**Assessing and managing chronic insomnia in the healthy pre-adolescent child**

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Dr Hill planned and authored the main body of the article with the input of Dr Everitt to ensure relevance to general practitioners. Dr Everitt reviewed the scientific literature relevant to the health consequences of poor sleep and co-authored this section. Both authors reviewed and approved the final manuscript.

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Both authors have completed the [Unified Competing Interest form](https://mc.manuscriptcentral.com/www.icmje.org/coi_disclosure.pdf) (available on request from the corresponding author). Both authors declare no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years, no other relationships or activities that could appear to have influenced the submitted work. Dr Hill received an equipment loan of pulse oximetry equipment from Masimo Inc (Irvine, CA, USA) as part of a research study of obstructive sleep apnoea in children with Down syndrome.

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Insomnia (difficulty falling asleep or staying asleep) is reported by parents of 20-30% of children in the developed world [1,2,3,4]. Reliable data from developing countries is lacking, but adult data suggests that insomnia is a global phenomenon [5]. Children born in the new millennium are likely to have around 70 minutes less total sleep time than generations born 100 years ago [6]. This is a public health concern as short sleep is associated with multiple adverse outcomes [7-18] (Figure 1) and sleep problems in early childhood may constrain brain development. In a population based prospective cohort study, parent report of sleep problems after 2 years of age predicted reduced grey matter volume at 7 years in 720 Dutch children [19]. Importantly, childhood insomnia can have an erosive effect on parents. Only one week of sleep disruption produces measurable changes in mood, emotional regulation and decision making in adults [20,21]. Many parents experience months or years of sleep loss before seeking help.

Despite the importance of sleep to children, general practitioners rarely ask about sleep [22], perhaps reflecting limited undergraduate education in sleep medicine [23]. Presenting sleep problems could be caused by over 50 different sleep disorders in six recognised categories as defined by the International Classification of Sleep Disorders [24]. Text box 1. This article offers a toolkit for the generalist to manage the commonest childhood sleep disorder, chronic insomnia.

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| **Category** | **Estimated frequency in childhood** |
| Insomnias  Hypersomnias  Parasomnias  Circadian rhythm disorders  Sleep related movement disorders  Sleep related breathing disorders | 20-30%  0.01-0.02%  25%  7%  1-2%  2-3% |

Text box 1: Categories of sleep disorders and their estimated prevalence in childhood [24]

**Managing expectations - what is normal?**

Sleep requirements and schedules change profoundly through childhood [25]. Parents often ask: expectations.

**How much sleep does my child need?**

The US National Sleep Foundation [26] provide a useful guide to 24-hour sleep needs across childhood worldwide (Figure 2). These are based on expert consensus interpretation of 312 English language studies linking sleep duration with cognitive, mental and physical health outcomes. Ethnicity, as well as age, may determine sleep needs. An internet survey of 29,287 parents reported that infants and toddlers living in predominantly Asian countries had later bedtimes and shorter sleep than those living in predominantly Caucasian countries. Whether this is culturally or biologically influenced is unclear [27]. The precision and specificity of sleep duration recommendations will improve as future research clarifies ‘dose-response’ relationships between sleep duration and health outcomes [28] in children across the globe.

In practice, assessing whether a child has adequate sleep can be difficult, as tired children may appear inattentive and hyperactive, rather than sleepy. Useful questions to ask include:

* Is the child refreshed when they wake in the morning?
* Is the child sleeping in the day at an age where naps are not expected?
* Is daytime behaviour noticeably different after a ‘bad night’?

**How long should it take to fall asleep?**

Most children can fall asleep within 30 minutes of bedtime.

**When do children stop waking at night?**

Surprisingly the answer is ‘never’. During sleep the brain cycles through 3 non-rapid eye movement sleep stages (N1,N2 and 3) each terminated by a REM (dream sleep) episode. Each cycle lasts around 60 minutes and brief awakenings are a normal part of sleep, notably in the second half of the night (Figure 3). However, as children mature, rather than signalling for parent they learn to self-soothe after these brief awakenings. Newborn infants typically wake to feed twice at night in the first month, decreasing to once by 6 months. Between 2-3 years of age 20-30% of children still wake on a regular basis, by 5 years this has decreased to around 10% [29, 30, 31], so by school-age most children can self-soothe back to sleep after natural night wakings. Others may need help to learn this skill (see later).

