

Understanding and Supporting Parents with Sleep Disturbances in the Under-5's

Gilly Mancz, Lecturer Adult Nursing, School of Health Science and Social Work

Abstract

Sleep disturbances are common in the under-5 age group and are associated with negative health outcomes for both the child and their wider family. Health visitors are key at identifying, supporting and treating sleep disturbances, although it is recognised that professionals often report gaps in their knowledge and a lack of confidence at managing sleep issues. This article will provide an overview of sleep physiology and how this applies to sleeping patterns in young children. The most frequently reported sleep disorders will be explored and key guidance for supporting parents will be provided.

Key words

- Child, Preschool
- Sleep disturbance
- Sleep hygiene
- Parenting
- Health Visitor

Background

This article will explore the fundamentals of sleep, the sleep disorders that health visitors are most likely to be consulted on in practice and guidance on how best to work with parents in tackling behavioural insomnias.

Although sleep is a fundamental function that is essential for human growth, development, wellbeing and ultimately survival (Rudzik, 2015; Twomey, 2015; Bathory and Tomopoulos, 2017) sleep problems in childhood are commonplace (Moturi and Avis, 2010; Gregory and Sadeh, 2012; Vriend et al, 2013; Bathory and Tomopoulos, 2017), affecting between one in four (Owens, 2008) and two in five children (Mindell et al, 2009). Poor sleep in young children is known to have a significantly detrimental effect on cognitive development, behaviour, emotional regulation and health (Holley et al, 2011; Gregory and Sadeh, 2012; Vriend et al, 2013) and is associated with a

negative impact on the wider family (Wake et al, 2006; Bayer et al, 2007; Martin et al, 2007; Smart and Hiscock, 2007; Giallo et al, 2011).

Due to the extensive impact that sleep disturbances in young children can have on both themselves and their families, supporting parents with managing sleep has been identified as a public health priority, with families requiring access to well-child focused services (Smart and Hiscock, 2007; Hiscock et al, 2008). Health visitors are key professionals working with the under-five age group and their families, with responsibility for the delivery of the Healthy Child Programme (HCP) (Department of Health [DH], 2009), and as such are in a position to identify children with sleep issues and provide support (DH, 2009; Fisher, 2013; Mancz and Wigley, 2017). Health professionals often report they have gaps in their training and knowledge regarding sleep problems in childhood, which causes a lack of confidence when identifying sleep issues and supporting families (Fisher, 2013; Allen et al, 2016; Morsbach Honaker and Meltzer, 2016). It is important for health visitors to have the knowledge to understand what sleep is, recognise normal sleeping patterns and current guidance on how best to tackle sleep disturbances in the under-5's age group, in order to successfully support families (Fisher, 2013).

Sleep Architecture

Sleep comprises of two distinctive stages; rapid eye movement (REM) sleep, the stage associated with vivid dreams, increased brain activity and muscle atonia, and non-rapid eye movement (NREM) sleep which is related to decreased mental state, non-visual thoughts and the ability to move the body (Kalia, 2006; McCarley, 2007; Porkka-Heiskanen and Kalinchuk, 2011). Through the analysis of the changes in brain waves by using electroencephalography (EEG), NREM sleep has been identified to consist of different stages, with each stage correlating with specific brain waves, depth of sleep and ease of arousal (Kalia, 2006; Datta and MacClean, 2007; Silber et al, 2007).

NREM sleep consists of three/four stages (see table one):

- **Stage one** is brief and describes the transition of moving from being drowsy to falling into light sleep. In a normal sleep pattern, stage one only makes up a small amount of the overall sleep time (Himanen and Hasan, 2000; De Gennaro and Ferrara, 2003; Hill, 2011).
- **Stage two** is often described as the “scaffolding of sleep” as this is the stepping stone between light and deep sleep and is the stage that most sleep takes place in (Hill, 2011).
- **Stage three/four** describes the deepest levels of sleep, when it is most difficult to be woken (Hill, 2011).

Nocturnal arousals describe the normal brief awakenings between sleep cycles and these are particularly common in the later part of the night as an individual moves between REM and Stage two sleep (Hill, 2011).

It is important to highlight infant sleep (in babies up to six months old) is classified as active sleep (AS) and quiet sleep (QS) rather than REM or NREM, although REM correlates to AS and NREM compares to QS. This difference is due to recognisable sleep spindles not being detectable on an EEG until approximately six months of age (Mirmiran et al, 2003; Peirano et al, 2003; Tarullo et al, 2011). The increased time spent in AS versus QS as infants is thought to be due to the need to develop the central nervous system and visual structures, however QS, particularly slow wave sleep (Stage 3 & 4), is also recognised to be key for development and is the stage of sleep when memory consolidation and synapse re-modelling occurs (Mirmiran et al, 2003; Peirano et al, 2003; McCarley, 2007; Tarullo et al, 2011). QS/NREM sleep is also important as this sleep stage is when growth hormone is released, which is essential to normal development in childhood (Steiger, 2003; Kalleinen et al, 2011). Although young children continue to spend longer in REM than adolescents and adults they adopt a similar sleep cycle by six months of age, with NREM sleep dominating the early part of the sleep cycle and cycle length increasing from 60 to 90 minutes (Mirmiran et al, 2003; Peirano et al, 2003; Tarullo et al, 2011), see table one.

