Sleep

A basic introduction into the neuroscience of sleep and the effects of sleep deprivation on health, safety and wellbeing

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Is it time to ‘wake up’ and take sleep seriously?

First of all I must point out that I am in no way a qualified psychologist, psychiatrist or sleep medicine expert. However, for a long time I have been fascinated by neuroscience and how the brain operates to control our biological functions, one of which is the fundamental process of sleep, something that a large number of us simply take for granted.

In my opinion, sleep is an area of health and wellbeing that has been missed by many employers across the UK, even at a time where wellbeing has been in the spotlight more than ever before. Having employees who are achieving regular good quality sleep means that they will be more productive, more efficient and totally engaged in the delivery of services. When we sleep well, we wake up feeling refreshed and alert for our daily activities. Sleep affects how we look, feel and perform on a daily basis, and can have a major impact on our overall quality of life. What we see from those who aren’t getting enough sleep is disengagement and Presenteeism, where employees are ‘here in body, but not in mind.’

Sleep clearly affects health and wellbeing, but sleep disruption and sleep deprivation also has significant impacts on the safety of employees. Historically, sleep deprivation has been identified as the primary cause of a number of disasters resulting in loss of life, including the Space Shuttle Challenger in 1986, Herald of Free Enterprise in 1987 and the Exxon Valdez Oil Spill in 1989.

For those of you who suffer from some form of sleep problem, this booklet contains a number of useful tips, tricks and techniques to encourage the sleeping process and achieve the quantity, but more importantly, the quality of sleep that we require as human beings to ensure we are performing at our optimum level, both in our personal and work lives. I cannot guarantee that the information within this booklet will solve any sleep problems that you may be experiencing but what the information will do is raise your awareness about sleep and explain how simple changes in your sleep habits and bedtime routine can promote better sleep. In any instance where you may be chronically suffering from some form of sleep problem you should always consult with either your GP or a Behavioural Sleep Medicine Specialist.

I hope this short booklet will give you an interesting and insightful overview of the fascinating area of ‘sleep’ and encourage you to start taking your sleep seriously!

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Part 1

A basic introduction into the neuroscience of sleep
Introduction

The sound of the alarm clock is desperately familiar to most of us. But what that awful, ghastly sound does, is stop the single most important biological experience that we have, and that is sleep. The average human will spend approximately one third of their lives asleep. If we are lucky enough to reach the age of 75, that will mean we will have spent nearly 25 years asleep. What that tells us is that sleep, at some level, is important to us; yet for most of us we don't give sleep a second thought.

To understand why we neglect sleep so much in today's society we first need to take a step back in time to the 16th Century. Thomas Dekker, the English Dramatist, famously said “Sleep is the golden chain that ties health and our bodies together”. However, if we jump forward nearly 400 years to the beginning of the 20th Century, the tone begins to change somewhat. Thomas Eddison was quoted as saying “Sleep is a criminal waste of time and a heritage from our cave days”. Again, jump forward to the 1980’s and many of you may remember Margaret Thatcher saying “Sleep is for wimps” after regularly boasting about only getting 4 hours sleep per night. What this demonstrates is that we have started to treat sleep as the enemy, something to be ignored. Recent cultural sayings such as ‘you snooze, you lose” and “I will sleep when I’m dead” reinforce the viewpoint that sleep is a commodity. Our ignorance of sleep is quite profound.

So why do we tend to abandon sleep from our thoughts? Well, it’s because you don’t do anything much when you are asleep. You don’t drink, you don’t eat and you don’t have sex and therefore we think that it is a complete waste of time, right? Wrong! Sleep is an incredibly important part of our biology and an essential process in maintaining some of our key biological functions.

What is sleep?

Sleep is a dynamic and regulated set of behavioral and physiological states during which many processes vital to health and well-being take place. The sleep process occurs in 5 stages (which we will look at later in this booklet) and includes two types of sleep:

- **NREM** – for restorative functions, and;
- **REM** – for processing memories and dreaming.

If you ever get the chance to watch someone sleeping (although that sounds a bit creepy) you will conclude three main physical signs – closed eyes, lying down and being quiet. Sleep is often seen as a time when the body is inactive. In fact, the opposite is true. Sleep is an active, essential and involuntary process, without which we cannot function effectively. Primarily, sleep is for the brain, allowing it to recover and regenerate. Sleep is not a lifestyle choice, but a necessity.
‘Chronotypes’

You may have heard people referring to themselves as either a ‘lark’ or an ‘owl’. ‘Larks’ are early birds and so people who refer to themselves as ‘larks’ tend to wake up early and are ready to face the day that lies ahead. ‘Owls’ on the other hand are people who tend to wake later, struggle to wake up and stay up later at night.

For couples who have different ‘chronotypes’ this can present an issue as couples tend to go to bed at the same time. However, for the person who isn’t ready to sleep, this can often lead them to develop a long standing difficulty of getting off to sleep. A way to deal with this is to have ‘cuddle time’. Yes, I know this sounds a bit soppy but it does work. The couple schedules a bedtime suited to the ‘lark’ (morning person) but the ‘owl’ (night person) goes to bed with the intention of not falling asleep.

People find themselves at an increased risk of developing insomnia due to a mismatch between the individual’s biological preference (the predetermined disposition to sleep early) and going to bed late. Our sleep preferences tend to be influenced by the responsibilities associated with our social activities such as work and this is referred to as ‘social jet lag’.

Circadian Rhythm

If you’ve ever noticed that you tend to feel energized and drowsy around the same times every day, you have your circadian rhythm to thank. Your circadian rhythm is basically a 24-hour internal clock that is running in the background of your brain and cycles between sleepiness and alertness at regular intervals. It’s also known as your sleep/wake cycle.

For most adults, the biggest dip in energy happens in the middle of the night (somewhere between 2:00am and 4:00am, when they’re usually fast asleep) and just after lunchtime (around 14:00pm to when they tend to crave a post-lunch nap). This is known as the ‘Circadian Trough’ or ‘2 o’clock Trough’ and is to do with the body clocks circadian cycle telling you that you need a break and automatically wants to take a nap in the afternoon because you got up early for work. Core body temperature falls at this time signalling the brain to release more sleep hormone - melatonin. You won’t feel the dips and rises of your circadian rhythm as strongly if you’re all caught up on sleep. It’s when you’re sleep-deprived that you’ll notice bigger swings of sleepiness and alertness.

Your circadian rhythm works best when you have regular sleep habits, like going to bed at night and waking up in the morning around the same times from day to day (including weekends). When we have an innocent lie in on a weekend, this will throw your clock forward. Therefore on Monday, you have to get up earlier that the internal body clock dictates making people irritable and tired. This is why people experience the ‘Monday Morning Blues’. 
The Brain and Melatonin

To understand how sleep happens and the biological processes behind it, we first need to understand the brain and its role in regulating sleep, in particular the production of hormone ‘melatonin’.

Our bodies have a ‘sleep homeostat’ which controls our drive to sleep and regulates the body's ‘sleep-wake cycle’. As humans we have a light-dark cycle in which we occupy the light, and then sleep when it becomes dark. Light is a fundamental influence on when we sleep and regulates the production of the sleep hormone ‘melatonin’. A direct pathway from the light receptors in the eyes to the SCN has been identified in starting this biological process.

For you to understand how the brain influences sleep, you need to be aware of the role of ‘endogenous pacemakers’ and ‘exogenous zeitgebers’. Don't worry, I know it sounds complicated but all will become clear as we progress. So first of all let’s look at the role of ‘endogenous pacemaker’.

When I refer to ‘endogenous pacemakers’ I am of course referring to the internal body clock and the circadian rhythm which I have mentioned above. Neuroscientists now know the exact location of the internal body clock within the brain structure and it lies just behind the eyes in the area of the brain known as the ‘Superchiasmatic Nucleus’ (or SCN as we will refer to it as from this point onwards), a bundle of neurons in the hypothalamus that regulates the circadian rhythm. The human body operates a ‘Circadian Rhythm’ which is in effect our 24 hour cycle in which a proportion of that time is spent undertaking some form of activity whilst the other proportion is spent sleeping. That’s why your circadian rhythm tends to coincide with the cycle of daytime and night-time.

Interestingly, they know this because of previous studies on hamsters which have shown that when the SCN is removed, the sleep-wake cycle disappears. Also if the hamsters SCN's are transplanted with those of another species, they adapt the same sleep-wake cycle as their donors.

As darkness falls, special photoreceptors in the retina feed information via the optic nerve into the SCN and pineal gland (a small cone shaped gland in the brain the produces melatonin). The pineal gland begins to secrete melatonin into the blood stream which inhibits the production of serotonin by the Reticular Activating System (RAS). The RAS is the area of the brain that regulates wakefulness and so by inhibiting this system, we achieve sleep. In reverse, when the sunrises in a morning the eyes feed this information into the SCN which stops the production of the sleep hormone and activates the RAS which wakes us up. This brings us nicely onto the role of ‘exogenous zeitgebers’, in particular the role of light in regulating our sleep. Melatonin levels begin to rise usually about two hours before your usual bedtime, decreasing mental alertness, and this point is known as the ‘sleep gate’ or ‘sleep onset zone’ where the urge to sleep increases dramatically.
For those of you who may previously studied German you may already know that the word ‘zeitgeber’ translates to mean ‘time giver’. Zeitgebers give us the time of day and influence the body clock by determining when we go to sleep. Daily exposure to bright light, especially sunlight, helps keep the body’s circadian rhythms synchronized and operating on a 24-hour schedule.

**CASE STUDY:** In 1972, Michael Siffre, a French cave explorer spent 7 months underground, under close scientific observation, with no cues about the time of day. The only contact he had with the outside world was via a manned 24 hour telephone. He organised his life into a normal pattern with
alternate periods of activity and sleep. What the scientists found was that he chose to live a 25 hour day. What I mean by this is that the length of time he was awake increased and on a few occasions he was awake for 36 hours and slept for 14 hours as there were no zeitgebers (external cues) to inform him of the time of day. For each day that passed, he got up one hour later proving the clock in his brain was running a little bit slow. In fact, he celebrated the New Year celebrations nearly three days late as a result.

So, in summary, we have a circadian rhythm which, in conjunction with some physical structures within the brain, forms the internal body clock and this body clock is influenced by external cues which in effect inform us of the time of day and regulate our sleep-wake cycle.

**The Sleep Process**

Now that you understand the biological processes that occur in order to induce sleep, let’s look at the sleep process in more detail. As human beings, most of us cross the bridge between the conscious and unconscious on at least a daily basis. Yet we rarely give a second thought to the countless processes that occur within our bodies and brains when we are deep in slumber. It is essential for us to better understand the sleep process in order to ensure that we get a regular amount of good quality sleep.

When we go to sleep the brain doesn’t shut down contrary to common belief. In fact neuroscientists have shown that some areas of the brain are actually more active during the sleep state than during the wake state. We sleep for many reasons, some of which we will cover later in this booklet, but the primary reasons are for restoration, memory consolidation and cognitive functioning.

