

Behavioural Sleep Interventions for Infants and Young Children

An Evidence Summary for Healthcare Providers

Good sleep is essential to foster physical, mental, and emotional health and well-being (Gruber et al., 2014). For example, it is important for early brain development, learning, and memory consolidation (Owens, France, & Wiggs, 1999). Sleep also contributes to the normal physical growth in children, as growth hormones are released during sleep, stimulating cell reproduction and regeneration (Ramussen, Wildschiodtz, Juul, & Hilsted, 2008). In contrast, poor sleep has been associated with attention, behavioural, and learning problems (Paruthi et al., 2016), as well as poor emotional regulation (Owens et al., 1999).

Sleep issues among infants and young children are often identified by their parents.¹ Common sleep issues include difficulties settling to sleep (also known as bedtime resistance), frequent night waking, and excessive nighttime crying. Many parents of infants and young children turn to friends and family, healthcare providers, or parenting books for advice about sleep issues. Often times, behavioural sleep interventions, such as the “crying it out” method or “sleep training”, are recommended to parents as a solution.

¹ This resource uses the term “parent” to refer to primary caregivers of children, acknowledging that children’s primary caregivers may be someone other than a biological parent.



It is important that parents are provided with evidence-based information about normal sleep development, since they can mistake normal physical, cognitive, and emotional changes that occur at various developmental stages as “sleep problems” (Douglas & Hill, 2013). It is also important that parents are educated about the efficacy of behavioural sleep interventions so that they can make informed decisions that are best for their families. According to the available literature, there is not enough research (in either methodological quality or quantity) to definitively recommend any specific behavioural sleep intervention for infants and young children. Instead, it may be most prudent to provide parents with basic sleep education, address common sleep myths, and acknowledge common parental concerns (e.g., feeding issues or parental anxiety) that may influence both children’s and parents’ quality of sleep.

Normal Sleep Development

It is important that parents are informed about normal sleep development in childhood. Although sleep duration varies widely in childhood (Gruber et al., 2014), the American Academy of Sleep Medicine has developed *general guides* for the amount of sleep children need over a 24-hour period (including both nighttime sleep and daytime naps) to promote favourable well-being (i.e., improved attention, behaviour, learning, memory, emotional regulation, quality of life, and mental and physical health). Recommendations for infants younger than four months of age do not exist because of the wide range of normal fluctuation in duration and patterns of sleep at this age, as well as a lack of evidence for associations with health outcomes (Gruber et al., 2014). Below are the consensus recommendations developed by the American Academy of Sleep Medicine (Paruthi et al., 2016).

Age Group	Recommended Hours of Sleep in a 24-Hour Period
Infants (4 to 12 months old)	12-16 hours
Toddlers (1 to 2 years old)	11-14 hours
Children (3 to 5 years old)	10-13 hours
Children (6 to 12 years old)	9-12 hours
Teenagers (13 to 18 years old)	8-10 hours

These guidelines may be helpful to parents who are interested and/or concerned about the amount of sleep their infant or young child is receiving. At the same time, it is important for parents to recognize that these guidelines are not hard and fast rules, since sleep duration can vary widely from child to child (Galland, Taylor, Elder, & Herbison, 2011) and between developmental stages (Gruber et al., 2014). If parents understand that sleep duration fluctuates between developmental stages, they may be less likely to define these changes as “sleep problems” (Douglas & Hill, 2013). Further, recognizing that sleep patterns can vary from child to child may ease any parental anxiety that can result from comparing one child’s sleep to another’s.

It is also important to note that the greatest rates of change regarding sleep occur within the first six months of life (Gruber et al., 2014). During this time, most infants develop the ability to sleep for longer episodes. They begin to sleep more during the night, gradually adopting a sleep pattern similar to adults (Peirano, Algarín, & Uauy, 2003). This information may be particularly encouraging to parents of young infants who are struggling to adjust to their infant's drastically different sleep patterns. These parents can be assured that, over time, their child will begin to adopt a sleep pattern similar to theirs.

Behavioural Sleep Interventions

As noted prior, common sleep issues identified by parents include difficulties settling to sleep (also known as bedtime resistance), frequent night waking, and excessive nighttime crying. Behavioural sleep interventions are commonly offered as a solution to parental concerns about sleep in infancy and childhood. These interventions use behavioural methods to try to bring about desired changes (i.e., correcting infant sleep disturbances, such as bedtime resistance and frequent night waking).

