

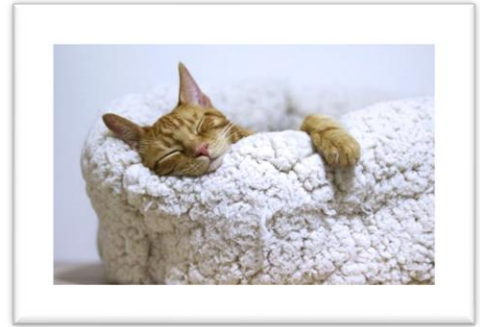
What is sleep?

The dictionary definition of sleep is:

The resting state in which the body is not active and the mind is unconscious.

A more scientific explanation of sleep is:

Sleep is a naturally recurring state of mind and body, characterized by altered consciousness, relatively inhibited sensory activity, reduced muscle activity and inhibition of nearly all voluntary muscles during rapid eye movement (REM) sleep, and reduced interactions with surroundings.



How much sleep do we need?

The amount of sleep we need varies, but generally adults require between 7-9 hours, whilst children's sleep is a little more complex, with some requiring up to 14 hours.

	Age Range	Recommended Hours of Sleep
Newborn	0-3 months old	14-17 hours
Infant	4-11 months old	12-15 hours
Toddler	1-2 years old	11-14 hours
Preschool	3-5 years old	10-13 hours
School-age	6-13 years old	9-11 hours
Teen	14-17 years old	8-10 hours
Young Adult	18-25 years old	7-9 hours
Adult	26-64 years old	7-9 hours
Older Adult	65 or more years old	7-8 hours

Table source: Sleep Foundation.org

Why is sleep so important?

'Society's apathy towards sleep has, in part, been caused by the historic failure of science to explain why we need it. Sleep remained one of the last great biological mysteries.' Matthew Walker

- Lack of sleep can significantly impact brain function. A healthy amount of sleep impacts the brain's ability to adapt to input. Sleep is not merely the absence of wakefulness, whilst our bodies are in a state of sleep, our brains are getting busy.

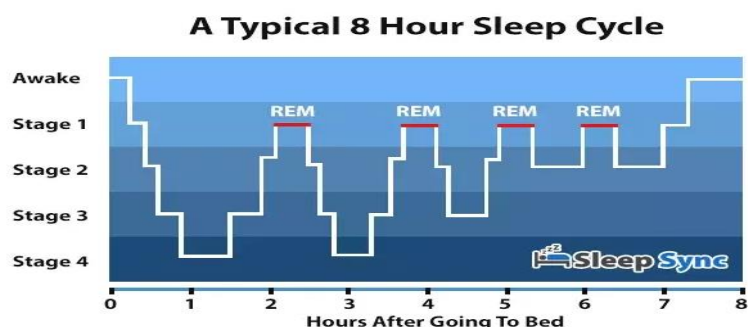
- **Consolidating learning** - the brain contains trillions of nerve cells, which while we sleep rewire themselves to enable us to process new information. Sleep before learning helps to prepare the brain for the initial formation of memories, whilst sleep after learning is essential to save these memories. Whilst we're asleep, the brain is busy forming new memories, consolidating older ones, and linking more recent with earlier memories. This helps to 'cement' information for a better recall.
- **Clearing out toxins** – whilst it is known that the body's lymphatic system clears out toxins and waste materials from the body, the same function for the removal of waste from the brain is thought to act in a different way, and this process takes place when the body is in a state of sleep. A blog produced by Harvard University explains this theory in more detail: <https://sitn.hms.harvard.edu/flash/2018/clearing-junk-healthy-lifestyle-choices-boost-brain-waste-disposal/> Thus, sleep is a vital function in allowing the brain to flush out toxins, clean itself, and 'make space'.
- **Making creative connections** – sleep can be a powerful creativity booster, as in an unconscious resting state can make surprising new connections that it might not otherwise do in a waking state. A 2007 University of California study found that sleep can foster 'remote associates' (unusual connections), in the brain which can lead to a 'eureka' moment upon waking.
- **Making decisions** – during sleep, the brain processes complex stimuli (a thing or event that evokes a specific functional reaction in an organ or tissue) and it is thought that the brain then uses this information when awake.