The brain has 2 centres involved in the sleep wake cycle – ‘The Alertness Centre’ – which keeps us awake, and ‘The Sleep Centre’ – which puts us to sleep. For the sleep centre to dominate the alertness centre we need to be tired, calm and relaxed, our brain not to be active and a quiet and dark environment, which is comfortable and the right temperature. These are the preconditions of sleep. External stimuli such as noise, light and worrying, activate the alertness centre of the brain and prevent us from sleeping.

The sleep process occurs in five stages as shown in Figure 2 below – the first four forming our Non-Rapid Eye Movement (NREM) sleep which is for restorative functions – and the fifth being Rapid Eye Movement (REM) sleep which is for cognitive processing and dreaming.
**Figure 2: The Sleep Process – Stages of Sleep**

**STAGE 1: Transition to Sleep**

This stage is the transition between awake and sleeping where we experience light sleep and can be easily awoken. We experience eye, body and muscle movement and this lasts for approximately 5 minutes. Some people experience ‘Hypnic Jerks’ (where a person experiences a falling sensation or jumps violently in bed) as a result of the body going to sleep too quickly. We then enter a ‘Hypnagogic State’ and experience our first dream of the night.

**STAGE 2: Light Sleep**

The most time is spent sleeping in this stage (lasts 10-20 minutes) and eye movement stops and the heart rate slows. Brain waves and brain activity levels become slow. The person who is sleeping becomes disengaged from their surroundings.

**STAGE 3: Deep Sleep**

During deep sleep it is difficult to wake the sleeper but people are more prone to parasomnias such as bedwetting or sleepwalking. If woken during this stage, the individual would feel cranky and disorientated. Slow brain waves appear during this period and there are no eye or muscle movements.

**STAGE 4: Intense Deep Sleep**

This is the deepest stage of sleep that lasts for approximately 30 minutes. It is the essential stage for ensuring that you achieve proper sleep and forms the majority of restorative sleep where tissue growth and repair occurs and energy is restored.

**STAGE 5: REM/Dream Sleep**

During stage 5, dreams and nightmares occur, eye movements are fast, brain activity increases, heart rate and blood pressure increase and the arm and leg muscles become paralysed. If a person is woken in this stage they are likely to remember their dreams.

90-110 minute cycle ascending back up the stages
Each sleep cycle takes between 90-110 minutes and then you ascend back up the stages experiencing the first dream of the night. This cycle happens between four and five times every night. The reason we go from deep sleep back up to the lighter stages of sleep is thought to be because of our evolution as a species. It is suggested that, even though we are physically asleep during these periods of light sleep, we routinely scan the environment for unusual noises just to make sure that is safe to continue sleeping. This makes sense, as it would be unwise to progress into deep sleep, where we would be less responsive if a predator entered our cave.

**What is REM?**

REM (or Rapid-Eye Movement Sleep) is stage 5 of the sleep process and is primarily for brain processing and is the stage in which dreams and nightmares occur. We also know that REM has a function of repairing the brain as research done on patients who had suffered drug overdoses found that the patients experienced prolonged REM in order to improve and repair brain.

REM sleep plays a role on the rate of brain development that occurs in the early stages of a person’s lifespan. In fact, babies sleep for between 18-24 hours a day in their first year. What we know is that an area of the brain known as the ‘pons’ regulates REM sleep and when a part of this brain structure is removed (locus coeruleus), REM sleep disappears completely.

During REM the eyeballs move up and down and back and forth rapidly under the eyelids. What neuroscientists have found is that when sleepers are observed using polysomnography, the dreams they are having correlate directly to the rate at which the eyeballs flicker under the eyelids. For example, if the rate of movement is rapid this would indicate that they are experiencing a fast-paced, active, or exciting dream whereas if the eyes are twitching slowly that would indicate a passive or relaxing dream. We will look at dreaming a bit later on in the booklet.

We sleep in REM for approximately 25% of the night. REM sleep first occurs about 90 minutes after falling asleep and recurs about every 90-110 minutes (approximately 5 times per night). The amount of REM increases per cycle and the amount of NREM decreases.

For those who deprive themselves of sleep, for example, doctors working a 72 hour shift, the few hours’ sleep they get will be completely REM and nothing else. The following night when they get a full sleep, the total amount of REM is very high in order to compensate for sleep lost. This is known as the ‘REM rebound’. So when you hear people say, “I will have to catch up on that sleep that I lost”, this is a fallacy as the brain will automatically recover the sleep loss without the need for extra hours.

**Why do we sleep?**

Sufficient sleep is essential for maintaining optimal physical health, mental and emotional functioning and cognitive performance. Inadequate sleep time and poor quality sleep interfere with quality of life and can be harmful to health. Inadequate sleep impacts behavior in adults and may
result in impaired daytime functioning, including decreased workplace performance due to decreased alertness, poor memory, and impaired problem solving.

It won’t surprise you to hear that there is no consensus on why humans sleep and there are many theories. However, I will outline three of the most common theories below which are as follows:

1) **Oswald’s Restoration Theory** – The theory suggests that the energy we burn up during the day is restored and rebuilt during the night as we sleep. We know that stages 3 and 4 of NREM sleep enable body repair and REM enables the brain to recover. What reinforces this idea is that for the majority of us, we are tired at the end of the day and are craving sleep. So this idea sounds perfectly plausible!

2) **Energy Conservation Theory** – The theory is based on the presumption that we sleep to save calories. However, when you do the sums it equates to approximately 100 calories saved per night which is the equivalent of a slice of bread. As a result, I am less convinced by this theory.

3) **Brain Function** – What has been shown is that if people are taught a task and then deprived of sleep, they struggle to recall the task at a later stage. Sleeping at night increases creativity and the ability to find solutions to difficult scenarios.

In reality, we sleep for a multitude of different reasons but sleep is not an indulgence, it is a necessity. But what we do know is that during sleep we process information, consolidate memories and undergo a number of maintenance processes that help us function during the daytime. Sleep allows us to achieve overall better health and a lack of sleep is associated with the development of a number of ill-health conditions. There are also numerous mental benefits including having clearer thinking during the day, enhancing mood, relieving stress and improving memory and concentration levels. In fact it is estimated that have one hour of extra sleep equates to approximately a 25% increase in productivity. Not getting enough sleep may lead to use of caffeine and other stimulants to maintain wakefulness but this forms a vicious cycle as these substances prevent us sleeping later in the day.

**Why do we dream?**

Dreams are basically stories and images our mind creates while we sleep. Dreams can be vivid. They can make you feel happy, sad, or scared and they may seem confusing or perfectly rational. What is interesting is that the prefrontal cortex (the area of the brain that controls reasoning) shuts down during REM sleep so you don’t question illogical parts of dreams. Dreams can occur anytime during sleep but the most vivid dreams occur during REM sleep, when the brain is most active. Some neuroscientists believe we dream at least four to six times per night, however, a large number of us will experience ‘emotional Intensification’ or ‘amnesia’ after sleeping which results in us forgetting approximately 95% of our dreams.
There are 3 different types of dream:

- **Hallucinations**
- **Delusions** – Where we believe the events in our dreams are actually real
- **Cognitive Abnormalities** - Events that are impossible in real life.

So why do we dream? Well the truthful answer is that nobody really knows and neuroscientists have come up with many logical theories and explanations which are yet to be proven, some of which are as follows:

- For information processing and consolidation of knowledge
- For finding solutions to problems or working out difficult emotions
- For finding inspiration or answers
- For dealing with trauma
- For rebooting the system – dreams are used to refresh and repair the brain.
- Dreams are the brains way of maintaining sleep, keeping the brain occupied so we don’t wake up.
- Rehearsing for Emergencies (threat simulation) - Neuroscientists suggest that two thirds of dreams involve some type of aggression such as fights, verbal disputes, car crashes, falling, drowning, being lost, trapped, terrorism etc.
- ‘Toilet bowl theory’ – to flush out excessive information and thoughts that aren’t required and file important information into long term memory.

**Benefits of Good Sleep**

To get the most out of our sleep, both quantity and quality are important. If sleep is cut short, the body doesn’t have time to complete all of the phases of sleep needed for muscle repair, memory consolidation and release of hormones regulating growth and appetite. Then we wake up less prepared to concentrate, make decisions, or engage fully in work and social activities.

Good sleep can be achieved not only when the quality and quantity is right, but also when the timing of the sleep you are getting matches your biological sleep need. People who sleep well tend to be physically healthier, more able to fight infection, combat the effects of stress and control their blood pressure. As well as the benefits to self, research has shown that when people have slept well, others perceive them as looking younger, healthier and more attractive. After all, it is called ‘beauty sleep’.

The benefits of good sleep go well beyond protecting physical health and also include, but are not limited to:

- Increased ability to learn and remember information
- Increased ability to concentrate
• Increased creativity
• Increased ability to evaluate and respond to risk
• Increased energy and stamina
• Improved mood

**How much sleep do we need?**

There is no universal answer to this question as this varies from person to person. It is important to find out how much sleep you personally need and ensure you achieve this. We need to ensure we get the right amount of sleep and enough good quality sleep as I have mentioned above. As a rough estimate, you should have 1 hour of sleep for every 2 hours that you have been awake.

Over the past 20 years, people have added approximately 158 hours to their working and commuting each year and recent research suggests that young mothers are doing the equivalent of 2 ½ jobs per week. These demands are bound to have a negative bearing on the amount of sleep that is achievable.

The table below (Figure 3) gives a rough indication of how much sleep each person should be striving to achieve per night based on the individual’s age group. What we can gauge from this information is that if infants are the age group that requires the most sleep, this supports the idea that the primary biological function of sleep is for the purpose of brain restoration and development.

**Figure 3: Estimated hours of sleep to be achieved in relation to age group**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Estimated Hours of Sleep</th>
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<tbody>
<tr>
<td>Infants</td>
<td>16-20 hours</td>
</tr>
<tr>
<td>Toddlers</td>
<td>12-14 hours</td>
</tr>
<tr>
<td>Pre-School</td>
<td>11-13 hours</td>
</tr>
<tr>
<td>School Age</td>
<td>10-11 hours</td>
</tr>
<tr>
<td>Teenagers</td>
<td>9 ½ - 10 hours</td>
</tr>
<tr>
<td>Adults</td>
<td>7 ½ - 8 hours</td>
</tr>
</tbody>
</table>

On average, we are getting between 1 ½ - 2 hours less sleep per night compared to how much sleep our grandparents were getting ‘back in the day’ and the majority of people in the UK are now in the region of getting 6 ½ hours a night. A lot of people still believe in the misconception that they must have 8 hours sleep in order to function, but this is not necessarily the case. The amount of sleep a person needs is determined on an individual basis and is not generic across the board. The estimations in the table above are based on averages and the amount of sleep we need, will differ between people. In effect, it is all about listening to your body, and not ignoring the signs of sleep deprivation. Clearly if your body is calling out for extra sleep that is a clear indication that sleep deprivation may be affecting you. If we use the analogy of a faulty car, when the warning light appears on the dashboard (for whatever reason), we don’t simply ignore it and cover it over with
so some black tape. What we do is take it to a garage or qualified mechanic to identify the source of the problem. This principle also applies to sleep.

Other misconceptions exist with regards to teenagers and the aged. If we look at teenagers first, people believe that teenagers are lazy but that is not the case. They have a predisposition to go to bed late and get up late. Teenagers need approximately 9 hours sleep to achieve full brain performance yet many of them are getting an average of approximately 5 hours per night which is simply not enough. When we look at the aged, their sleep requirements don't change as they get older, but they tend to have large blocks of disrupted sleep for a variety of reasons. Their total sleep fragments over time which means they sleep less as a result, however their sleep demands do not reduce over time.