A sleep cycle involves moving between NREM stage 1-3/4 then into a period of REM sleep, with brief waking often occurring between each cycle (Hill, 2011). When supporting parents with infant sleep issues, it can often be helpful to explain the sleep process using a hypnogram (see figure 1), a visual representation of a sleep cycle, with an emphasis that brief awakenings are a normal element of sleep. As adults and children move through the sleep cycle, most will easily fall back to sleep after a brief waking without remembering that they had woken, however, this often becomes an issue when a child needs support to reinitiate sleep (Hill, 2011; Mancz and Wigley, 2017).

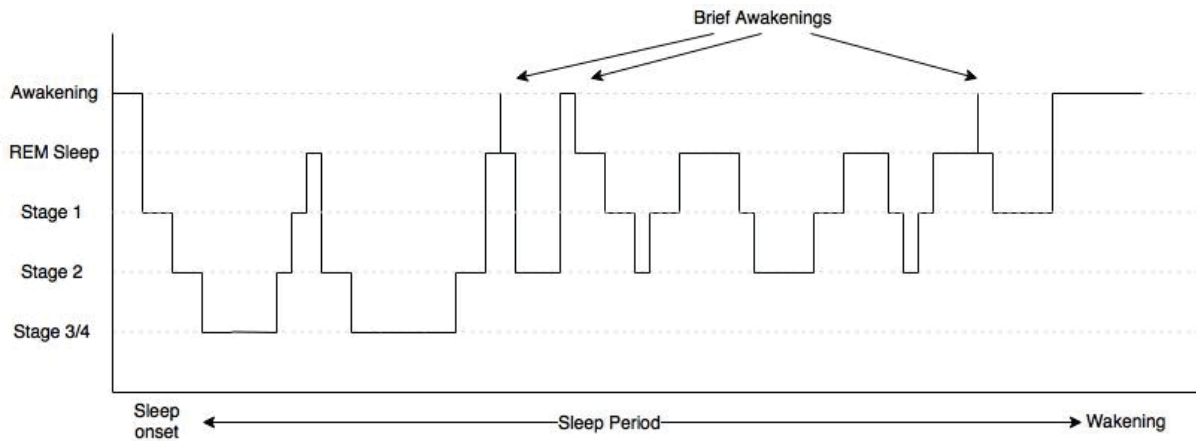


Figure 1 – Hypnogram of a Sleep Cycle

Stage	Adult	Child	Infant
REM	Makes up 20-25% of total sleep time and is the stage associated with vivid dreams	Overall sleep time spent in REM decreases in childhood and by the age of 10 years it has reached adult ratios	Is classified as active sleep in babies rather than REM and accounts for 50% of overall sleep time
Stage 1	Transition stage between being drowsy and asleep		NREM sleep is categorised as quiet sleep in babies and is the stage when growth hormone is excreted, memories are consolidated, and synapse re-modelling occurs
Stage 2	The majority of sleep is spent in this stage and is identifiable on an EEG by the onset of sleep spindles		
Stage 3&4	This is the deepest level of sleep and is characterised by slow waves on an EEG	This is the deepest level of sleep during which growth hormone is secreted	
Nocturnal Arousals	Brief awakenings between sleep cycles	Can be problematic if the child is not able to self soothe	

Table 1 - Summary of Sleep Stage Definitions

Sleep Wake Cycle

The sleep cycle is regulated by a complex two-part process; the circadian rhythm and homeostatic drive and involves an interplay between sleep and wake inducing neuronal systems (Kalia, 2006; Moore, 2007; Rosenwasser, 2009). Studies have shown that sleep is affected by the circadian rhythm as it is cyclical and occurs at a predictable time in the 24-hour period (Datta and MacLean, 2007; Hill, 2011; Mental Health Foundation, 2011), although it is recognised that individually this varies with some people naturally waking earlier and others feeling sleepy later (Mental Health Foundation, 2011). The circadian rhythm is maintained by the supra-chiasmatic nucleus (SCN) which is located in the hypothalamus. The SCN is recognised to be the body's master clock and is responsible for the production of the hormone melatonin, which causes sleepiness (Datta and MacLean, 2007; Rosenwasser, 2009; Mental Health Foundation, 2011; Allen et al, 2016). The SCN maintains the circadian rhythm by synchronising or being entrained by external stimuli, especially light (Mirmiran, 2003; Moore, 2007). In comparison, the homeostatic drive is responsible for the production of sleep inducing substances - somnogens, such as adenosine, that intensify the longer an individual is awake causing increased tiredness (Bathory and Tomopoulos, 2017). These substances are dispersed whilst the individual sleeps and so upon waking they have little or no homeostatic drive (Oskar and Carskadon, 2004; Kalia, 2006; Moore, 2007; Hill 2011; Porkka-Heiskanen and Kalinchuk, 2011). As such, sleep occurs when the substances produced by the homeostatic drive accumulate and the circadian drive for wakefulness reduces (Moore, 2007).