**When should children stop napping in the day?**

At 9-12 months children typically nap twice in the day (morning and early afternoon). This reduces to a single afternoon nap from 12 months [25]. Most children stop napping between 3 and 7 years of age although siesta cultures retain afternoon naps throughout life (Figure 2).

**When parents report a sleep problem firstly establish the key concern:**

* falling asleep?
* staying asleep?
* waking up too early?
* not enough sleep or excessive sleep?
* daytime sleepiness (or behavioural dysregulation suggesting poor sleep)
* things that happen in sleep (e.g. bed-wetting/snoring/sleep walking/sleep terrors)

For most children these problems are transient. Problems sleeping may be triggered by life events such as the arrival of a new sibling, change of school or illness. When problems falling asleep, troublesome night wakings and/or early morning waking persist for 3 months or more, occur at least three times a week and affect daytime function they are classified as chronic insomnia and should be addressed. The exception is infants where these behaviours are normal and parental expectations may need to be adjusted.

*General considerations*

Sleep problems should be understood in the context of the child’s health, development, social and cultural environment. Nocturnal discomfort (pain/itch), chronic health problems (e.g. asthma, diabetes, epilepsy and eczema) and developmental disorders will impact on sleep, as will noisy living environments.

**Sleep diaries**: Ask parents to keep a diary of their child’s sleep for at least a week. This should include bedtime, time child falls asleep, timing and duration of night wakings, morning wake-up time and daytime naps if relevant). Kids Sleep Dr is an accessible smart phone App which record this information (http://kidssleepdr.com)

A systematic rapid sleep evaluation is suggested in Figure 4. Used in combination with sleep diaries and Figure 2 it offers a guide to identifying the sleep disorder; resources for families and an indication of when to refer for paediatric advice.

**Behavioural insomnia**

In pre-adolescent children the commonest cause of chronic insomnia is behavioural insomnia. A less common cause is psychophysiological insomnia characterised by anxiety at bedtime and preoccupation with failure to fall asleep. This type of insomnia is more commonly seen in adolescents and adults and is not considered further. There are two categories of behavioural insomia [24]

***‘Limit-setting’ type:*** This is easy to recognise and typically becomes a problem when toddlers can climb out of bed. The child resists bedtime, ‘curtain calling’ and making demands (another story/drink/need the toilet). They quickly learn what elicits a response in the parent (crying/‘the monster under the bed’). This can escalate into nightly battles if:

* the child has an oppositional temperament
* parents are not consistent in setting limits (from night to night and/or between parents)

Setting limits may difficult for parents if there are concerns about disturbing neighbours or other family members or when they are anxious about the child (e.g. after illness or a significant life-event). If parents do not set limits children will invariably choose a later bedtime.

***‘Sleep onset association’ type:*** Children worldwide learn to associate falling asleep with specific environmental conditions or ‘sleep onset associations’, such as their own bed, dim lights and a soft toy. Problems arise when children become conditioned to fall asleep with associations that cannot be replicated after spontaneous night waking (such as falling asleep in parent’s arms, in the car, watching TV on the sofa). The parent may not recognise falling asleep as the problem but will report troublesome night waking. Treatment focuses on teaching the child to settle in the same environment that they will later wake up in during the night. Once parents understand this principle many can solve the problem independently.

**How is behavioural insomnia managed in children?**

Empathetic listening, reassurance, clear advice and support can help [33]. Behavioural and ‘sleep hygiene’ approaches are the bedrock of treatment. While the prescription pad may seem a quick solution, the use of hypnotic medication in typically developing children with behavioural insomnia is not supported by a reliable evidence base [34].

**Sleep hygiene**: This concept includes modifiable factors that promote good quality sleep including:

* environmental factors (e.g. bedroom space/light/noise/use of portable electronics)
* routine (the sequence of behaviours in the hour before bedtime)
* daytime activities (e.g.use of caffeine and exercise)

Analysis of the 2004 US National Sleep Poll including 1473 children from birth to 10 years reported sleep hygiene components that were unhelpful to children and were associated with reduced sleep time. These included: bedtimes after 9pm at all ages; lack of consistent bedtime routines and having a TV in the bedroom in children over 3 years; and one or more caffeinated drink during the day in children over 5 years. Having a parent present in the bedroom when the child falls asleep was associated with more night wakings [35].