A common question is 'how do I know if I’m not getting enough sleep?' Common signs that you may not be getting enough sleep are:

- Needing an alarm clock to wake you up in a morning
- Taking a long time to get out of bed
- Taking stimulants to counteract the effects of sleep deprivation
- Behavioural changes such as being grumpy or miserable
- Work colleagues making comments about behaviours

Another assessment tool that can be used to assess whether or not you are adversely sleepy, is to use the 'Epworth Sleepiness Scale'. The tool is used as a self-assessment method to determine whether or not you would be likely to sleep in certain situations. A copy of the tool can be found in Figure 4 below:
**Figure 4: The ‘Epworth Sleepiness Scale’**

<table>
<thead>
<tr>
<th>EPWORTH SLEEPINESS SCALE</th>
<th>Patient self-assessment questionnaire</th>
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<tbody>
<tr>
<td></td>
<td>Please fill in the following questionnaire by filling in a number in the box by each situation. In each situation, please try and estimate the chance of you dozing:</td>
</tr>
<tr>
<td></td>
<td>Would never dose = 0</td>
</tr>
<tr>
<td></td>
<td>Slight chance of dozing = 1</td>
</tr>
<tr>
<td></td>
<td>Moderate chance of dozing = 2</td>
</tr>
<tr>
<td></td>
<td>High chance of dozing = 3</td>
</tr>
<tr>
<td>Sitting reading a book</td>
<td></td>
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<tr>
<td>Watching television</td>
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<td>Sitting inactive in a public place e.g. in a meeting</td>
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<td>Lying down to rest in the afternoon</td>
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<td>Sitting talking to someone</td>
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<td>Sitting quietly after lunch without alcohol</td>
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<td>In a car, stopped in traffic or at lights</td>
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<td>In a car, as a passenger for an hour</td>
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<td>RESULT</td>
<td>WHAT YOUR ESS RESULT INDICATES</td>
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<tr>
<td>&lt; 10</td>
<td>You are most likely getting enough sleep. However, if you have noticed a change in your normal sleep routine, you may want to talk to your doctor.</td>
</tr>
<tr>
<td>10-16</td>
<td>You may be suffering from excessive daytime sleepiness. You may need to see your doctor to determine the cause of your sleepiness and possible treatment.</td>
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<tr>
<td>16+</td>
<td>You are dangerously sleepy</td>
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**Evolution of sleep**

By now you should be starting to realise that sleep is very important to us. One of the best quotes I have read in relation to the importance of sleep came from a psychologist named Blakemore in the 1980’s who said:

“Our planet is a dangerous place. There is ruthless competition for limited resources and only the fittest survive. Any yet all the most advanced animals, normally alert and watchful, drop
their defences in order to sleep. Even human beings, the most successful species, spend 1/3 of their lives more or less paralysed and senseless. If sleep is so risky, it must bestow a huge benefit on animals that indulge on it, or it would have been eliminated by the powerful forces of evolution. Animals that did not sleep would surely have evolved and prevailed over their sleepy competitors. Sleep therefore must surely be valuable.”

Although we are no longer faced with the threats and dangers that the Neanderthal had to face many years ago, evolution has no changed our sleep needs. We are biologically prepared to function on minimal sleep and the prehistoric blueprint for sleep hasn’t evolved fast enough for 21st century life. As I have discussed we actually sleep on average, 1 ½ hours less than our grandparents did. In prehistoric times, the caveman would probably only have slept 2-3 hours a day as survival was much more critical. This sleep time would only be taken once the caveman found a safe place to sleep due to the fear of being hunted! We don’t have that problem these days as our survival is not determined by sleep. We are not being hunted and most of the time we are safe.

Those still at risk from predators (that cannot find a safe place to sleep) or those that must stay awake in order to survive, sleep very little. If we look at some other species for a moment, let’s first explore the sleeping habits of mallard ducks. Mallard ducks are clever and shut off half of their brain (one hemisphere) at a time in order to sleep, leaving the other half vigilant. The duck keeps one eye open to look for potential predators whilst the other eye is closed, disengaging that half of the brain. When we look at the bottle-nosed dolphin, they are similar to the mallard duck in the fact that they put one hemisphere of the brain to sleep to prevent them from drowning. Then after 30-60 minutes the brain reverses its role allowing the other hemisphere time to rest. If we compare this to Indus Dolphins, they sleep for 2 seconds at a time (microbursts). Finally, animals that are safe from predation tend to sleep for most of the day. For example, sloths and koalas, which tend to be found at the top of very tall trees, sleep for approximately 22 hours a day waking only to eat eucalyptus before falling back asleep again.

What we can conclude from this is that every species sleeps for some period of time, no matter how short, as it bestows huge benefits in order to survive. This directly correlates with humans.
‘Sleep Debt’ and ‘Sleep Deprivation’

Sleep deprivation has previously been used as a method of interrogation and torture. The Romans used waking torture to extract information from captured enemies, whilst the Chinese invented ‘Chinese water torture’ to purposefully keep captives awake as they knew the negative effects that sleep deprivation would have on people. Interestingly, the world record for longest period of unbroken sleep is still held by Randy Gardner (a 17 year old schoolboy at the time) who managed to go 264 hours (the equivalent of 11 days) without sleeping.

‘Sleep debt’ or ‘sleep deficit’ is the cumulative effect of not getting enough sleep and is built up over days, weeks and even months. A large sleep debt may lead to mental or physical fatigue. There are two kinds of sleep debt: ‘partial sleep deprivation’ and ‘total sleep deprivation’. Partial sleep deprivation occurs when a person sleeps too little for several days or weeks. Total sleep deprivation means being kept awake for at least 24 hours. As we now know, our bodies have a ‘sleep homeostat’ which controls our drive to sleep and if we have a high ‘sleep debt’ the ‘sleep homeostat’ indicates to us that we need more sleep. What we have already learned is that you don’t need to take sleep extra, as your brain does all the work for you by changing your sleep pattern to include more REM sleep to help your body recover.

‘Sleep deprivation’ is the condition of not having enough sleep and can be either chronic or acute. A chronic sleep-restricted state can cause fatigue, daytime sleepiness, clumsiness and weight loss or weight gain. It adversely affects the brain and cognitive functions. However, in a subset of cases sleep deprivation can, paradoxically, lead to increased energy and alertness and enhanced mood.

After only one night of sleep deprivation, people have episodes of sleep lasting a few seconds known as ‘microsleeps’. I would presume that we have all experienced a ‘microsleep’ at some stage in our lives where we ‘zone out’ and start ‘daydreaming’ for no apparent reason. Microsleeps can be somewhat embarrassing but in some situations can be deadly. If we take the example of driving, have you ever been sat in the car on the way to work and have realized that you are driving on autopilot? This is because you have made the journey so many times and your brain (though concentrating on the road subconsciously) is not fully alert and this poses a risk to safety. A large number of workplace accidents and driving related incidents occur due to fatigue and the inability to make important judgments. A recent study on drivers showed that those who were sleep deprived, compared to those who had an adequate night’s sleep, were 8 times more likely to be involved in an accident. Other research suggests that 30% of drivers will fall asleep at the wheel at some point in their life. That is a serious concern. But what is more concerning is the same research also suggests that if you have two hours less sleep than what you are normally used to, it is the equivalent of being over the legal drink-drive limit.

Some of the other consequences of sleep deprivation are as follows:

- Damages overall work performance
• Reduces concentration levels
• Reduces the efficiency of the immune system leading to higher rates of illness and infection.
• Raises the levels of cortisol (stress hormone) which is linked to brain cell damage
• Safety issues and subsequent accidents
• Impaired reaction time, judgment and vision
• Problems with information processing and short term memory.

It is important to realise that sleep deprivation has many more consequences than simply mildly impaired cognitive function. In fact it is estimated that people who get less than 6 hours per night have a 50% increased chance of developing or dying from heart disease or similar condition and a 12.5% increased chance of dying before the age of 65.

Sleep deprivation can also lead to increased impulsiveness. A tired brain craves things to wake it up and so we turn to medications, caffeine and nicotine to fuel the waking state with stimulants. Then it gets to 11pm and the brain can’t sleep, so we turn to alcohol. Alcohol mildly sedates the body and can be useful to aid the sleep transition. However, because it sedates, it harms the neurological processes occurring during normal sleep. This is short term acute measures, but be weary of using this method long term as it may lead to addiction!

Sleep deprivation is also linked to weight gain. If the brain is not getting the energy it needs for sleep it will often try to get it from food. Running low on rest causes the body to increase the production of ghrelin (the hunger hormone) and so the brain craves carbohydrates and sugary foods. Poor sleep can also mess with leptin levels and so when you’re not sleeping properly you tend to eat more of what you’re craving because you’re not feeling the signals to stop eating.

As a point of note, neuroscientists have now made a direct link between sleep deprivation and certain mental health conditions. It has been proven that sleep deprivation precedes certain types of mental illness. People with a predisposition to develop depression and bipolar disorders have been found to already have a sleep abnormality prior to their formal mental health diagnosis. It has also been proven that sleep disruption also exacerbates certain mental health conditions.

**Napping**

Winston Churchill famously napped and was quoted as saying “you must sleep sometime between lunch and dinner and no halfway measures. Take off your clothes and get into bed. That’s what I always do.” Now, I’m not recommending that you go to the extreme of getting naked and sleeping during your lunch hour, but a short nap has been proven to be useful in getting the sleep that the body craves, providing it is done in the right way.

After a bad night’s sleep, naps can be useful to recharge the batteries. However, what is important to keep in mind if you’re planning on using napping as a method is that the length of time you nap for should be strictly controlled. Having a 5-10 minute power nap once or twice a day or a short nap
for up to 30 minutes can improve cognitive functioning and help you get through the day. What we know is that if naps are extended beyond 30 minutes we begin to enter the deep sleep stage meaning when we wake up we will feel groggy and your level of performance will be significantly reduced.

Over 500 years ago, Leonardo de Vinci used a 20 minute napping method as the paint he used for large murals was not allowed to dry for more than 30 minutes and so he had to keep going until the masterpiece was completed.

I am going to use an eating analogy to explain this further. The longer we go without food, the hungrier we get, and the same principle applies for sleep. If we have a large breakfast, that will impact on our hunger at lunchtime so we may miss that meal but we will be hungry at teatime and so we eat again. But if we had a buffet at lunch, that is likely to affect our hunger at teatime. Compare this to sleeping, and if we indulge in a large nap at lunchtime, it is likely that we are not going to be able to sleep later in the day.

**Disrupting Biological Rhythms: ‘Shift Working’ and ‘Jet Lag’**

If you remember right back at the start of Part 1, we explored the Circadian Rhythm and how that regulates and influences our sleep patterns. Sometimes the social implications of our lives such as working late or travelling can interfere with the body’s internal clock, which affects when we sleep and both quality and quantity of sleep.