Sleep Disturbance in the Under-5s

Sleep disorders are classified into seven categories, including; insomnia, sleep-related breathing disorders, circadian rhythm sleep-wake disorders, parasomnias (such as night terrors, sleep walking) and sleep-related movement disorders (Sateia, 2014). When working with families reporting sleep issues in their child, it is important to undertake a full and thorough assessment to ensure that the correct sleep disorder is identified (Hill, 2011). Tools that can help the assessment process include in-depth questionnaires, sleep diaries and in some cases referral to sleep clinics where specialist monitoring such as actigraphy or polysomnography can be undertaken (Hill, 2011). Although a small number of children experience sleep disorders that are physiological in nature and need specific medical intervention, such as restless legs or sleep apnoea, the majority of sleep disturbances in the under-5 age group are behavioural in nature (Allen et al, 2016; Morsbach Honaker and Meltzer, 2016).

Behavioural sleep insomnias consist of three disorders; sleep onset disorder, limit setting disorder and a combination of sleep onset and limit setting disorder, and are influenced by a complex combination of developmental, environmental and cultural factors (Morgenthaler et al, 2006; Moturi and Avis, 2010).

- **Sleep onset disorder** is most common in children aged between six months and three years and is distinguished by a child who struggles to independently initiate sleep, resulting in a demand for specific conditions to help them fall asleep, such as a dummy, being rocked, parental presence or music (Morgenthaler et al, 2006; Moturi and Avis, 2010; Mancz and Wigley, 2017). This becomes especially challenging for parents as their child needs the same conditions to fall asleep when they wake overnight as they did at bedtime (Hill, 2011; Galland et al, 2012).
- **Limit setting disorder** occurs in early to mid-childhood and presents either as a child who refuses to go to bed, through stalling or making multiple requests, or as a child who has no consistent bedtime routine and falls asleep when and where they like. Both types of limit setting disorder are characterised by parents who struggle to maintain consistent boundaries (Morgenthaler et al, 2006; Moturi and Avis, 2010; Hill, 2011; Twomey, 2016; Mancz and Wigley, 2017).
- The final disorder comprises of **a combination of sleep onset association and limit setting disorders**. Desperate and exhausted parents will often use their presence (sleep onset disorder) to help encourage a resistant child to go to sleep (limit setting disorder) (Morgenthaler et al, 2006; Moturi and Avis, 2010; Hill, 2011; Mancz and Wigley, 2017).

Parental Expectations

Sleep in infants aged under six months is frequently a source of concern for parents, and parents of this age group often seek professional support regarding their baby's sleeping patterns (St James-Roberts, 2007; Douglas and Hill, 2013; Rudzik, 2015). However, sleep disorders are not formally recognised in babies under the age of six months due to a number of biological and developmental factors, for example, the biological need for frequent feeds to maintain growth - it is not until six months that healthy full-term babies are considered physiologically able to sleep through the night without needing a feed (Twomey, 2016). Other biological and developmental factors include a lack of production of the melatonin hormone, which is not produced until an infant is six weeks old and does not begin to play a part in the sleep wake cycle until they reach six months old and an

immature biological clock, which is not attuned with a diurnal cycle, also have an impact (Rudzik, 2015; Bathory and Tomopoulos, 2017).

It is important to highlight to parents that it is counterproductive to recommend commencing a sleep programme if the baby is continuing to either breast or bottle feed overnight. If the baby is over the age of six months, full term, developing as expected and regularly gaining weight, parents can be supported with phasing out night feeds, prior to commencing a sleep programme (Henderson, 2010; Ball, 2017). Breastfed babies should continue to be offered their late evening feed until they are no longer interested (Ball, 2017).

In practice, this means that although babies can be encouraged and supported to develop healthy sleep habits, sleep programmes are not offered before the age of six months, with some areas preferring to wait until a baby has reached the age of twelve months. Furthermore, the evidence base indicates implementing behavioural interventions in babies under six months does not decrease infant sleep problems and can have the unintended consequence of increased maternal anxiety, increased periods of infant distress and reduced breastfeeding rates (Douglas and Hill, 2013).

Although formal behavioural interventions, such as controlled crying, are not recommended under six months, a recent study by St James-Roberts et al (2016; 2017) found that consistent limit setting parenting approaches, including a short delay prior to feeding or a delayed response to night waking, promoted fewer night wakings and longer periods of sleep in babies aged three months old. The timings used within the limit setting approaches were much shorter than the approaches used within behavioural interventions, such as controlled crying, and the babies whose parents implemented these techniques were found to experience an increase of 1.5 minutes per hour of distress per night (St James-Roberts et al 2016). St James-Roberts et al (2015; 2016; 2017) argue that although further research is needed before recommending such strategies universally, healthcare professionals can support parents and provide information to help parents promote good sleep practices from infancy.