A systematic review of evidence supporting the effectiveness of different sleep hygiene components [36] (figure 5) noted there were few intervention studies to support causal pathways. Those sleep hygiene recommendations with a strong evidence base include: a consistent bedtime routine, limiting access to electronic devices in the child’s bedroom and allowing children to settle to sleep independently [36]. Other recommendations such as limiting caffeine intake and ensuring a quiet, dark bedroom have weaker evidence but have empirical grounding in scientific understanding of sleep regulation. Better public awareness of sleep hygiene through simple public health messages has the potential to benefit the health of children.

**Behavioural treatment approaches**

Alongside good sleep hygiene, behavioural approaches are key. A recent meta-analysis evaluated the evidence for behavioural interventions using GRADE methodology in 16 controlled trials and 12 within-subject studies. Small to large effect sizes in controlled trials and large effect sizes in within-subject studies were reported for all sleep outcomes. Although the evidence to support behavioural interventions in young children was moderate, only low-level evidence was found for school-aged children [45]. More research is needed in this age group.

Different approaches can be effective [46] and flexibility to suit individual parenting styles is both critical for success and valued by parents [47]. Management of behavioural insomnia is based on learning theory and encourages the child to learn to self-soothe to sleep at bedtime. These principles can be applied from 6 months of age when infants are no longer dependant on night-time feeding for their nutrition. Despite commonly expressed concerns about cry it out techniques and controlled comforting, there is no evidence that these techniques are harmful to children’s psychological development or attachment [48, 49]. A systematic review of 52 behavioural intervention studies for settling and night waking difficulties in pre-school children [46] reported clinically significant positive benefits of the following approaches:

*Controlled comforting:* the parentignores the child’s bedtime protests but returns to give brief reassurance at pre-set intervals; or rapidly returns the child to bed with minimal interaction. Typically checks are 5-10 minutes apart but there is no evidence as to whether fixed or extended interval checks are more effective. This must be negotiated with the parent according to their tolerance limits and the child’s temperament.

*Cry it out:* The parent ignores the child’s demandfrom ‘lights out’ time to morning waking (other than safety checks if needed). This takes steely resolve and absolute commitment from parents. Although effective, few parents choose this approach.

*Gradual retreat*: Ifparents cannot tolerate (or do not agree with) a distressed child, a gentler approach of gradual withdrawal may be appropriate. For example, if a child needs a parent lying alongside them in bed the first step may be sitting alongside the bed. Once the child learns to fall asleep this way the physical distance between parent and child is increased. If the child leaves the bed they are calmly returned. This may suit the anxious child who does not tolerate rapid change.

*Stimulus control techniques:* Children with bedtime resistance ‘learn’ that bedtime means conflict. Bedtimes are initially delayed to the child’s usual time to fall asleep. For example, if bedtime is 7pm but the child usually resists sleep until 9pm, initially bedtime is set at 9pm. Once a struggle-free bedtime is achieved, bedtime is brought forward by 15 minutes every few days until a more appropriate bedtime is reached. Morning wake up times should be consistent throughout.

*Positive reinforcement*

Behaviour is maintained for a purpose. If appropriate behaviour is rewarded it is likely to be repeated. Rewards should be given for small achievable steps, should never be withdrawn and must maintain the child’s interest. Star charts can rapidly lose their shine. A morning ‘lucky dip’ bag maintains novelty and is popular with many children.

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| **EDUCATION INTO PRACTICE**   * Do you know how much sleep is typical for children from birth to adolescence? * Do you feel confident recommending simple and effective management strategies for a child with behavioural insomnia? * What might you do differently having read this article? |

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| **WHAT YOU NEED TO KNOW**   * Sleep problems in children are common and often affect the sleep patterns of other family members. * Always identify the sleep disorder – avoid just treating the symptoms * Behavioural insomnia is the commonest disorder in pre-adolescent children and management strategies such as controlled comforting can be highly effective |

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| **HOW PARENTS WERE INVOLVED IN THIS ARTICLE**  The article was shared with parents of children referred to the Southampton Children’s Sleep Disorder service and feedback given that this was helpful information that they would wish their GP to understand and that with appropriate advice their child’s sleep problem could have been managed earlier in its course. |

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