First of all, let’s look at shift working. Shift work is any work that takes place outside normal daytime hours (7am-7pm) and this subsequently affects the biological clock. Our internal clock is not designed for activities outside these times and so our sleep is disrupted. Night work is the most disruptive kind of shift work. When you consider the shift worker themselves, their body clock does not shift to the demand of working at night and is locked onto the same light-dark cycle as the rest of us. So when the shift worker gets home at the end of their shift to try and sleep during the day, desperately tired, their body clock is saying “it’s time to wake up”, and so, as a result, their sleep quality is poor. Unfortunately, for the shift worker, it is not just sleep that is affected. A study back in 1993 showed that divorce rates were 60% greater amongst shift workers and this may be due to social disruption of working unsociable hours.

Shift workers are fighting their natural sleep-wake pattern meaning they find it hard to stay alert at night and more difficult to sleep during the day. As a result, the mind and body does not have time to rejuvenate properly and the World Health Organisation (WHO) has identified ‘shift work’ as a big cause of occupational cancer.

**Top tips to combat the effect of shift working include:**

- Taking short breaks throughout the shift to ensure you remain alert
• Introduce a buddy system ensuring that you talk to co-workers to keep you alert and spot signs of drowsiness.
• Try to exercise during breaks
• Try to eat 3 normal meals a day and try not to snack at irregular times
• Don’t overuse caffeine – it will be more useful when you need it.

A psychologist named Bambra suggested that the best shift work cycle is one that follows the logical order of the day – for example - a morning shift for one week, an afternoon shift on the second week and an evening shift on the third week - applying a rapidly or weekly rotating shift cycle, moving back one shift every time. However, another psychologist named Czeisler discovered that it takes approximately 16 days to adjust to a new shift pattern and so recommends that the shift rotation period be extended from 7 days to 21 days and that shifts rotate forward in time taking advantage of the body’s personal preference for a slightly longer than 24 hour cycle. This results in increased productivity and a decrease in the number of errors leading to accidents. Employers who use a ‘phase delay’ schedule are more likely to benefit from their employees.

Now let’s focus on ‘jet lag’. Jet lag or ‘desynchronosis’ is a physiological condition which results from the alterations to the body’s circadian rhythm caused by rapid changes in time zones as a result of air travel. The condition of jetlag may last for several days before the traveller is fully adjusted to the new time zone and a recovery period of one day per time zone crossed is a suggested guideline. Since your body is still operating on the time you left from, your melatonin levels will be off causing a disruption in your circadian rhythms and making you mentally fatigued, depressed, irritable and have problems sleeping. Humans are not designed to be awake at night and asleep during the day and this causes a conflict with the circadian rhythm.

Flying from west to east causes the greatest problems as we experience what is known as a ‘phase advance’ where our body clock is shifted backwards, meaning we go to bed earlier. The body finds it much harder to adjust to a shorter day than a longer one. If we fly the opposite direction (east to west) we experience a longer day and the body is required to stay up later than it is used to, however, it can cope with this change easier. This is known as a ‘phase delay’.
Jet lag occurs because melatonin production remains on the same day-night pattern of the home country for several days resulting in a conflict between the internal body clock and the external stimuli telling you to stay awake or go to sleep. The sleep-wake cycle is set on where you left (telling you one time), but the light cues are trying to tell us it is a different time of day.

**Phase Delay:** Flying from West to East creates a 'phase delay' as the body clock shifts backwards and we go to bed earlier.

**Phase Advance:** Flying from East to West creates a 'phase advance' where the body clock shifts forwards and we are forced to stay up later.
Part 2

Common sleep disorders and sleep problems
Introduction to Sleep Disorders

Sleep problems and disorders are very common and in fact it is estimated that approximately 1/3 of the population will be affected by one in their life, with the current annual cost of dealing and managing sleep problems standing at approximately £40 billion.

A sleep disorder – technically known as a ‘somnipathy’ or ‘dyssomnia’ – is any medical disorder which negatively affects a person’s healthy sleep patterns. Usually this involves less than adequate sleep to the extent that this may interfere with the person’s normal physical, mental and emotional functioning, but excessive sleep, can also be a problem. There are at least 80 different sleep disorders that have been identified, the most common and well-known being insomnia. Sleep problems can be broken down into two distinct types – ‘Parasomnias’ and ‘Sleep Disorders’ – and we will explore some of the most common ones in this part of the booklet.

Typically, sufferers may complain of difficulty getting to sleep, difficulty staying asleep, intermittent wakefulness during the night, early morning awakening, or combinations of any or all of these. It should be noted that the vast majority of those afflicted with sleep disorders (even some of the more garish and extreme ones) are not suffering from unaddressed psychological problems as was once assumed, but have healthy psychological profiles similar to the rest of the population.

Sometimes, being the room- or bed-partner of someone with a sleep disorder can be a kind of sleep disorder in itself. Snoring, sleep apnea, restless legs syndrome and periodic limb movement disorder are often the worst offenders here, but it can be highly disruptive of sleep to live with someone who regularly suffers parasomnias like night terrors, sleep-walking etc. Even having to be on constant alert to care for an infant, or a sick or elderly person, has earned its own disorder label: caretaker insomnia.

Sleeping disorders can cause significant health problems and often remain undiagnosed among sufferers. Insomnia, sleep apnea and sleepwalking are just a few of the conditions which contribute to sleep deprivation and lead to an individual not feeling refreshed and restored when they wake up. Sleep is an essential component of good health and should be rated as important as exercise and diet. As we now know, inadequate sleep can result in fatigue, depression; concentration problems, illness and injury.
The difficulty with diagnosing sleep disorders is because people often don't know the quality of the sleep they are getting. Six hours of quality sleep could be enough to have a person feeling rested the next day, but having eight to ten hours of restless sleep may leave you feeling exhausted after you awaken and for the rest of the day. Of course this can be exacerbated if you have young children or work shifts which change your regular sleep patterns.

There are a plethora of medical and counselling websites and self-help books which deal with sleep disorders in great detail. This section simply aims to briefly describe some of the more common sleep problems and disorders. In any instance where you may be suffering from a long-standing sleep problem, it is recommended that you consult your GP or a qualified sleep medicine professional for treatment options.

**What Causes Sleep Problems?**

Sleep problems can be caused by various factors. Although causes may differ, the end result of all sleep disorders is that the body’s natural cycle of slumber and daytime wakefulness is disrupted or exaggerated. Factors that can cause sleep problems include:

- Physical disturbances such as pain e.g. arthritis
- Medical issues such as breathing difficulties e.g. asthma or being overweight
- Psychiatric disorders such as depression and anxiety disorders which tend to keep the alertness centre of the brain active.
- Environmental issues in relation to surroundings such as light and noise.

Short-term or acute insomnia can be caused by life stresses such as job loss or change, death of a loved one, or moving home, illness, or environmental factors, such as light, noise, or extreme temperatures. Long-term or chronic insomnia (insomnia that occurs at least three nights a week for a month or longer) can be caused by factors such as depression, chronic stress, and pain or discomfort at night. Other factors that can interfere with sleep include:

- **Genetics** - Researchers have found a genetic basis for narcolepsy, a neurological disorder of sleep regulation that affects the control of sleep and wakefulness.
- **Night shift work** - People who work at night often experience sleep disorders, because they cannot sleep when they start to feel drowsy. Their activities run contrary to their biological clocks and disrupt sleep routines.
- **Medications** - Many drugs can interfere with sleep, such as certain antidepressants, blood pressure medications, and over-the-counter cold medicine. Some people turn to alcohol to help them sleep, however, alcohol is a sedative and so suppresses certain stages of the sleeping process meaning sleep doesn't achieve its physiological functions. Also, the regular use of sleeping pills reduced their efficiency to work on the individuals and use of both pills and alcohol to achieve sleep in the long run can potentially lead to addiction and/or dependency.
• **Aging Process** - About half of all adults over the age of 65 have some sort of sleep disorder. It is not clear if it is a normal part of aging or a result of medications that older people commonly use.

**Parasomnias**

'Parasomnias' are a category of sleep disorders that involve abnormal movements, behaviours, emotions, perceptions, and dreams that occur while falling asleep, sleeping, between sleep stages, or during arousal from sleep. Most parasomnias are dissociated sleep states which are partial arousals during the transitions between wakefulness and NREM sleep, or wakefulness and REM sleep. Some of the most common parasomnias are explained in more detail below.

**Bedwetting (Nocturnal Enuresis)**

Bedwetting is a condition that mainly affects young children. While bedwetting can be a symptom of an underlying disease, a large majority of children who wet the bed have no underlying disease that explains their bedwetting. In fact, an underlying condition is identified in only about 1% of children who routinely wet the bed. That does not mean that the child who wets the bed can control it or is doing it on purpose. Children who wet the bed are not lazy, willful, or disobedient. Bedwetting is most often a developmental issue.

There are 2 types of bedwetting - primary and secondary. Primary means bedwetting that has been ongoing since early childhood without a break. A child with primary bedwetting has never been dry at night for any significant length of time. Secondary bedwetting is bedwetting that starts up after the child has been dry at night for a significant period of time, at least 6 months.

**Sleepwalking (Somnambulism)**

Sleepwalking is a disorder that causes people to get up and walk while they’re asleep. It usually happens when a person is going from the deep stage of sleep to a lighter stage or into the awake state. The sleepwalker can’t respond during the event and usually doesn’t remember it. In some cases, they may talk and not make sense. Sleepwalking mostly happens in childhood, typically between the ages of 4 and 8, but adults can do it too.

When someone sleepwalks, they might quietly walk around their room or they might run or attempt to "escape." It is not unusual for people to urinate in cupboards whilst sleepwalking and it can be harmful if the person ventures outdoors or into harm whilst sleepwalking.

Typically, the sleepwalker’s eyes are open with a glassy stare as they roam the house. When you get them back to bed without waking them up, they usually won’t recall the event. Older children may wake up more easily at the end of a sleepwalking episode.
Brief episodes of sleepwalking are often caused by stress or a disturbance in your usual sleep pattern.

**Nightmares and Night Terrors**

While it’s true that nightmares are more common among children, one out of every two adults has nightmares on occasion and between 2% and 8% of the adult population is plagued by nightmares.

Nightmares are vividly realistic; disturbing dreams that rattle you awake from a deep sleep. They often set your heart pounding from fear. Nightmares tend to occur most often during rapid eye movement (REM) sleep, when most dreaming takes place. Because periods of REM sleep become progressively longer as the night progresses, you may find you experience nightmares most often in the early morning hours.

The subjects of nightmares vary from person to person. There are, though, some common nightmares that many people experience. For example, a lot of adults have nightmares about not being able to run fast enough to escape danger or about falling from a great height. If you’ve gone through a traumatic event, such as an attack or accident, you may have recurrent nightmares about your experience.

Although nightmares and night terrors both cause people to awake in great fear, they are different. Night terrors typically occur in the first few hours after falling asleep. They are experienced as feelings, not dreams, so people do not recall why they are terrified upon awakening. Nightmares in adults are often spontaneous. But they can also be caused by a variety of factors and underlying disorders.

Some people have nightmares after having a late-night snack, which can increase metabolism and signal the brain to be more active. A number of medications also are known to contribute to nightmare frequency. Drugs that act on chemicals in the brain, such as antidepressants and narcotics, are often associated with nightmares. Non-psychological medications, including some blood pressure medications, can also cause nightmares in adults.