Sleep stages

Sleep is not a singular entity, it's a process of different cycles or stages. The main types of sleep are categorized as rapid eye movement – REM and non-rapid eye movement- NREM. These processes take place in different stages of sleep, in a single night you can go through the same cycle of sleep stages four or five times, although you'll spend less time in deep sleep during each successive time through the cycles.

Table source
<https://inspiredbymiranda.com/>



Stage 1 - NREM – this is the beginning of the sleep cycle which is considered to be a transition between wakefulness and sleep whereby the brain produces high **amplitude theta waves** which are slow brain waves. This period lasts typically 5-10 minutes.

Stage 2 - NREM – in this second stage, you will become less aware of surroundings, your body temperature drops and breathing and heart rate become more regular. The brain produces **rapid, rhythmic brain wave** activity known as sleep spindles. This stage lasts approximately 20 minutes.

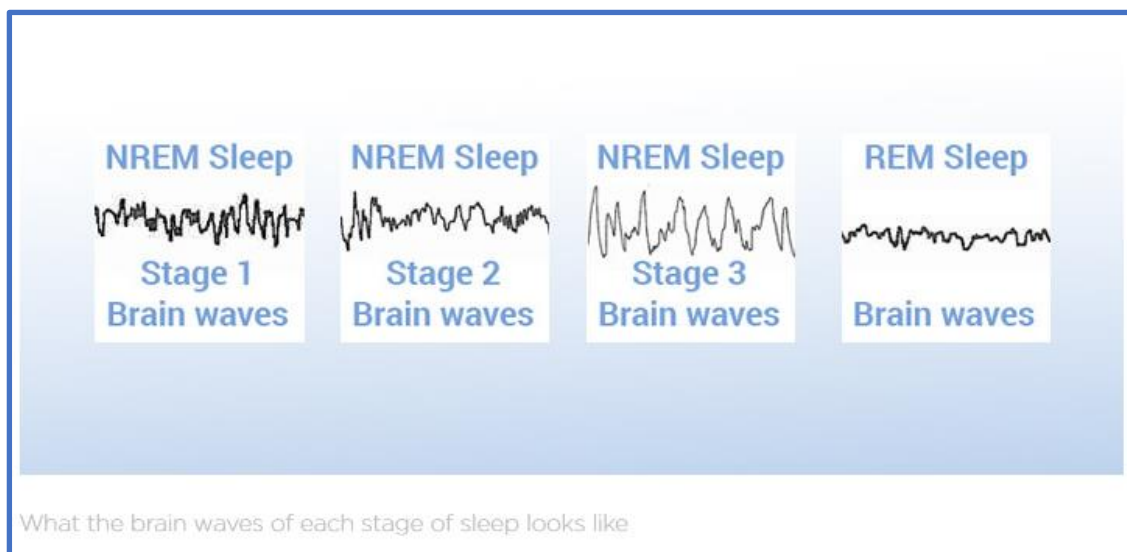
Stage 3 - NREM – in the third stage of sleep, the brain produces deep, slow brain waves known as **delta waves**. Muscles relax, blood pressure and breathing rate slows and deep sleep occurs. This stage acts as a transitional period between light sleep and very deep sleep. During this time, you become less responsive to environmental factors.

Stage 4 - REM – as the brain becomes more active, the body becomes relaxed and this is when most dreaming occurs. It is characterised by eye movement and increased brain activity and is sometimes referred to as **paradoxical sleep**.

The sleep stages in sequence

Sleep does not progress through these stages in sequence. Typically, it will follow a pattern of:

Stage 1 - Stage 2 - Stage 3 - Stage 2 - Stage 4 (REM) - Stage 2. The first REM usually happens about 90 minutes after falling asleep and periods can become longer as sleep continues.



Picture source: <https://blog.withings.com/>

The circadian rhythms

Circadian rhythms are physical, mental and behavioural changes that follow a 24-hour cycle. The processes respond primarily to light and dark and affect most living things including animals and plants. Throughout the body, cells are programmed to roughly follow a 24-hour cycle which affects body temperature, appetite, energy levels and sleep. For humans, one of the most significant circadian rhythms is the sleep-wake cycle.