Good Sleep Hygiene

Sleep is recognised to be affected by both internal and external factors, such as biological differences (internal) in hormone production in babies compared to toddlers and use of televisions within the bedroom environment (external) (LeBourgeois et al, 2005). Sleep hygiene describes the

practices that parents, in the under-5 age group, can implement to help reduce the influence of external factors on child sleep, resulting in improved daytime alertness, sleep duration and quality (LeBourgeois et al, 2005; Mindell et al, 2009). Modifiable sleep hygiene practices include bedtime routines, dietary intake, sleeping environment and daytime behaviours with good sleep hygiene practices associated to better sleep outcomes (LeBourgeois et al, 2005; Mindell et al, 2009).

Dietary Intake

Children are sensitive to the effects of caffeine, with recognised side effects including the disruption of the homeostatic drive and build-up of sleep inducing substances, resulting in a shorter overall sleep time (Hill, 2011). A Sleep in America Poll in 2004 found that over one in four pre-schoolers were reported to consume at least one caffeinated drink per day, resulting in an average of 42 minutes less sleep per night compared to those that did not drink caffeinated products (Mindell et al, 2009). Parents may be unaware of the impact of caffeine on their child's sleeping patterns and should be advised to restrict the intake of caffeinated products.

It is also important to consider the timing of the evening meal, eating too early can make the child hungry at bedtime or more likely to wake overnight and conversely eating just before bed can make the child feel too full and uncomfortable to settle (Great Ormond Street Hospital for Children NHS Foundation Trust [GOSH], 2017).

Electronics

The impact of electronics use on sleep is complex – it is recognised that increased screen time is linked to higher incidence of sedentary behaviour and therefore reduced physical activity – which is also linked to sleep difficulties (Owens et al, 2009; Hill, 2011). The blue light emitted from electronics is acknowledged to interfere with melatonin production, can inaccurately entrain the circadian rhythm and promote wakefulness (Czeisler, 2013; Buxton et al, 2015; Bathory and Tomopoulos, 2017; Shechter et al, 2018). Finally, the content of material being viewed could also be a contributory factor in sleep issues as it could be causing anxiety or stimulate further wakefulness (Owen et al, 2009; Hill, 2011).

Parents are often unaware of the impact of screen time on sleep and promoting a screen-free period before bed should be a priority in those seeking sleep support and when providing sleep advice as a preventative measure (Owens et al, 2009; Hill, 2011).

Environment

A child's sleep environment is an important aspect of sleep hygiene and their bedroom should be a calm, warm, dark, safe space that is free of distractions (Hill, 2011; Bathory and Tomopoulos, 2017; GOSH, 2017). It is also important that their bed and bedroom is consistently where the child goes to sleep, and this is the primary purpose of the room, as this will help to build positive sleep associations (Allen et al, 2016). Distractions should be kept to a minimum and the bedroom should be particularly free of electronic equipment (Buxton et al, 2015; Allen et al, 2016; Bathory and Tomopoulos, 2017).

Exercise

Physical activity is recommended from birth, including floor play and water activities for non-mobile babies and 180 minutes of daily physical activity for under-5s who are mobile, with the aim of reducing the incidence of obesity and improving health and well-being (DH, 2011; Public Health England, 2016). Lack of physical activity and increased sedentary behaviours is also linked to a longer sleep latency period – the time taken to fall asleep - (Nixon et al, 2009) risking a potential reduction in the total sleep time for sedentary children (Hill, 2011). Physical activity should be included in sleep hygiene measures, with children being encouraged to be physically active during the day, with a period of calm quieter activities before bed (Allen et al, 2016; Bathory and Tomopoulos, 2017; GOSH, 2017).

Routine

The development of a consistent bedtime routine that involves the parent and child completing the same set of tasks in the same sequence each night prior to falling sleep, not only improves sleep onset and quality of sleep, but also reduces frequency of night waking (Mindell et al, 2009; Allen et al, 2016). The timing of a child's bedtime is also important; Mindell et al, (2009) found that children who were put to bed after 9pm were more likely to wake more frequently overnight, have more difficulty falling asleep and sleep for 1.3 hours less per night.

A bedtime routine can be made into a picture chart or an activity list, using photos of the child completing the activity or pictures to help parents reinforce the bedtime routine, please see table 2.

Timing	Activity	Additional Information
5pm	Television/screen time	Electronic equipment should be switched off a minimum of an hour before bed
5.15pm	Dinner	
5.45pm	Calming activity	For example, puzzles, games or drawing
6.15pm	Last drink	Avoid drinks with caffeine in, including hot chocolate/chocolate milk.
6.30pm	Bath and brush teeth	Sand timers may be useful for children reluctant to get out of the bath/move on to the next stage
	Go from the bathroom to the bedroom	Avoids distractions in other parts of the house
6.45pm	Bedtime story and cuddle	This should be a consistent length of time – for example one or two short stories
7pm	Put child into their cot or bed	Say good night in the same way every night – should take no more than 2-3 minutes.