Night terrors may be caused by stressful and/or traumatic life events, fever, sleep deprivation and medications that affect the brain but are usually influenced by frightening experiences that have occurred during the day. Unlike nightmares, most people do not recall a dream after a night terror episode, and they usually do not remember the episode the next morning. A typical night terror episode usually begins approximately 90 minutes after falling asleep. Most episodes last only a few minutes, but they may last up to 30 minutes before the person relaxes and returns to normal sleep.

**Sleep Paralysis**

Sleep paralysis is a feeling of being conscious but unable to move. It occurs when a person passes between stages of wakefulness and sleep. During these transitions, you may be unable to move or speak for a few seconds up to a few minutes. Some people may also feel pressure or a sense of choking. During an episode, a person may hear, feel, or see things that are not there, which often results in
fear. Episodes generally last less than a couple of minutes and may occur as a single episode or be recurrent. The condition can be triggered by sleep deprivation, psychological stress, or abnormal sleep cycles. The underlying mechanism is believed to involve a dysfunction in REM sleep.

Sleep paralysis usually occurs at one of two times. If it occurs while you are falling asleep, it’s called ‘hypnagogic’ or ‘predormital sleep paralysis’. If it happens as you are waking up, it’s called ‘hypnopompic’ or ‘postdormital sleep paralysis’. Sleep researchers conclude that, in most cases, sleep paralysis is simply a sign that your body is not moving smoothly through the stages of sleep. Rarely is sleep paralysis linked to deep underlying psychiatric problems.

Sleep paralysis affected both males and females equally and up to as many as four out of every 10 people may have sleep paralysis. This common condition is often first noticed in the teen years but men and women of any age can have it.

**Sleep talking (Somniloquy)**

Sleep talking is a sleep disorder defined as talking during sleep without being aware of it. Sleep talking can involve complicated dialogues or monologues, complete gibberish or mumbling. The good news is that for most people it is a rare and short-lived occurrence. Anyone can experience sleep talking, but the condition is more common in males and children. It is estimated that approximately 4% of the UK adults sleep talk on a regular basis.

Sleep-talkers are not typically aware of their behaviours or speech; therefore their voices and the type of language they use may sound different from their wakeful speech. Sleep talking may be spontaneous or induced by conversation with the sleeper. Little is known about the content of the sleep talking: some talking makes no sense at all and some of it may relate to past events, experiences, and relationships that no longer have current relevance or emotional impact. Modern sleep science and the law accept that sleep talking is not a product of a conscious or rational mind and is therefore usually inadmissible in court.

Although not physically harmful, sleep talking can cause embarrassment and can annoy a bed partner, roommate, or be disruptive in group-sleeping situations. Because of this sleep talkers are sometimes afraid to sleep away from home and can cause insomnia in a person sleeping nearby.

**Teeth Grinding (Sleep Bruxism)**

Most people probably grind and clench their teeth during sleep from time to time. Occasional teeth grinding, medically called bruxism, does not usually cause harm, but when teeth grinding occurs on a regular basis, the teeth can be damaged and other complications can arise, such as jaw muscle discomfort or pain.
Although the causes of bruxism are not really known, several factors may be involved. Stressful situations, an abnormal bite, and crooked or missing teeth appear to contribute. There is also some evidence that sleep disorders such as sleep apnea can cause teeth grinding.

Teeth grinding can be prevented with the use of a mouth guard. The mouth guard, supplied by a dentist, can fit over the teeth to prevent teeth from grinding against each other. Stress reduction and other lifestyle modifications, including the avoidance of alcohol and caffeine, may also be helpful.

**Sleep Disorders**

Sleep disorders are a group of conditions that affect the ability to sleep well on a regular basis. Sleep disorders, including snoring, sleep apnea, insomnia, sleep deprivation, and restless legs syndrome, are common. Whether they are caused by a health problem or by too much stress, sleep disorders are becoming increasingly common. Most people occasionally experience sleeping problems due to stress, hectic schedules, and other outside influences. However, when these issues begin to occur on a regular basis and interfere with daily life, they may indicate a sleeping disorder. Depending on the type of sleep disorder, people may have a difficult time falling asleep and may feel extremely tired throughout the day. The lack of sleep can have a negative impact on energy, mood, concentration, and overall health. Some of the most common sleep disorders are explained in more detail below.

**Insomnia**

Insomnia is the most common type of sleep disorder where the person has poor quality sleep, not enough sleep and wakes up for long periods during the night. It is the inability to fall or remain asleep over a period of several nights and may be due to stress, anxiety, hormonal changes, lifestyle, environmental factors, physical ailments, or psychiatric illness.

**People with insomnia have one or more of the following symptoms:**

- Difficulty falling asleep
- Waking up often during the night and having trouble going back to sleep
- Waking up too early in the morning
- Feeling tired upon waking

**There are also two types of insomnia:**

- **Primary insomnia**: This is where the person is having sleep problems that are not directly associated with any other health condition or problem.
- **Secondary insomnia**: This is where the person is having sleep problems because of something else, such as a health condition (like asthma, depression, arthritis, cancer, or heartburn); pain; medication they are taking; or a substance they are using (like alcohol).
It has been suggested one in ten people suffer from some form of insomnia with the most common causes being stress, medication and other stimulants, pain, anxiety and depression. People who experience insomnia for more than one month are considered chronic sufferers but many experience the condition for short periods of time during stressful events. The most likely groups of sufferers are older people with ill health and shift workers, due to the constant changing of the sleep patterns. Women are also twice as likely to suffer from insomnia and this has been related to higher rates of anxiety and depression.

Treatment will depend on the cause of the insomnia. Poor sleep habits can be mitigated through lifestyle changes and if the root cause is anxiety of depression, cognitive behavioral therapies (CBT) can also alleviate the condition. Importantly though, sleeping pills and other prescribed medication are only temporary cures and their effectiveness will decrease over time.

Insomnia can be used as a clue about a person’s mental health. Falling asleep easily but waking up a couple of hours later is a sign of anxiety, whereas, waking up between 4am-6am is a sign of depression.

Interestingly, there is an extremely rare genetic disorder known as ‘fatal familial insomnia’ which only affects 100 people worldwide. This condition usually begins between the ages of 35 and 60 and leads to their death a few months later.

**Obstructive Sleep Apnoea**

Obstructive sleep apnea happens when something partly or completely blocks your upper airway during sleep, that makes the diaphragm and chest muscles work harder to open the obstructed airway and pull air into the lungs. Breathing usually resumes with a loud gasp, snort, or body jerk.

Sleep apnea can be a very dangerous condition which has been linked to heart disease, high blood pressure and strokes. It is characterised by pauses in breathing or instances of shallow or infrequent breathing during sleep, commonly caused by snoring. When you are not breathing, your oxygen levels fall and this causes your blood pressure to go up. Unfortunately when you are breathing normally while awake, the problem of low oxygen levels continues and therefore your blood pressure remains high during a whole 24 hour sleep-wake cycle. Billy Connolly, the Scottish comedian and actor, is a high-profile sufferer of sleep apnea and tells some very funny stories about trying to cure the problem, but for people unaware they are suffering this chronic condition, the results can be tragic.

Sleep apnea affects approximately 180,000 people in the UK and men are eight times more likely to have the condition. It is also more prevalent in people who are either obese or overweight and smoking and alcohol consumption increase the risk of developing the condition. During sleep, the persons breathing pauses or stops for approximately 10-20 seconds or more, up to 20-30 times an hour. The person may snore very loudly and sometimes stop breathing for short periods throughout the night. The sleeper wears a special mask over nose and mouth during sleep whilst a
breathing machine pumps a constant stream of air to keep the airway open. Without the mask these individuals may stop breathing up to 600 times a night and must wake up for a microsecond each time to resume normal breathing. The condition can also reduce the flow of oxygen to vital organs and cause irregular heart rhythms.

Most health professionals will ask a patient to participate in an overnight sleep study to determine if they are suffering this condition. There are several treatments for sleep apnea with the two most common being nasal continuous positive airway pressure (CPAP) or an Oral Appliance. The introduction of either one of these treatments can lead to a person living a normal and healthy life.

**Restless Leg Syndrome (RLS)**

RLS (or Willis-Ekbom Disease as it is also known) is a disorder of the part of the nervous system that causes an urge to move the legs. Because it usually interferes with sleep, it also is considered a sleep disorder. It is estimated that approximately 3.9% of the UK population suffer from this sleep related motor disorder, and it is usually more common in women.

People with restless legs syndrome have uncomfortable sensations in their legs (and sometimes arms or other parts of the body) and an irresistible, involuntary urge to move their legs to relieve the sensations. The condition causes an uncomfortable, "itchy," "pins and needles," or "creepy crawly" feeling in the legs. The sensations are usually worse at rest, especially when lying or sitting. The severity of RLS symptoms ranges from mild to intolerable. Symptoms can come and go and severity can also vary. The symptoms are generally worse in the evening and at night. For some people, symptoms may cause severe nightly sleep disruption that can significantly impair their quality of life.

The cause of RLS is unknown and so is difficult to treat. Research suggests that having extra magnesium, vitamin B, vitamin E and iron may help and eating foods such as wholegrain, nuts, seeds and pulses.

**Narcolepsy**

Narcolepsy is a chronic neurological disorder that is caused by the brain’s inability to regulate sleep-wake cycles normally. People with narcolepsy experience excessive daytime sleepiness and intermittent, uncontrollable episodes of falling asleep during the daytime. These sudden sleep attacks may occur during any type of activity at any time of the day.

In a typical sleep cycle, we initially enter the early stages of sleep followed by deeper sleep stages and ultimately REM sleep after about 90 minutes. For people suffering from narcolepsy, REM sleep occurs almost immediately in the sleep cycle, as well as periodically during the waking hours. It is in REM sleep that we can experience dreams and muscle paralysis - which explains some of the symptoms of narcolepsy – in particular, cataplexy (full body paralysis).
The cause of narcolepsy is not known and unfortunately it cannot be cured, but may be treated with some medications. However, neuroscientists have made progress towards identifying genes strongly associated with the disorder. These genes control the production of chemicals in the brain that may signal sleep and wakefulness cycles. Some neuroscientists think narcolepsy may be due to a deficiency in the production of a chemical called ‘hypocretin’ by the brain. In addition, researchers have discovered abnormalities in various parts of the brain involved in regulating REM sleep, and these abnormalities apparently contribute to symptom development.

**Hypersomnia (Daytime Sleepiness)**

Hypersomnia, which refers to either excessive daytime sleepiness or excessive time spent sleeping, is a condition in which a person has trouble staying awake during the day. People who have hypersomnia can fall asleep at any time - for instance, at work or while they are driving. They may also have other sleep-related problems, including a lack of energy and trouble thinking clearly.

**Snoring**

Snoring is a common condition that can affect anyone (approximately 37% of UK adults), although it occurs more frequently in men and people who are overweight. Snoring has a tendency to worsen with age.

Occasional snoring is usually not very serious and is mostly a nuisance for your bed partner. However, if you are a habitual snorer, you not only disrupt the sleep patterns of those close to you, but you also impair your own sleep quality. However, habitual snorers can be at risk for serious health problems, including obstructive sleep apnea. Medical assistance is often needed for habitual snorers (and their loved ones) to get a good night's sleep.