Common Behavioural Sleep Interventions for Infants and Young Children

- **The “crying it out” method (also known as unmodified extinction):** This typically involves having parents put their child to bed at a specified time and then ignoring the child's behaviours (e.g., cries, tantrums) until a set time in the morning (Mindell, Kuhn, Lewin, & Meltzer, 2006).
- **Sleep training (also known as modified or graduated extinction):** This typically involves some variation of the parents ignoring their child's bedtime crying and tantrums for specified periods or intervals. Parents can employ a fixed schedule (e.g., every 20 minutes) or they can wait progressively longer intervals (e.g., 5 minutes, 10 minutes, then 15 minutes) before checking on the child (Owens et al., 1999).
- **Positive bedtime routine/faded bedtime with response cost:** Establishing a positive bedtime routine (e.g., giving the child a bath and doing quiet activities, such as reading with the child) that is standardized is intended to let the child know that bedtime is coming. For the faded bedtime with response cost technique, parents remove their child from his/her bed for set periods of time when the child does not fall asleep. Further, bedtime is delayed so that the child may fall asleep quickly when put down. Once the child is falling asleep relatively quickly, the bedtime is moved earlier by 15 to 30 minutes over successive nights until a pre-established bedtime goal is achieved. Both strategies are similar in that the child's bedtime corresponds with his/her natural sleep onset time and depends a great deal on stimulus control techniques to bring about behaviour change (Mindell et al., 2006).
- **Scheduled awakenings:** Parents wake and comfort their child approximately 15 to 30 minutes before a typical unprompted awakening and gradually increase the time period between awakenings (Mindell et al., 2006).

- **Parent education/preventative education:** The goal of parent education/preventative education is to establish positive sleep habits early on (e.g., a consistent sleep schedule, a positive bedtime routine). Preventative education typically targets expectant parents and parents of newborns in order to prevent sleep problems before they occur. General parent education typically provides information about normal sleep development and can target both parents of young infants, as well as those of older infants and children (Mindell et al., 2006).



Summary of Research Findings about Behavioural Sleep Interventions

There is some research to suggest that behavioural sleep interventions are efficacious in improving sleep issues among infants and young children. Two systematic reviews², in particular, found a variety of interventions effective in improving settling problems and night waking among infants and young children between the ages of 0 and 5 years. Despite these positive findings, some researchers suggest that any conclusions drawn from research showing support for behavioural sleep interventions should be considered tentative, since the methodological quality of such studies is often poor and the sample sizes are typically small (Ramchandani, Wiggs, Webb, & Stores, 2000). Further, there is other research to suggest that behavioural sleep interventions are not effective for, and may even be harmful to, infants less than 6 months of age.

Support for Behavioural Sleep Interventions Among Infants and Young Children

As noted above, two systematic reviews have found a number of behavioural sleep interventions efficacious in improving sleep problems in infants and young children. Mindell et al. (2006) examined the efficacy of behavioural sleep interventions for bedtime resistance and night waking in young children between the ages of 0 and 5 years. Fifty-two studies were included in the review and most interventions could be placed into the following categories: unmodified extinction (crying it out), extinction with parental presence (i.e., parent stays in child's room but ignores the child and his/her behaviours), graduated extinction (sleep training), positive bedtime routines, bedtime fading with response-cost, scheduled awakenings, positive reinforcement (i.e., reinforcing the child's successful nights the next morning using praise and small rewards), and parent education/preventative education. It is important to note that some of these interventions (i.e., positive bedtime routines and positive reinforcement) were included as part of a multi-treatment package, instead of being evaluated as a sole intervention.

² See the [Levels of Evidence: The Pyramid Model](#)

Across all 52 treatment studies, 94% of the behavioural interventions produced clinically significant improvements in bedtime resistance and night waking. Additionally, over 80% of children had significantly improved sleep that was maintained for three to six months following the behavioural intervention. Unmodified extinction (crying it out) and parent education/preventative education received strong empirical support across the highest level of studies (i.e., those employing a randomized controlled trial design). Graduated extinction (sleep training), positive bedtime routines/bedtime fading, and scheduled awakenings were also found to be efficacious. Mindell and colleagues concluded that children participating in a behavioural sleep intervention show greater improvements in sleep, compared to those who do not receive treatment. Further, when examining direct comparison studies, they concluded that there was not enough evidence to suggest one behavioural intervention as vastly superior to another.

Another systematic review by Ramchandani and colleagues (2000) assessed the efficacy of study interventions (both drug and non-drug trials) for settling problems and night waking in young children between the ages of 0 and 5 years. Five behavioural (i.e., non-drug) studies met the inclusion criteria for this review, all of which were randomized controlled trials. Interventions were placed into the following categories: positive bedtime routines, scheduled awakenings, unmodified extinction (crying it out), graduated extinction (sleep training), modified extinction (sleep training) (i.e., check-ins every 20 minutes maintained throughout treatment), an educational booklet (i.e., providing parents with general information about sleep and describing the advantages and disadvantages of the range of interventions for sleep problems), and a sleep program (i.e., individually tailored behavioural programs using a variety of techniques with support telephone calls and a behavioural advice book).

