attention in children classified as 'poor sleepers' before intervention. Interestingly, it was noted that mothers did not change their behaviour significantly during the parent-child interactions after intervention. The investigators therefore attributed the changes seen in these interactions to changes in child behaviour, which may have resulted from better sleep. However, other studies which have examined child behaviour before and after sleep intervention have found inconsistent or no change in daytime behaviour (Wiggs & Stores, 1999; Thackeray & Richdale, 2002). Further research in this area is required, however behavioural intervention for sleep problems can result in improved child sleep, and may also result in improvements in other areas of functioning such as daytime behaviour.

In conclusion, research evidence indicates that children who experience sleep problems are at increased risk for behavioural, emotional, and cognitive disturbances compared to children without sleep

problems. Parents of children with sleep problems are also at increased risk of disturbed sleep, stress, depression, and negative parent-child interactions which impact on the family as a whole. Although the causal relationships between these variables have not yet been demonstrated, it is clear that behavioural processes involving interactions between parent and child can contribute significantly to the development and maintenance of sleep problems. For sleep problems related to difficulties initiating and maintaining sleep such as SOAD and LSSD, parent training in behaviour management techniques for bedtime is indicated as a treatment.

Research evidence also suggests that treatment for children's sleep problems can result in improvement in parent sleep and well-being. Therefore, sleep disturbances in children are a serious problem which warrants intervention. Paediatric clinicians therefore need to be aware of the serious detrimental effect that sleep problems can have on the child and family, and be aware of the parental and behavioural factors that can contribute to the development and maintenance of sleep problems in children when developing a treatment approach.

Table 1: Diagnostic criteria for limit-setting sleep disorder (AASM, 2001).

Limit-setting sleep disorder	
A	Difficulty initiating sleep
B	Stalling or refusing to go to bed at an appropriate time
C	Once the sleep period is initiated, sleep is of normal quality and duration
D	Polysomnographic monitoring demonstrates normal timing, quality and duration of sleep period.
E	No significant underlying medical or mental disorder accounts for the complaint.
F	Does not meet criteria for any other sleep disorder causing difficulty in initiating sleep (e.g., sleep onset association disorder).
Minimal criteria	B plus C
Stipulate	Mild, Moderate or Severe
Stipulate	Acute, Sub-acute, Chronic

Table 2: Diagnostic criteria for sleep-onset association disorder (AASM, 2001).

Sleep-onset association disorder	
A	A complaint of insomnia
B	The complaint is temporally associated with the absence of certain conditions. E.g., being rocked, held, etc.
C	The disorder is present for at least three weeks
D	Sleep with the particular association present is normal in onset, duration and quality.
E	PSG monitoring shows normal timing, duration, and quality of the sleep period when the associations are present. In the absence of the association there can be an increased sleep latency and increased duration or number of night wakings.
F	No significant underlying medical or mental disorder accounts for the complaint.
G	Does not meet criteria for any other sleep disorder causing difficulty in initiating sleep, (e.g., limit-setting sleep disorder).
Minimal criteria	A plus B plus D plus F plus G.
Stipulate	Mild, Moderate or Severe
Stipulate	Acute, Sub-acute, Chronic

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#### Research Profiles

Dr Melinda Polimeni is an educational and developmental psychologist and is a Clinical Research Fellow at the Parenting Research Centre. She is currently involved in several research projects examining aspects of parenting including the provision of parenting support in schools and for vulnerable families. Melinda also has a research interest in the treatment of behavioural and learning problems in children, and provides psychological services to schools. She completed her PhD in the area of paediatric sleep problems.

Dr Amanda Richdale is Associate Professor of Developmental Psychology. Her research interests include children's sleep development, the behavioural management of children's sleep disorders, and issues related to the development and management of children

with developmental disabilities, particularly autism. She has published widely concerning sleep problems and their management in children with developmental disorders and maintains a strong connection with the autism research community.

Dr Andrew Francis is an Associate Professor of Behavioural Neuroscience. He investigates broadly within the field of chronobiology into aspects of sleep-wake, menstrual and seasonal rhythms, and their relationship to psychopathologies. He conducts clinical trials examining the efficacy of a wide range of treatments on sleep problems including behaviour modification, exercise, and herbal and nutritional products.