During the day, light exposure signals to the brain that we should be awake and alert, and when it becomes dark, the brain initiates a hormone, melatonin, that promotes sleep. In this way, our 'inner clock' aligns sleep and wakefulness with day and night. Disruption to the circadian rhythms means that our body's systems do not function properly, for example, we suffer disturbed sleep-wake patterns.

Factors affecting the circadian rhythms may include some sleep disorders, as well as jet-lag and working shifts. For children, and in particular adolescents, a natural shift in sleep patterns often impacts this cycle.

The circadian rhythms of adolescence can shift by as much as two hours during the teenage years.

Indeed, many parents find that their children will still be awake later than themselves; the

neuroscientist Matthew Walker likens asking a

teenager to sleep at a reasonable hour, say 9 or 10

pm, to the circadian equivalent of asking the parent to sleep at 7 or 8 pm. This natural shift is known as 'sleep phase delay'.



What impacts sleep

There are many influencing factors that can affect sleep, certain medical conditions are known to influence sleep, among these are asthma, epilepsy, eczema, cerebral palsy and Downs Syndrome, to name but a few.

There are also thought to be sleep-affecting associations with other conditions such as attention deficit hyperactivity disorder (ADHD), attention deficit disorder (ADD) and autism. Typically, children with these conditions find it more difficult to fall asleep, are more restless, have difficulty waking and experience more disengagement. Where medication is prescribed for these conditions, this may also impact sleep.

Children with these conditions will benefit from strict sleep routines and good sleep 'hygiene' (a term used to encompass all areas of consideration in relation to sleep, for example, environment, routine, habits, diet etc.).

Temperature and sleep

There is a well-documented link between core body temperature and sleep. The idea of having a relaxing bath before bedtime serves at least two purposes; to relax the mind and body, and to help drop the core body temperature by 1 or 2 °c. This drop in temperature, exiting from a warm environment to a colder one, serves to release the sleep hormone, melatonin. This process is called vasodilation and signals the circadian clock to increase blood flow to the extremities, thus cooling the core body. If a warm bath or shower is not always practicable, the act of washing hands and feet in warm water can be as effective.

During REM sleep, the body ceases most temperature regulation behaviours such as sweating or shivering, leaving us more sensitive to ambient temperature changes.

The optimum room temperature for sleeping is 18.3°C. If children throw off bedclothes during the night, it's usually because they are too hot. A consideration for a child's room may be to turn down the thermostat.

Night terrors and nightmares

Night terrors are common in children aged 3 to 8 years old. The episodes usually occur in the early part of the night, and sometimes more than once. Unlike nightmares, a child generally does not remember the incident in the morning. They may be triggered by illness, being over-tired, medication, excitement or anxiety. NHS England offer advice for this condition <https://www.nhs.uk/conditions/night-terrors/>

Nightmares generally cause a child to wake in the night, they may be in response to an incident or experience or caused by stress or lack of sleep. Nightmares tend to decrease with age and can be supported by:

- Offering comfort and reassurance
- Keeping a strict bedtime routine
- Making sure a child is getting enough sleep
- Talking about them during the day
- Referring to them as 'bad dreams', not nightmares
- Working on building a child's self confidence

Day light and Blue-light

There have been numerous scientific studies on the effect of artificial light on sleep, and it's fair to say that not all scientists or studies agree that any one type of artificial light is better, or worse than another. What is not in dispute, is that artificial light can interfere with the body's circadian clock.

Scientifically speaking, all light is not the same, indeed, some artificial light emitting sources can disrupt the production of the sleep hormone melatonin by as much as 50%; in relative time, this could delay sleep by up to 3 hours. However, scientists do agree that exposure to more light in the day and less at night is thought to improve a healthy night's sleep. A few hours of exposure to light outside, or by a window, can dramatically improve sleep.