Table 2 – Example of a bedtime routine and approximate timings

Assessing Parental Readiness to Change

When identifying a sleep problem in young children it is important to assess whether the parents consider it a concern and have a desire to make changes. A number of factors, including parental understanding and expectations regarding sleep, recognition of a sleep issue, cultural norms and readiness to engage with a behavioural intervention affect parental engagement and willingness to tackle their child's sleep issue (Beresford et al, 2010; Mindell et al, 2010; McDowall et al, 2017). Implementing a sleep programme can be challenging and it is important parents are aware that there is not a magic wand and it will require changes in their responses to their child's behaviour (Beresford et al, 2010). It can be helpful to consider parental readiness to change using a behaviour change framework, such as the transtheoretical model that categorises readiness to change into six steps; pre-contemplation, contemplation, preparation, action, maintenance and termination (Prochaska and Velicer, 1997). Scaling tools can be used when assessing parents' readiness and

willingness to change and allow for conversations which can help parents move from the contemplation stage into preparation (Scott, 2010; Royal College of Nursing 2018).

When parents are ready to implement a sleep programme, it is important to involve both the parents in the assessment process, where possible, and to individually tailor the sleep programme to the family's needs. Parents should be empowered to select which behavioural intervention suits them best, whilst health visitors should be mindful that parents may have tried to implement behavioural strategies prior to seeking support and this may impact on their willingness to undertake similar strategies with professional guidance (Loutzenhiser et al, 2014).

Behavioural Interventions

Behavioural interventions are considered the recommended treatment for sleep disturbances in the under-5's (Moturi and Avis, 2010) and involve the use of modified extinction strategies, such as controlled crying and gradual retreat, to enable a child to learn to self soothe and improve sleeping patterns (Morgenthaler et al, 2006; Hill, 2011).

Although concerns have been raised regarding the use of techniques which advocate parents ignoring their child when distressed (Gunnar and Fonzelle, 2002; Gerhardt, 2004, Rudzik, 2015), modified extinction techniques, such as controlled crying, allow parents to offer intermittent reassurance to their child and have not been found to cause lasting harm (Thunström, 2000; Eckerburg, 2004; Hiscock et al, 2008; Blunden, 2011; Matthey and Črnčec, 2012). In addition, further studies into the outcomes of behavioural interventions have found an increase in positive experiences of parenting, improved parental satisfaction, a decrease in maternal stress levels and better sleep associations (Noble et al, 2002; Blunden, 2011; Matthey and Črnčec, 2012). Behavioural interventions were also found to be effective at improving maternal mood in mothers experiencing postnatal depression (PND) (Hiscock and Wake, 2002; Wade et al, 2007; Hiscock et al, 2008; Matthey and Črnčec, 2012). The impact on maternal mood is significant for health visiting practice as the incidence of (PND) is higher in mothers reporting sleep disturbances in their young children compared to the general population (Hiscock and Wake, 2002; Smart and Hiscock, 2007; Črnčec et al, 2009) and a proportion of mothers continue to be reluctant to seek support for PND, meaning tackling child sleep disturbance may be more acceptable.

Other Support Networks

Parents engage with a range of resources and support networks regarding a variety of issues, including sleep, prior to seeking support, including the use of social media and the internet (Middlemiss et al, 2017) which can have a range of associated positive and negative outcomes. Many credible resources are now available on-line, including websites, twitter accounts and blogs, which provide instant access to evidence-based sleep advice for parents, such as NHS Choices (2015), Infant Sleep Information Source (2017) and the British Sleep Council (2018). Parents often seek support from on-line peer support networks, such as Facebook groups or Mumsnet (Doyle, 2013; Niela-Vilén et al, 2014), with many parents using these types of resource as their first port of call for information (Doyle 2013). These types of peer support provide parents with the experiential knowledge of other parents who are going through similar situations, often providing validation, reassurance and the opportunity to ask questions without feeling judged (Doyle, 2013; Pedersen and Smithson, 2013). However, the majority of the information found on these sites is from peers rather than health professionals and, although it is recognised to be a valid form of experiential knowledge (Doyle, 2013), it may be important to clarify the validity and evidence base of the information being shared and ensure that this is in-line with recommended health visiting practice and current guidelines (Middlemiss et al, 2017).

Conclusion

Behavioural insomnias are common in the under-5 age group and are associated with negative outcomes for both the child and their families (Moturi and Avis, 2010). Health professionals frequently report they do not feel confident at addressing sleep issues. This article provides an overview of the physiology of sleep, the most commonly reported sleep disorders in young children and guidance regarding how to promote good sleep practices and behavioural interventions with parents. It also provides an opportunity to explore good sleep hygiene practices and the supporting evidence base, allowing health visitors to promote these practices as both a preventative measure and when addressing sleep disorders.