Ramchandani and colleagues (2000) found that specific behavioural interventions showed both short-term and long-term (up to six weeks) efficacy for dealing with settling problems and night wakings. Regarding overall efficacy, establishing a positive bedtime routine and graduated extinction (sleep training) produced a benefit for settling problems, compared with no treatment; while unmodified extinction (crying it out) and scheduled awakenings had a beneficial effect on night waking, compared with control groups. Despite these findings, Ramchandani et al. (2000) assert that any conclusions drawn from their review should be considered tentative, since many behavioural sleep intervention studies are of poor methodological quality and typically include small sample sizes.

Behavioural Sleep Interventions may not be Effective for Infants Less than Six Months of Age

Behavioural sleep intervention studies, like the two systematic reviews outlined above, often include a wide range of ages (e.g., 0 to 5 years of age) and fail to differentiate between different developmental stages. When focusing specifically on infants less than six months of age, there is research to suggest that behavioural sleep interventions are not effective. A systematic review looking at the effects of behavioural sleep interventions among infants younger than six months of age found that such interventions did not improve infant sleep problems (Douglas & Hill, 2013). Moreover, the authors of this review suggest that implementing sleep strategies in the first six months of life may increase the risk of unintended negative outcomes (e.g., increased amount of crying, premature cessation of breastfeeding, and worsened maternal anxiety). The behavioural interventions included in this review

incorporated one or more of the following techniques: delayed response to infant signals or cues (i.e., unmodified or graduated extinction methods, including parental presence), regulation of feed times, set rules for sleep durations and bedtimes, and other strategies with the goal of training the infant to fall asleep without feeding or bodily contact with the caregiver. The authors conclude that behavioural sleep interventions should be avoided for infants younger than six months of age. Instead, they suggest addressing parental sleep anxiety and issues that may influence infant sleep problems (e.g., feeding difficulties and psychosocial risk factors, such as poor maternal mental health; Douglas & Hill, 2013). Douglas and Hill (2013) also suggest educating parents about safe sleep; normal crying; and sensitive and consistent responses to infant cues, as opposed to delaying responses to pre-cry and cry cues. In a similar vein, attachment research suggests that infants use attachment behaviours (e.g., crying, clinging, following, cooing) to show they need care; and parents can help to regulate their infants by reading their infants' signals and responding appropriately. This, in turn, helps to develop secure attachments between parents and infants (e.g., infants trust that their parents will be there for them; Saskatchewan Prevention Institute, 2007).

Similar to Douglas and Hill (2013), Price, Hiscock, and Gradisar (2013) recommend that behavioural sleep interventions only be applied to children aged six months and older. Price and colleagues stress that six months is recognized as the age at which children have the capacity to understand object permanence (i.e., understanding that a person or thing exists when it moves out of sight). In the context of sleep interventions, once a child reaches six months of age, he/she will understand that his/her parent continues to exist and will return after brief departures as part of the behavioural sleep intervention.

Methodological Limitations of the Research

Although there is some research to suggest that behavioural sleep interventions are efficacious in improving sleep problems among infants and young children over the age of six months, as noted above, findings should be interpreted with caution since available research has a number of methodological constraints. Below are some of the methodological limitations of the available research.

- Individual studies vary greatly with respect to methodological quality, and this variance makes it difficult to accurately compare studies (Mindell et al., 2006).
- The majority of interventions involve a multi-component treatment package [e.g., combining graduated extinction (sleep training) with a positive bedtime routine], making it difficult to assess the essential components needed for an effective intervention (Mindell et al., 2006).
- Often, studies do not control for other variables that may influence the success of a sleep intervention, such as the age of the child, parents' level of comfort with the intervention, parents' mental health, cultural values and beliefs about sleep, and family dynamics (Mindell et al., 2006).
- Most studies have a short follow-up period, which leaves uncertainty as to the longer-term effectiveness of behavioural sleep interventions (Maute & Perren, 2018; Mindell et al., 2006).