Snoring occurs when the flow of air through the mouth and nose is physically obstructed. Air flow can be obstructed by a combination of factors, including:

- **Obstructed nasal airways** - Some people snore only during allergy seasons or when they have a sinus infection. Deformities of the nose such as a deviated septum (a structural change in the wall that separates one nostril from the other) or nasal polyps can also cause obstruction.
- **Poor muscle tone in the throat and tongue** - Throat and tongue muscles can be too relaxed, which allows them to collapse and fall back into the airway. This can result from deep sleep, alcohol consumption, or use of some sleeping pills. Normal aging causes further relaxation of these muscles.
- **Bulky throat tissue** - Being overweight can cause bulky throat tissue.
- **Long soft palate and/or uvula** - A long soft palate or a long uvula (the dangling tissue in back of the mouth) can narrow the opening from the nose to the throat. When these structures vibrate and bump against one another the airway becomes obstructed, causing snoring.
Alcohol increases snoring as it relaxes tissue at the back of the throat causing it collapse into the airway and vibrate more easily.

**REM Behaviour Disorder**

In a person with REM sleep behavior disorder (RBD), the paralysis that normally occurs during REM sleep is incomplete or absent, allowing the person to "act out" their dreams. RBD is characterized by the acting out of dreams that are vivid, intense, and violent. Dream-enacting behaviors include talking, yelling, punching, kicking, sitting, jumping from bed, arm flailing, and grabbing. An acute form may occur during withdrawal from alcohol or sedative-hypnotic drugs. RBD is usually evident in middle aged and elderly people and is more common in men.

In a rare case back in 2003, Jules Lowe of Manchester attacked and killed his 82 year old father while sleepwalking. Lowe had a history of sleepwalking, was under great stress and had no motive to kill his father. Sleep expert Dr Irshaad Ebrhaim testified that tests showed Lowe to be sleepwalking at the time of the attack and in 2005 Lowe was acquitted.

**How are sleep disorders diagnosed?**

It’s important to receive a diagnosis and treatment right away if you suspect you might have a sleep disorder. When left untreated, the negative effects of sleep disorders can lead to further health consequences. They can also affect your performance at work, cause strain in relationships, and impair your ability to perform daily activities.

In diagnosing sleep problems, your GP will perform a physical examination and gather information about your symptoms and medical history. They could also order various tests to be conducted including:

- **Polysomnography** – a sleep study that evaluates oxygen levels, body movements and brain waves to determine how they disrupt sleeps.
- **Electroencephalogram** – a test that assesses electrical activity in the brain and detects any potential problems associated with this activity.
- **Genetic blood testing** – a blood test commonly used to diagnose conditions such as narcolepsy and other underlying health conditions that might be causing sleeping problems.

These tests can be crucial in determining the right course of treatment for sleep disorders.

**How are sleep disorders treated?**

If you are suffering from a sleep disorder, it is important you consult your GP or a qualified Sleep Medicine Professional in order to seek treatment. There are significant ongoing health problems which can result from chronic cases and you can end up causing injury to yourself and other people.
Treatment for sleep disorders can vary depending on the type of problem and underlying cause. However it generally includes a combination of medical treatments and lifestyle changes.

- **Medical Treatments** – including sleeping pills, melatonin supplements, allergy and cold medications, medications for any underlying health issues, breathing device or surgery (usually for sleep apnea) and a dental guards (for teeth grinding).

- **Lifestyle Changes** – including:
  - Incorporating more fish and vegetables into your diet
  - Reducing sugar intake
  - Reduce stress and anxiety by exercising
  - Creating and sticking to a regular sleep schedule.
  - Drinking less water before bedtime.
  - Limiting caffeine intake, especially in the late afternoon and evening.
  - Decreasing tobacco and alcohol consumption.
  - Eating smaller, low carbohydrate meals before bedtime.

We will explore ‘sleep hygiene’ and techniques to promote better sleep in part 3 of this booklet.
Part 3

Sleep hygiene including and methods and techniques for dealing with insomnia and other sleep related problems
What is Sleep Hygiene?

Now we have explored what sleep is and the subsequent sleep problems that can potentially result, we can start to look at ways to deal with some of these issues, along with some useful hints and tips to promote good sleep.

‘Sleep hygiene’ is the recommended behavioral and environmental practice that is intended to promote better quality sleep. This recommendation was developed in the late 1970s as a method to help people with mild to moderate insomnia. Clinicians assess the sleep hygiene of people who present with insomnia and other conditions, such as depression, and offer recommendations based on the assessment. Sleep hygiene recommendations include establishing a regular sleep schedule, using naps with care, not exercising physically or mentally too close to bedtime, limiting worry, limiting exposure to light in the hours before sleep, getting out of bed if sleep does not come, not using bed for anything but sleep and sex, avoiding alcohol as well as nicotine, caffeine, and other stimulants in the hours before bedtime, and having a peaceful, comfortable and dark sleep environment. We will explore all of these concepts individually within part 3 of this booklet.

When we talk about ‘sleep hygiene’ we are looking at five specific areas, all of which contribute in some way to how well, or in most cases, how poorly we sleep, and simple adjustments can improve both the quality and quantity of sleep we can achieve:

1. Diet and Substance Intake
2. Sleeping Environment
3. Exercise and Activities
4. Behaviours
5. Thoughts

FACTOR 1: Diet and Substance Intake

A number of foods and substances have been found to disturb sleep, due to stimulant effects or disruptive digestive demands. Avoiding nicotine, caffeine (including coffee, energy drinks, soft drinks, tea, chocolate, and some pain relievers), and other stimulants in the hours before bedtime is recommended by most sleep hygiene specialists, as these substances activate neurobiological systems that maintain wakefulness. It is best not to indulge in these substances after lunch if possible.

Alcohol near bedtime is frequently discouraged by clinicians, because, although alcohol can induce sleepiness initially, the arousal caused by metabolizing alcohol can disrupt and significantly fragment sleep. Alcohol mildly sedates the body and can be useful to aid the sleep transition. However, because it sedates, it harms the neurological processes occurring during normal sleep. The effects of alcohol on the body wear off quickly and this leads to increased amounts of light sleep during the second half of the night. The use of alcohol to aid sleep is a short term acute measure, but
be weary of using this method long term as it may lead to addiction. Alcohol is also a diuretic which may mean we need to go to the toilet more during the night which disrupts our sleep and it also dehydrates the body meaning sleep becomes fragmented. Similarly, limit the intake of any liquids before bedtime to prevent interruptions due to urination.

Smoking tobacco products (which contain the stimulant nicotine) before bed is also thought to reduce one’s quality of resting by decreasing the time spent in deep sleep, leading to sleep fragmentation and nocturnal restlessness. It is therefore advised that if you smoke and experience sleep difficulties, try and have your last cigarette at least 4 hours before bedtime.

Both consumption of a large meal just before bedtime, requiring effort to metabolise it all, and hunger have been associated with disrupted sleep. It is recommended that you try and eat your main meal 2-3 hours before bed or alternatively, eat a light snack before bedtime. However, don’t go to bed hungry either as this may lead to early waking and concentration on a rumbling stomach.

It is recommended that you consume foods that are rich in the amino acid tryptophan, such as bananas, dates, nuts, butters, tuna, turkey, yogurt and milk, as these are useful in promoting the production of the sleep hormone – melatonin – which will subsequently aid the sleeping process. And remember not to eat cheese before bed…and yes, that is true. Cheese (along with other foods such as chocolate, pickles and tomatoes) contain tyrosine which causes the body to produce dopamine which in turn stimulates the brain and keeps it active.

Finally, avoid taking depressant drugs. Although these promote sleep, they reduce the amount of REM sleep achieved. It is always worth consulting with your GP or medical practitioner if you believe any of the medications you are taking may be subsequently affecting your sleep.

**FACTOR 2: Sleeping Environment**

Arranging a sleep environment that is quiet, very dark, and cool is recommended. Nuisance noises, light, and uncomfortable temperatures have been shown to disrupt continuous sleep. As we explored during part 1 of this booklet, light regulates the internal body clock and so bright lights before bed can trick the brain into thinking that it is in fact daytime and so the alertness centre of our brain keeps us awake and reduces the person’s drive to sleep. It is therefore recommended that you reduce light exposure at least 30 minutes before bed. However, what is interesting is that for most of us, one of the last things we will do before bed is brush our teeth in a brightly lit bathroom. So ensure that you block out as much external light as possible, for example, by means of blackout curtains/blinds and eliminate, prevent yourself from using electronic devices (which emit blue light and signal to the brain to stop producing melatonin) before you go to bed and if you have to get up in the night, resist the temptation to put on a light. Then in a morning when you wake, it is advised to obtain at least 30 minutes of sunlight shortly after arising as this will synchronise the body clock to the new day.
Another recommendation that is frequently made, though less studied, includes selecting comfortable mattresses, bedding, and pillows. It is important to get a mattress that suits you and if you have a tendency to steal the duvet in the night, make sure you get two. If you can bend your pillows in half that indicates that the pillow is dead and needs replacing. Men have tendency to keep the same pillows for long periods of time and if they are not suitable, then long-standing sleep problems may persist until these are replaced accordingly.

Eliminating a visible bedroom clock to prevent us focusing on the time passing when we are trying to fall asleep is another recommendation that is frequently made. Human beings have an innate tendency to want to know the time of day at all times, and that includes during the night. If you are a frequent clock watcher, it is advised to either eliminate alarm clocks from the bedroom or turn the clock faces away from you so they cannot be seen. When we wake in the middle of the night, we check the clock and subconsciously calculate how much time we have left in bed before we have to get up. This leads to worry and a tendency to clock watch for the rest of the night. ‘Clock watching’ only creates anxiety in relation to the fact that we are awake and cannot sleep for whatever reasons.

Finally, don’t allow pets to sleep in the same room as you. Most pets are either nocturnal or have different sleep-wake patterns to humans and so they are awake when we are trying to sleep which may prevent sleep from being achieved.

It is important to associate the bedroom with calm, relaxation and sleep and make it a haven for sleep. If we associate the bedroom with not sleeping, we will not sleep. This is known as ‘conditioned insomnia’ and we will explore this further when we look at ‘stimulus control’ in a little while.

**FACTOR 3: Exercise and Activities**

Exercise is an activity that can facilitate or inhibit sleep quality. People who exercise experience better quality of sleep than those who do not, but exercising too late in the day can be activating and delay falling asleep. 20 minutes of gentle aerobic exercise during the day releases endorphins into the body which make us feel good and ultimately sleep better. However, exercise should not be undertaken within 3 hours of bedtime as this stimulates the body and the mind, preventing sleep.

Participating in ‘wind-down activities’ that reduce physiological arousal and cognitive activity will promote falling asleep and so engaging in relaxing activities before bedtime is recommended as this clams the body and mind prior to sleeping. Conversely, continuing important work activities or planning shortly before bedtime or once in bed has been shown to delay falling asleep. Similarly, good sleep hygiene involves minimizing time spent thinking about worries or anything emotionally upsetting shortly before bedtime. Trying purposefully to fall asleep may induce frustration that further prevents falling asleep, so in such situations a person may be advised to get out of bed and try something else for a brief amount of time.
FACTOR 4: Behaviours

Humans are creatures of habit and so by setting regular bedtime routines that can promote sleep. If we have disrupted sleep routines, for whatever reasons, that prevents us from getting to sleep at the time that we are used to and as a result we experience sleep deprivation.