Key points:

- Sleep disorders in young children are associated with a range of negative outcomes for both the child and their wider family
- Behavioural insomnias are the most common sleep disorder in the under-5 age group and parents frequently seek professional support in managing sleep issues

- Health visitors are ideally placed to support parents manage their child's poor sleep through the promotion of good sleep hygiene practices and the implementation of behavioural interventions

References

Allen S, Howlett M, Coulombe A and Corkum P (2016) ABCs of SLEEPING: A review of the evidence behind paediatric sleep practice recommendations. *Sleep Medicine Reviews* 29:1-14

Ball C (2017) The role of sleep aids for babies and young children. *Journal of Health Visiting* 5 (11): 542-543

Bathory E and Tomopoulos S (2017) Sleep regulation, physiology and development, sleep duration and patterns, and sleep hygiene in infants, toddlers and preschool-age children. *Current Problems in Pediatric and Adolescent Health Care* 47 (2): 29-42

Bayer J, Hiscock H, Hampton, A and Wake M (2007) Sleep problems in young infants and maternal mental and physical health. *Journal of Paediatrics and Child Health* 43 (1-2):66-73

Beresford B, Stuttard L, Clarke S, Maddison J and Beecham J (2010) *Managing behaviour and sleep problems in disabled children: An investigation into the effectiveness and cost of parent-training interventions*

Available at: <https://www.york.ac.uk/inst/spru/research/pdf/interventions.pdf> [Accessed 13.4.18]

Blunden S (2011) Behavioural treatments to encourage solo sleeping in pre-school children: An alternative to controlled crying. *Journal of Child Health Care* 15 (2): 107-117

British Sleep Council (2018) *Meet Daisy*

Available at: <https://sleepcouncil.org.uk/sleep-advice/meet-daisy/> [Accessed 13.4.18]

Buxton O, Chang, A, Spilsbury J, Bos T, Emsellem H and Knutson K (2015) Sleep in the modern family: protective family routines for child and adolescent sleep. *Sleep Health Journal of the National Sleep Foundation* 1 (1):15-27

Črnčec R, Matthey S and Nemeth D (2009) Infant sleep problems and emotional health: a review of two behavioural approaches. *Journal of Reproductive and Infant Psychology* 28 (1): 44-54

Czeisler C (2013) Perspective: Casting light on sleep deficiency. *Nature* 497: S13

Datta S and MacLean R (2007) Neurobiological mechanisms for the regulation of mammalian sleep-wake behavior: Reinterpretation of historical evidence and inclusion of contemporary cellular and molecular evidence. *Neuroscience and Biobehavioral Reviews* 31(5):775–824

De Gennaro L and Ferrara M (2003) Sleep spindles: an overview. *Sleep Medicine Reviews* 7 (5): 423-440

Department of Health (2009) *Healthy Child Programme: Pregnancy and the first five years of life*

Available at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/167998/Health_Child_Programme.pdf [Accessed 8.3.18]

Department of Health (2011) *Start Active, Stay Active. A report on physical activity for health from the four home countries Chief Medical Officers*

Available at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/216370/dh_128210.pdf [Accessed 12.3.18]

Douglas P and Hill P (2013) Behavioural Sleep Interventions in the First Six Months of Life Do Not Improve Outcomes for Mothers or Infants: A Systematic Review. *Journal of Developmental and Behavioural Pediatrics* 34 (7): 508-522

Doyle E (2013) Seeking advice about children's health in an on-line parenting forum. *Medical Sociology Online* 7 (3): 17-28

Eckerberg B (2004) Treatment of sleep problems in families with young children: effects of treatment on family well-being. *Acta Paediatr* 93(1):126-34.

Fisher M (2013) Sleep matters for health visitors: evidence and best practice. *Nursing in Practice Health Visitor Supplement May/June*

Available at: <http://www.nursinginpractice.com/article/sleep-matters-health-visitors-evidence-and-best-practice> [Accessed 8.3.18]

France K and Blampied N (2005) Modifications of Systematic Ignoring in the Management of Infant Sleep Disturbance: Efficacy and Infant Distress. *Child & Family Behavior Therapy* 27 (1):1-16

Galland B, Taylor B, Elder E and Hernison P (2012) Normal sleep patterns in infants and children: A systematic review of observational studies. *Sleep Medicine Reviews* 16 (3): 213-222

Gerhardt S (2004) *Why Love Matters: How Affection Shapes a Baby's Brain*. East Sussex: Routledge

Giallo R, Rose N and Vittorino R (2011) Fatigue, wellbeing and parenting in mothers of infants and toddlers with sleep problems. *Journal of Reproductive and Infant Psychology* 29(2): 236-249

Great Ormond Street Hospital for Children NHS Foundation Trust (2017) *Sleep hygiene in children*
Available at: <http://www.gosh.nhs.uk/medical-information/procedures-and-treatments/sleep-hygiene-children> [Accessed 12.3.18]

Gregory A and Sadeh A (2012) Sleep, emotional and behavioural difficulties in children and adolescents. *Sleep Medicine Reviews* 16 (2):129-136

Gunnar M and Donzella B (2002) Social regulation of the cortisol levels in early human development. *Psychoneuroendocrinology* 27 (1-2):199-220

Henderson A (2010) *The Good Sleep Guide for you and your baby* (3rd ed.). Wiltshire: Hawthorne Press

Himanen S and Hasan J (2000) Limitations of Rechtschaffen and Kales. *Sleep Medicine Reviews* 4 (2): 149–167

Hill C (2011) Practitioner Review: Effective treatment of behavioural insomnia in children. *Journal of Child Psychology and Psychiatry* 52 (7): 731–741

Hiscock H, Bayer J, Hampton A, Ukoumunne O and Wake M (2008) Long-term Mother and Child Mental Health Effects of a Population-Based Infant Sleep Intervention: Cluster-Randomized, Controlled Trial. *Pediatrics* 122 (3): e621-627