- Sleep problems are defined primarily by the parents. A parent’s definition can be influenced by a host of variables, such as parental psychopathology, family dynamics, and parenting style (Mindell et al., 2006). As noted prior, parents may also mistake normal physical, cognitive, and emotional changes that occur at various developmental stages for “sleep problems” (Douglas & Hill, 2013).
 - Many studies do not address parents’ acceptability of various interventions, though they impact compliance and outcomes (Ramchandani et al., 2000). For example, behavioural sleep interventions, like the “crying it out” method, can be quite distressing for parents and infants. Behavioural sleep intervention studies often have significant recruitment problems and high drop-out rates, indicating that many families who identify sleep problems do not wish to engage in behavioural programs or do not wish to continue once they have attempted them (Douglas & Hill, 2013).
 - Behavioural sleep intervention studies often fail to differentiate between different developmental stages. As such, uncertainty exists in the research as to whether specific interventions are more effective and appropriate for specific age categories of infants and children.
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Conclusions

Parents who identify their children as having sleep problems often demonstrate an urgent desire for advice and support from healthcare providers. This may be particularly true of parents with young infants who are struggling to adjust to their infant’s vastly different sleep patterns. Since behavioural sleep interventions are often recommended as a solution to infant and child sleep problems, the current evidence summary sought to outline the evidence concerning the efficacy of such interventions.

There is some research to suggest that behavioural sleep interventions are efficacious in improving sleep problems among infants and young children over the age of six months, although there is a lack of evidence to suggest that one behavioural sleep intervention is vastly superior to another. Despite these positive findings, some researchers suggest that any conclusions drawn from research showing support for behavioural sleep interventions should be considered tentative, since many studies are of poor methodological quality and the sample sizes are typically small (Ramchandani et al., 2000). Further, there is research to suggest that behavioural sleep interventions are not effective for, and may even be harmful to, infants less than six months of age.

More research is needed (both in methodological quality and quantity) to confidently recommend specific treatments (or combinations of treatments) for infants and young children. There is also a need for more research examining whether or not sleep interventions are effective and appropriate for younger infants (i.e., under the age of six months). At this time, it may be most prudent to provide parents with basic sleep education and address common sleep myths, as well as acknowledge and address issues that may impact infant sleep, like feeding complications or poor maternal mental health. Below are suggestions of information to share with parents of infants and young children.

Providing Basic Sleep Education

Basic sleep education may include talking to parents about the benefits of good sleep (e.g., important for early brain development, learning, and memory consolidation; Gruber et al., 2014), as well as the potentially negative consequences of poor sleep (e.g., behavioural problems, poor emotional regulation; Owens et al., 1999). Basic sleep education may also consist of providing parents with information about normal infant and child sleep development. For example, during the first month of life, infants typically sleep as much during the day as they do at night. By around 10-12 weeks of age, infants begin to sleep more at night and for longer durations, supplemented by three or four naps during the day. A major developmental milestone is achieved at around six to nine months, where many infants are able to “sleep through the night” (i.e., sleep for at least 8 hours per night; Gruber et al., 2014). For a more in-depth outline of sleep changes from childhood to adolescence (i.e., 0-19 years of age) see Gruber et al.’s (2014) position statement on pediatric sleep for psychiatrists (<https://www.ncbi.nlm.nih.gov/cyber.usask.ca/pmc/articles/PMC4197518/>).

It is also important for parents to understand that sleep can vary from child to child (i.e., there is a normal range of fluctuation in sleep from one child to the next). This understanding may ease parental anxiety caused by comparing one child’s sleep to another’s.

Dispelling Common Sleep Myths

When healthcare providers are talking to parents of infants and young children about sleep, it may be helpful to address common sleep myths. For example, one myth is that all infants should be sleeping through the night at six months of age. Although a major developmental milestone achieved by many infants at six to nine months is the ability to “sleep through the night” (i.e., to sleep for at least eight hours per night), this is not the case for all infants, as sleep duration can vary widely from child to child (Galland et al., 2011; Gruber et al., 2014). Research has also shown wide variation in individual infants’ total sleeping times from day to day (Wooding, Boyd, & Geddis, 1990).

Another common sleep myth is that infants and young children cry at night because they “want” something and not necessarily because they “need” something. Along these lines, if parents attend to their child’s crying at nighttime, they are considered to be spoiling him/her. Crying is a major form of communication, often expressing what cannot be verbally expressed (Blunden, Thompson, & Dawson, 2011). In a critical review by Blunden et al. (2011), they suggest that in the context of nighttime crying, parents may not fulfill their child’s needs if they misinterpret their infant’s “needs” as “wants”.

Addressing Issues that may Influence Infant Sleep

Finally, it may be prudent for healthcare providers to acknowledge and address potential issues that could influence infant sleep, like feeding complications or poor maternal mental health. Douglas and Hill (2013) discuss how feeding and sleep problems are often interrelated in early infancy (i.e., 0-6 months); if feeding problems are unidentified and unmanaged, they could impact infant sleep in the first months of life. Another issue that could impact infant sleep is poor maternal mental health. Specifically, there is research to show that maternal depressive symptoms can influence infant and child sleep (e.g., in the frequency and/or duration of nighttime awakenings; Warren, Howe, Simmens, & Dahl, 2006).

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