Having a regular sleep-wake pattern, even on a weekend, is really important. When we have an innocent lie in on a weekend, this will throw your body clock out of sync making it crave for extra sleep in the upcoming days to compensate for the sleep it thinks it should have had.

Having a hot bath or shower before bed is also recommended as this increases the core body temperature. Afterwards the body cools down and this induces sleep as this process mimics the temperature changes that occur naturally when the body becomes sleepy.

Other behaviours which are recommended with regards to sleep are to avoid napping during the day where possible, only using the bedroom for sleep, avoiding non-sleeping activities in bed such as work, emails or paperwork and try to avoid serious discussions, arguments or conversations prior to bedtime.

Checking emails, social media before bed get the brain thinking a time when you should be winding down. There is also an expectation on people these days to respond immediately or people are waiting for an immediate response from someone else.

FACTOR 5: Thoughts

Worrying about sleep increases the tension in the body making it harder for us to get to sleep. Negative thoughts such as “I will never get enough sleep”, “I need 8 hours of sleep to function” and “I will be too tired to perform well at work tomorrow” are not useful and in no way will help you get to sleep. Other thoughts such as “Everyone else sleeps better than me” are just false statements as we now know that a large number of people (approximately one third) struggle to get good sleep. Using positive self-talk techniques and verbally giving yourself permission to switch off, for example, “Now I am going to switch off, everything can wait until tomorrow” are useful ways of dealing with unwanted thoughts which may prevent us sleeping. These sorts of techniques, which are similar to Cognitive Behavioural Therapies (CBT), take some time to practice and then next few sections will look in more detail at some techniques which you may find useful.

Using Sleep Diaries

Using a sleep diary (like the one shown on figure 6 below) is a good way of assessing how much sleep you are getting and allows you to identify certain aspects of your sleep hygiene and bedtime routines which may be contributing to your lack of sleep.
Please note that if you are going to use a sleep diary, it is best to complete it 20 minutes after waking. This is because ‘sleep inertia’ – the feeling of ‘not being quite it’ - where we are dazed and sluggish because of a less than smooth transition from sleep to wakefulness, may affect how we perceive our sleep has been. It is never a good idea to evaluate your sleep during this period as the ‘sleep inertia’ may influence it.
**Figure 6: Example of a Sleep Diary template**

<table>
<thead>
<tr>
<th>Date</th>
<th>How you slept?</th>
<th>Bed Time</th>
<th>Time to Sleep</th>
<th>Wake in Night</th>
<th>Wake up in morning</th>
<th>Total sleep</th>
<th>Food and Drink</th>
<th>Temp, lights, noise etc.</th>
<th>Activity before bed</th>
<th>Notes</th>
<th>How did you feel?</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/01/18</td>
<td>7/10</td>
<td>11:00pm</td>
<td>20 minutes</td>
<td>Once (toilet)</td>
<td>7.30am</td>
<td>8 hrs 10</td>
<td>Heavy dinner, milk before bed</td>
<td>15°C, windows closed, felt a bit hot</td>
<td>Watched TV</td>
<td>Missed usual walk at lunch</td>
<td>8/10 – bit sleepy on the bus to work</td>
</tr>
</tbody>
</table>
Cognitive Behavioural Therapy for Insomnia (CBT-I)

Sleep hygiene is a central component of cognitive behavioral therapy for insomnia (CBT-I). Sleep hygiene recommendations have been shown to reduce or eliminate the symptoms of insomnia in conjunction with CBT-I methods. Cognitive behavioral therapy for insomnia (CBT-I) is a technique for treating insomnia without (or alongside) medications. CBT-I aims to improve sleep habits and behaviours by identifying and changing the thoughts and the behaviours that affect the ability of a person to sleep or sleep well.

The first step in treating insomnia with CBT-I is to identify the underlying causes of the insomnia. People with insomnia should evaluate or have their sleep patterns evaluated and take into account all possible factors that may be affecting the person’s ability to sleep. This would involve keeping a sleep diary or journal (see below) for a couple weeks. The journal will help to identify patterns of thoughts or behaviors, stressors, etc. that could be contributing to the person’s insomnia.

After identifying the possible underlying cause and the factors contributing to insomnia, the person can begin taking steps towards getting better sleep. In CBT-I these steps include sleep hygiene recommendations, stimulus control, sleep restriction, relaxation techniques, cognitive control and cognitive distraction. I have outlined these components to CBT-I below in more detail.

**Stimulus Control**

Generally, for people experiencing difficulties with sleep, spending less time in bed will result in deeper and more continuous sleep. It is therefore recommended to eliminate the use of the bed for any other activities except sleep.

What I mean by this is that cognitively, we begin to associate the bedroom with sleep only. In this instance, we only sleep when we are tired and leave the bedroom if sleep is not achieved within 20-30 minutes. Eventually, after a period of time, we will expect to go to sleep when we enter the bedroom because sleeping has been the sole purpose of that room.

Another example to explain the principle of ‘stimulus control’ further would be home working. If I set my laptop up in the dining room at home I find that I am hungrier as I have created a stimulus that when I am in that particular room, all I do is eat. The pairing of the bedroom and poor sleep will result in automatic association between the two and will evoke conditioned arousal. If we can change this thought, then sleep will automatically occur each time we go to sleep in the bedroom, because our brain is expecting this to happen.

To determine whether your sleep arrangements are adequate try this quick exercise. If you have recently stayed over at a hotel, B&B or another location other than your home, did you sleep better or worse when sleeping somewhere unfamiliar? If you slept better, that may indicate a slight
degree of conditioned arousal as you appear to have negative thoughts towards your usual sleeping place. If not, it may indicate that you have a good set up and sleep routine.

**Sleep Restriction**

Sleep restriction is probably the most controversial step of CBT-I, since it initially involves the restriction of sleep. Insomniacs typically spend a long time in bed not sleeping, which CBT-I sees as creating a mental association between the bed and insomnia. The bed therefore becomes a site of nightly frustration where it is difficult to relax as we have discussed above. Although it is counterintuitive, sleep restriction is a significant and effective component of CBT-I which involves controlling time in bed (TIB) based upon the person’s sleep efficiency in order to restore the drive to sleep and thereby re-enforce the "bed-sleep connection". Sleep Efficiency (SE) is the measure of reported Total Sleep Time (TST), the actual amount of time the person is usually able to sleep, compared with their (TIB). The process is as follows:

- Sleep efficiency = (Total sleep time / Time in bed)
- First, time in bed is restricted to the total sleep time
- Increase or decrease TIB weekly by only 20-30 min
- Increase TIB if SE >90%
- Decrease TIB if SE <80%

This process may take several weeks or months to complete, depending on the person’s initial sleep efficiency and how effective the treatment is for them individually. Daytime sleepiness is a side-effect during the first week or two of treatment, so those who operate heavy machinery or otherwise cannot be sleep deprived should not undergo this process.

**Cognitive Control**

In effect, ‘cognitive control’, is ‘putting the day to bed before you go to bed’. The first stage of this process is to determine a cut off time where you stop all daytime activities such as work. First of all get a notebook with a cover. When we are awake at night we tend to use that time to think – firstly about the days event, then tomorrows events and then onto bigger, broader issues.

This exercise should be done a couple of hours before bedtime and it is important to leave yourself at least 30 minutes to complete the task. You may find this a bit silly at first but I can assure you it is an effective method.

First of all make a note of all your short term thoughts. What I mean by this is to list everything you accomplished today, everything you will achieve tomorrow, everything you have done to deal with the things happening tomorrow and a few thoughts about how the day went.

The next step is to have some ‘constructive worry time’. Write down your biggest worries or concerns, then what you can do about the situation right now (this might be nothing) and finally
write down some actions and as many solutions as possible. A short example is illustrated below to aid your understanding of how this works in practice.

*Figure 7: Example of ‘Cognitive Control’ exercise*

<table>
<thead>
<tr>
<th>Worry/concern</th>
<th>What can I do about that situation right now?</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am not going to finish that piece of work before the deadline</td>
<td>Nothing</td>
<td>Cancel other work commitments</td>
</tr>
<tr>
<td>I forgot to leave Martin a note on his desk</td>
<td>Send him a text now</td>
<td>N/A</td>
</tr>
<tr>
<td>Sue said that she hates Janet because she said some unkind things about her</td>
<td>Nothing</td>
<td>Speak to them both tomorrow</td>
</tr>
</tbody>
</table>

Once you have done this, physically close the cover on your notebook. This is a symbolic gesture that tells us that the day has been put to bed. If you wake up thinking of something you have missed, simply write it in the pad and tell yourself that it is done with for tonight.

**Cognitive Distraction**

If we clear the mind of all thoughts using cognitive control (as explained above), if we are awake at night, we fill that space with unwanted thoughts about of sleep. Therefore we need to give the mind something to concentrate on. Some people like to focus on counting sheep, however, from personal experience; this can be quite ineffective as it is too simple. A better method which I would recommend is to try counting back from 1000 in block of 7. Whether you get the numbers right or wrong doesn’t matter at all. The brain either reaches a point of overload or boredom and so sleep becomes the desired alternative.

**Sleep Conditioning**

Have you ever got part way through a film or book and never finished it because you fell asleep? Have you ever experienced this a few times? What I mean by that is when you watch that particular film or read that particular book you begin to feel sleepy. This is probably because you have conditioned yourself to sleep during this activity. Eventually, if you can do this over a long period of time, it can be used to induce sleepiness. The response can become so strong that simply by touching that certain book will induce sleepiness.
**Paradoxical Intention**

Paradoxical Intention, to me, provides a fascinating insight into the quirkiness of the human mind. To explain what this principle is, I want you to not think about the purple elephant. What are you thinking of? The purple elephant! So the behaviour I asked you not to do, you have automatically done. Now think about the most boring thing you have done on an evening, perhaps watching a boring film or theatre production. You may have told yourself ‘don’t fall asleep’ but the likelihood is that you will have probably nodded off.

So, if we apply this to sleep, try getting into bed as normal, turn off the lights and get everything ready for sleep. However, keep your eyes open letting go of any thoughts about getting off to sleep. Instead, ask yourself to stay awake for just a little bit longer. You will quickly notice that your eyes begin to feel heavy and you may be unable to stop yawning.

Paradoxical intention technique is used as part of CBT-I where the person is struggling to sleep but is advised to remain passively awake, purposely giving up on trying to sleep. The person reduces the effort they spend on trying to sleep and in doing so they sleep easier.

**Sleep scheduling**

This recommendation relates to the timing of sleep. For adults, getting less than 7–8 hours of sleep is associated with a number of physical and mental health deficits, and therefore a top sleep hygiene recommendation is allowing enough time for sleep. It is frequently advised that these hours of sleep are obtained at night instead of through napping, because while naps can be helpful after sleep deprivation, under normal conditions naps may be detrimental to nighttime sleep.

Negative effects of napping on sleep and performance have been found to depend on duration and timing, with shorter midday naps being the least disruptive. There is also focus on the importance of awakening around the same time every morning and generally having a regular sleep schedule.