Hiscock H and Wake M (2002) Randomised controlled trial of behavioural infant sleep intervention to improve infant sleep and maternal mood. *BMJ* 324: 1062

Holley S, Hill CM and Stevenson J (2011) An hour less sleep is a risk factor for childhood conduct problems. *Child: Care, Health and Development* 37 (4):563-70

Infant Sleep Information Source (2017) *Welcome to the Infant Sleep Information Source*
Available at: <https://www.nhs.uk/conditions/pregnancy-and-baby/getting-baby-to-sleep/> [Accessed 13.4.18]

Kalia M (2006) Neurobiology of sleep. *Metabolism Clinical and Experimental* 55 (S2): S2-S6

Kalleinen N, Virkki A, Polo O, Himanen S, Irjala K, Joutsen A, Porkka-Heiskanen T and Polo-Kantola P (2011) The temporal relationship between growth hormone and slow wave sleep is weaker after menopause. *Sleep Medicine* 13 (1): 96–101

LeBourgeois M, Giannotti F, Cortesi F, Wolfson A and Harsh J (2005) The Relationship Between Reported Sleep Quality and Sleep Hygiene in Italian and American Adolescents. *Pediatrics* 115 (10):257-265

Loutzenhiser L, Hoffman J and Beatch J (2014) Parental perceptions of the effectiveness of graduated extinction in reducing infant night wakings. *Journal of Reproductive and Infant Psychology* 32 (3): 282-291

Mancz G and Wigley W (2017) Long-term outcomes of techniques used to manage sleep disturbance in the under-5s. *Journal of Health Visiting* 5 (1): 16-24

Martin J, Hiscock H, Hardy P, Davey B and Wake M (2007) Adverse Associations of Infant and Child Sleep Problems and Parent Health: An Australian Population Study. *Pediatrics* 119 (5): 947-955

Matthey S and Črnčec R (2012) Comparison of two strategies to improve infant sleep problems, and associated impacts on maternal experience, mood and infant emotional health: A single case replication design study. *Early Human Development* 88(6):437-442

McCarley R (2007) Neurobiology of REM and NREM sleep. *Sleep Medicine* 8 (4): 302–330

McDowall P, Galland B, Campbell A and Elder D (2017) Parent Knowledge of children's sleep: A systematic review. *Sleep Medicine Reviews* 31:39-47

Mental Health Foundation (2011) *Sleep Matters: The impact of sleep on health and wellbeing*
Available at: <http://www.mentalhealth.org.uk/publications/sleep-report/> [Accessed 12.3.18]

Middlemiss W, Stevens H, Ridgway L, McDonald S and Koussa M (2017) Response-based sleep intervention: Helping infants sleep without making them cry. *Early Human Development* 108: 49-57

Mindell J, Meltzer L, Carskadon M and Chervin R (2009) Developmental aspects of sleep hygiene: Findings from the 2004 National Sleep Foundation Sleep in America Poll. *Sleep Medicine* 10 (7): 771-779

Mindell J, Sadeh A, Wiegand B, Hwei How T and Goh D (2010) Cross-cultural differences in infant and toddler sleep. *Sleep Medicine* 11 (3):274280

Mirmiran M, Maas Y and Ariagno R (2003) Development of fetal and neonatal sleep and circadian rhythms. *Sleep Medicine Reviews* 7 (4): 321-334

Moore R (2007) Suprachiasmatic nucleus in sleep–wake regulation. *Sleep Medicine* 8 (S3): 27-33

Morgenthaler T, Owens J, Alessi C, Boehlecke B, Brown T, Coleman J, Friedman L, Kapur V, Lee-Chiong T, Pancer J and Swick T (2006) Practice Parameters for Behavioral Treatment of Bedtime Problems and Night Wakings in Infants and Young Children. *Sleep* 29 (10): 1277-1281

Morsbach Honaker S and Meltzer L (2016) Sleep in pediatric primary care: A review of the literature. *Sleep Medicine Reviews* 25: 31-39

Moturi S and Avis K (2010) Assessment and treatment of common pediatric sleep disorders. *Psychiatry* 7 (6): 24-37

NHS Choices (2015) *Helping your baby to sleep*

Available at: <https://www.nhs.uk/conditions/pregnancy-and-baby/getting-baby-to-sleep/> [Accessed 13.4.18]

Niela-Vilén H, Axelin A, Salanterä S and Melender H (2014) Internet-based peer support for parents: A systematic integrative review. *International Journal of Nursing Studies* 51 (11): 1524-1537

Nixon GM, Thompson JM, Han DY, Becroft DM, Clark PM, Robinson E, Waldie KE, Wild CJ, Black PN and Mitchell EA (2009) Falling asleep: the determinants of sleep latency. *Archives of Disease in Childhood* 94(9): 686-689

Noble HJ, Austen J and Parkinson C (2002) Restoring the balance: a choice for change -- the stories of parents using controlled comforting. *Neonatal, Paediatric & Child Health Nursing* 5 (1): 5-9