Blue light is a colour in the visible light spectrum that can be seen by the human eye; it is scattered more than any other colour because it travels shorter, smaller waves and this is why the sky appears to be blue. Blue wavelengths, the types used in electronic devices, are beneficial during daylight hours, but over-exposure in the evenings and at night can be detrimental to sleep, as they stimulate the brain. It is thought that children's eyes may be more sensitive to blue light, though all eyes, reactions to light and circadian rhythms differ. There are commercially available products, such as blue-light filters and glasses as well as apps that may help to reduce exposure. Most devices have night-modes which, when activated, may also be beneficial.

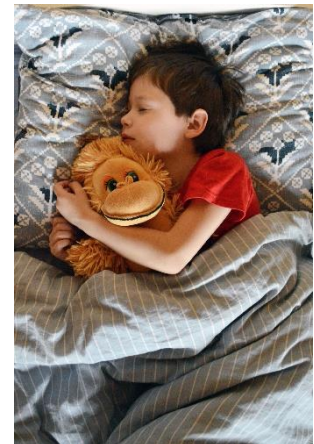
Limiting or reducing the use of light-emitting devices in the evenings will undoubtedly help to improve sleep. Better still, eliminate them from bedrooms altogether.

Sleeping environment and routine

Both environment and routine are vital elements in creating conditions for a good night's sleep. There is no magic formula, no secret switch to be flicked, and no right or wrong. The illusive magic formula that we do so often seek, is trial and error, as well as patience and perseverance.

The fore mentioned 'sleep hygiene' factors in both routine and structure and can play a crucial part in achieving good quality sleep. Things to consider:

- *Routine – a regular routine with minimal deviation from a set routine, even at weekends and holidays. This encourages good and healthy sleep patterns.*
- *Relaxing before bedtime – this can be incorporated into a routine and may include a wind-down period, bath, reading a story or listening to music.*
- *Ensuring a child feels safe – discourage scary stories, leave a low light on if necessary.*
- *Encourage the use of a bed to be for the purposes of sleep only, this helps to build the association of bed and sleep.*
- *Temperature – the optimum room temperature for sleep is 18.3°c.*
- *Avoid caffeine-based drinks and foods in late afternoon or evening.*
- *Remove blue-light emitting devices from the bedroom – or time-limit the use, especially for adolescent children.*



- *Avoid late afternoon naps or excessive exercise late in the evenings.*

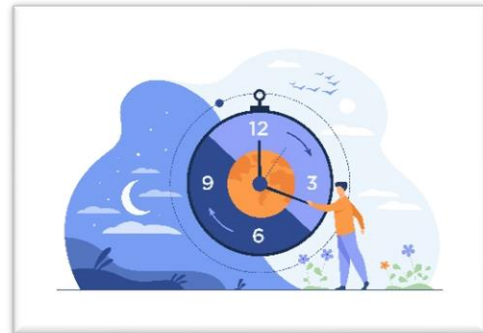
Takeaways and support

It is not uncommon for children to develop sleep problems at some point during their childhood. It is thought that as many as 50% of children may experience some type of sleep issue or problem - this can be upsetting, frustrating or the cause of much angst and argument in many households. Very often, these issues are short-term and will improve over time. It is important to trial different routines and techniques to see what works well for your child and household.

Some people find that mindfulness activities and yoga can help to relax and prepare the mind and body for rest. Where issues such as anxiety have been identified as barriers to sleep, cognitive behavioural therapy (CBT) and other talking therapies may help. Medications, supplements or sleep aids for children must only ever be used upon the advice of a doctor.

Some points to remember:

- *routine*
- *room temperature*
- *comfort and security*
- *artificial light*
- *caffeine-based products*



There are numerous organisations, charities and networks that can offer support and advice. The internet is a great source of information, though it is important to always check information and advice carefully.

Some organisations that offer support are:

<https://www.gosh.nhs.uk/conditions-and-treatments/procedures-and-treatments/sleep-hygiene-children/>

www.sleepfoundation.org

<https://www.nhs.uk/live-well/sleep-and-tiredness/how-to-get-to-sleep/>

<https://sleepcouncil.org.uk/>

<https://cerebra.org.uk/get-advice-support/sleep-advice-service/>

<https://www.nhs.uk/mental-health/talking-therapies-medicine-treatments/talking-therapies-and-counselling/cognitive-behavioural-therapy-cbt/overview/>