Oskar J and Carskadon M (2004) Spectral analysis of the sleep electroencephalogram during adolescence. *Sleep* 27(4):774-83

Owens J (2008) Classification and Epidemiology of Childhood Sleep Disorders. *Primary Care: Clinics in Office Practice* 35 (3): 533-546

Owens J, Maxim R, McGuinn M, Nobile C, Msall M and Alaria A (2009) Television-viewing Habits and Sleep Disturbance in School Children. *Pediatrics* 104 (3):e27

Pedersen S and Smithson J (2013) Mothers with attitude – How Mumsnet parenting forum offers space for new forms of femininity to emerge online. *Women's Studies International Forum* 38: 97-106

Peirano P, Algarin C and Uauy R (2003) Sleep-wake states and their regulatory mechanisms throughout early human development. *The Journal of Paediatrics* 143 (4): 70-79

Porkka-Heiskanen T and Kalinchuk A (2011) Adenosine, energy metabolism and sleep homeostasis. *Sleep Medicine Reviews* 15 (2):123-135

Prochaska J and Velicer W (1997) The Transtheoretical Model of Health Behaviour Change. *American Journal of Health Promotion* 12 (1): 38-48

Public Health England (2016) *Early Years. High Impact Area 4: Healthy weight, healthy nutrition*

Available at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/563922/Early_years_high_impact_area4_healthy_weight_healthy_nutrition.pdf [Accessed 12.3.18]

Rosenwasser A (2009) Functional neuroanatomy of sleep and circadian rhythms. *Brain Research Reviews* 61 (2): 281 – 306

Royal College of Nursing (2018) *Readiness to change*

Available at: <https://www.rcn.org.uk/clinical-topics/supporting-behaviour-change/readiness-to-change> [Accessed 13.4.18]

Rudzik A (2015) Normal infant sleep and parental expectations. *International Journal of Birth and Parental Education* 2 (2): 7-10

Sateia M (2014) International Classification of Sleep Disorders-Third Edition. *Chest Journal* 146 (5): 1387-1394

Scott, G (2010) Motivational interviewing 1: background, key principles and application in healthcare. *Nursing Times* 106 (34): 21-22

Shechter A, Wookhyun Kim E, St-Onge M and Westwood A (2018) Blocking nocturnal blue light for insomnia: A randomised controlled trial. *Journal of Psychiatric Research* 96: 192-202

Silber M, Ancoli-Israel S, Bonnet M, Chokroverty S, Grigg-Damberger M, Hirshkowitz M, Kapen S, Keenan S, Kryger M, Penzel T, Pressman M and Iber C (2007) The Visual Scoring of Sleep in Adults. *Journal of Clinical Sleep Medicine* 3 (2): 121-131

Smart J and Hiscock H (2007) Early infant crying and sleeping problems: A pilot study of impact on parental well-being and parent-endorsed strategies for management. *Journal of Paediatrics and Child Health* 43 (1-2): 284-290

St James–Roberts I (2007) Helping Parents to Manage Infant Crying and Sleeping: A Review of the Evidence and its Implications for Services. *Child Abuse Review* 16 (1): 47-69

St James-Roberts I, Roberts, M, Hovish, K, Owen C (2015) Video Evidence That London Infants Can Resettle Themselves Back to Sleep After Waking in the Night, as well as Sleep for Long Periods, by 3 Months of Age. *Journal of Developmental & Behavioral Pediatrics* 36(5):324-329

St James-Roberts I, Roberts M, Hovish K, Owen C (2016) Descriptive figures for differences in parenting and infant night-time distress in the first three months of age. *Primary Health Care Research & Development* 17(6): 611-621

St James-Roberts I, Roberts M, Hovish K, Owen C (2017) Video evidence that parenting methods predict which infants develop long night-time sleep periods by three months of age. *Primary Health Care Research and Development* 18(3): 212-226

Steiger A (2003) Sleep and endocrinology. *Journal of Internal Medicine* 254 (1): 13–22

Tarullo A, Balsam P and Fifer W (2011) Sleep and Infant Learning. *Infant Child Development* 20(1): 35–46

Thunström M (2000) A 2.5-year follow-up of infants treated for severe sleep problems. *Ambulatory Child Health* 6 (4): 225-235

Twomey J (2015) A consideration of maternal developmental needs in the treatment of infant sleep problems. *Clinical Social Work Journal* 44 (3): 309-318

Vriend J, Davidson F, Corkum P, Rusak B, Chambers C and McLaughlin E (2013) Manipulating sleep duration alters emotional functioning and cognitive performance in children. *Journal of Pediatric Psychology* 38 (10): 1058-1069

Wade C, Ortiz C and Gorman B (2007) Two-Session Group Parent Training for Bedtime Noncompliance in Head Start Preschoolers. *Child & Family Behavior Therapy* 29 (3): 2007 23-55

Wake M, Morton-Allen E, Poulakis Z, Hiscock H, Gallagher S and Oberklaid F (2006) Prevalence, Stability, and Outcomes of Cry-Fuss and Sleep Problems in the First 2 Years of Life: Prospective Community-Based Study. *Pediatrics* 117 (3): 836-842