As we have previously discussed, keeping a set time to wake up and go to sleep each day helps the body clock align itself for regular sleep.

**Relaxation Techniques**

Relaxation promotes sleep by relaxing the muscles and calming the mind. Relaxation can also include light aerobic activities such as walking to clear the mind, yoga and stretching and adopting good body posture. There are a number of other relaxation techniques that can be used in order to promote sleep, including:

- Breathing techniques such as mindfulness and meditation. An example of a breathing exercise on ‘mindfulness for insomnia’ can be found below.
• Use of soothing music such as crashing waves and whale song can help some individuals get to sleep.
• Use of visualisation which involves the person thinking of pleasant things such as lying on a beach in the sun etc. Focusing on one thing at a time will filter out distractions which may be preventing the person from sleeping.
• Use of aromatherapy, such as using smells such as lavender, to naturally relax the body and induce sleep.
• Consider journaling (similar to cognitive control) to write all the things down that you cannot get out of your head. Make a list of the things you are concerned or worried about that might be keeping you up at night and preventing you sleeping.
• Use of ‘Progressive Muscle Relaxation Technique’. An example of a progressive relaxation technique exercise can be found below.

**Jacobson’s Progressive Relaxation Technique – Exercise**

*Edmund Jacobson’s Progressive Relaxation Technique*, which was created in 1920’s, is a technique for learning to monitor and control the state of muscular tension. The technique itself involves deliberately introducing tension into muscle groups in sequence. The tension is then released with attention paid to the contrast between tension and relaxation. This results in the person becoming more aware of their body, in particular the physical sensations that they are experiencing. I have attached some instructions which you may find useful in performing this exercise as a means of relaxation.

 displeased.

**Progressive Muscle Relaxation Instructions:**

You will tense each muscle group vigorously but without straining, and then suddenly release the tension and feel the muscles relax. You will tense each muscle for approximately 10 seconds. If you experience any pain or discomfort at any of the targeted muscle groups feel free to omit that step. Throughout this exercise you may visualise the muscles tensing and then a wave of relaxation flowing over them as you release that tension. It is important that you keep breathing throughout the exercise. Now let’s begin...

Begin by finding a comfortable position either sitting or lying down in a location where you will not be interrupted.

Allow your attention to focus only on your body. If you begin to notice your mind wandering, bring it back to the muscles you are working on.

Take a deep breath in through your abdomen, hold for 10 seconds and then exhale slowly. Again, as you breathe, notice your stomach rising and falling and your lungs filling with air.
As you exhale, imagine the tension in your body being released and flowing out of the body. Again, inhale and exhale and feel your body begin to relax.

First of all, tighten the muscles in your forehead by raising your eyebrows as high as you can. Hold for 10 seconds and then release allowing the tension to fall away.

Now smile widely, feeling your mouth and cheeks tense. Hold for about 10 seconds and then release.

Gently pull your head back as if to look up at the ceiling. Hold for about 10 seconds again before releasing and feeling the tension melting away.

Now clench your fists and hold that position for 10 seconds. Then release.

Now flex your biceps. Feel that build-up of tension. You may even visualise that muscle tightening. Hold for 10 seconds and then release enjoying the feeling of limpness.

Now tighten your triceps by extending your arms out and locking your elbows. Hold for 10 seconds and then release again.

Now lift your shoulders up as if they could touch your ears. Hold for 10 seconds and then quickly release feeling their heaviness.

Tense your upper back by pulling your shoulders back trying to make your shoulder blades touch. Hold again for 10 seconds and then release.

Tighten your chest by taking a deep breath in, hold it for 10 seconds and then exhale blowing out all that tension.

Now tighten the muscles in your stomach by sucking in. Hold for 10 seconds and then release.

Tighten your buttocks. Hold for 10 seconds and then release imagining your hips were falling loose.

Tighten your thighs by pressing your knees together as if you were holding a coin between them. Hold for approximately 10 seconds again and then release.

Now flex your feet, pulling your toes upwards and feeling the tension in your calves. Hold for 10 seconds and then relax, feeling the weight on your legs sinking down.

Curl your toes under tensing your feet. Hold for 10 seconds and release.

Now imagine a wave of relaxation slowly spreading through the body beginning at your head and going all the way down to your feet.

Finally take one last deep breath in and exhale it out slowly.
Mindfulness and Meditation for Insomnia - Exercise

Mindfulness is the psychological process of bringing one’s attention to experiences occurring in the present moment, which can be developed through the practice of meditation and other training. Mindfulness and meditation involves focusing on your breathing and then bringing your mind’s attention to the present without drifting into concerns about the past or future. It helps you break the train of your everyday thoughts to evoke the relaxation response, using whatever technique feels right to you. This method has been used for a wide range of conditions to control worry and has now been used as a method to help people with insomnia or other sleep related conditions. I have attached some instructions which you may find useful in performing this exercise as a means of relaxation.

Mindfulness and Meditation Instructions:

Notice your body lying down, and observe any sensations in the body - tingling, temperature, pressure, coolness, heat, movement, tension, itchiness, heaviness or lightness.

Become aware of the sensations without judging them or fighting them. Relax and keep breathing.

Now rotate your awareness throughout the body, starting with the right thumb. Look for any sensation there. If not, notice the lack of sensation and move on to the index finger, and so on until you have covered the whole hand.

Bring your attention to the wrist, then to your forearm, elbow, upper arm, shoulder, armpit and the right side of body. Keep noticing the sensations.

If thoughts come, acknowledge them and let them go, like clouds floating across the sky.

Now, take your curiosity to your left hand, arm, shoulder and side of the body. Observe what is happening. Simply pay attention and acknowledge the sensations. Do not try to understand why they are happening or where they are coming from.

Keep breathing normally.

Now take your attention to your right buttock and become mindful of the sensations. Move down to your thigh, then knee, calf, shin, ankle, foot and toes.

Similarly trace the sensations down your left side starting with your left buttock.

Relax. If you find tension in any parts, breathe into them and let them dissolve.

Notice the sensations on your back - pressure, coolness, heat, tingling or any kind of movement.
Move to the front of your body and let your attention go to your stomach, to your chest, and then to your neck.

Finally, bring your attention to your chin, cheeks, nose, eyes, eye lids, right brow, left brow, temples, forehead, back of the head, sides, and crown of the head.

Relax. Rest in the awareness. Keep breathing normally.

Scan your body again, but in bigger clusters this time - right arm, left arm, both arms, right leg, left leg, both legs, back, abdomen, chest, neck and head.

Repeat with the whole body as one.

Continue listening to the instructions or scan the body again yourself; starting with the right thumb. Do it as many times as you find helpful.

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**Combatting the effects of jet lag**

We looked at jet lag and its effects back in part 1 of this booklet and here we are going to look at some helpful hints and tips to help you combat the effects of jet lag when you travel.

The expression goes that ‘west is best and east is a beast’ and it’s true. This is because you’ll end up trying to get to sleep when your body is actually waking up, meaning you’re forced to get up at what feels like the middle of the night. To put it another way, your body is better equipped to cope with a longer day than a shorter one as we have already discussed.

The key to tackling the effects of jet lag is to align eating, exercise and light as much as possible to the environment you are going to be in and put those changes into practice a few days before you travel. Other recommendations are as follows:

- **Relax your schedule** – knowing how to prepare for a long flight can mean you start your holiday feeling refreshed rather than fatigued. If you are the type of person who has a rigid schedule at home, try and relax that schedule during the days before your flight. Having rigid routines with regards to eating and sleeping will make it harder to adjust to new time zones.

- **Get a good night’s sleep before you fly** – People tend not to sleep or only sleep for a few hours prior to flying for a number of reasons. This is a big mistake as last minute changes to your routine will make it harder to adjust to new time zones.

- **Avoid arriving at night** - If possible; opt for a flight which arrives in the daylight as this will make it easier to stay awake.
• **Be plane savvy** – Some types of planes have hi-tech humidification systems that help to retain air moisture and LED lighting systems capable of simulating the natural phases of the day. The air purification system also renews the air every 2 minutes which helps prevent the effects of jet lag.

• **Split up the trip** – By building in a stopover your body has more time to adapt to the new routine.

• **Avoid drinking during the flight** – The effects of alcohol at altitude will increase tiredness and cause dehydration.

• **Avoid sleeping pills** – Relying on sleeping pills for long flights is not a good idea and they will do nothing to assist your recovery from jet lag and will leave you feeling lethargic when you land. If you are going to sleep, try and do it the natural way.

• **Avoid coffee and caffeinated drinks** – Caffeine heavy beverages are artificial stimulants which affect your ability to sleep and increase jet lag recovery time. The body functions at its best when it is well hydrated so it is best to consume lots of water.

• **Set your watch** – When you get on the plane, set your watch to the time of your destination to get yourself psychologically aligned.

• **Keep moving** – Move around regularly and do exercises to keep the blood flowing.

• **Eat right** – Eat three meals a day in line with the new time zone. Eating at normal times in the time zone you are in will synchronise the body clock.

• **Hunt the sun** – Get as much natural daylight as you can as it makes you feel better.

• **Get some exercise** – Do some light exercise to boost your endorphins. These days, a lot of airlines will have a section in their dedicated magazine on simple exercises for long flights.

• **Catch up on sleep** – Try to get as much sleep as you normally would in a 24 hour period and make up any shortfall with a short nap on the day of arrival if necessary.

**Combatting the effects of shift work**

We looked at shift work and its effects back in part 1 of this booklet and here we are going to look at some helpful hints and tips to help you combat the effects of shift work if this is something you have to do. Unfortunately shift work cannot be eliminated from our society and so we need to consider ways in which we can combat the effects of shift working to ensure that we continue to get adequate amounts of good quality sleep.

Three main factors influence a person’s adjustment to shift work - how easily they adapt to different sleep schedules, their ability or inability to overcome drowsiness and whether they are naturally most alert during the morning or evening. Consequently, employers should consider letting people select their own shifts. If you are an employer or manager of employees who undertake shift work I would strongly recommend that you consult the Health and Safety Executive’s (HSE) Guidance on ‘Managing Shift work’ – HSG256.
Research supports the theory that workers on fixed work schedules (at least one year on the same schedule) are better off than workers on rotating work schedules in terms of mental health, job satisfaction, organisational commitment, social participation, anticipated turnover, absenteeism, and lateness. If workers must rotate schedules, forward rotation is always much preferable to backward rotation as this follows the body’s natural preference.

Workers should sleep no more than ten hours on their days off. Attempting to compensate for sleep loss with extra sleep on off days may hinder shift-work adaptation. Workers that have an extended interval between each rotation (such as a week off) adjust a lot more easily.

As we know, the body operates on a 24-hour clock that is "synchronized" by anchors that occur at the same time each day such as meals and traditional rituals (showering, watching television etc.) It is important that you make sure to insert similar anchors into your day regardless of whether it begins at 7am in the morning or 5pm in the afternoon.

Light to moderate exercise tends to wake people up and can induce changes in the circadian rhythms of shift workers that may be interpreted as an adaptation to shift work. Also, workers who maintain social activities report better psychological wellbeing; fewer sleep problems, and are more satisfied with shift work and their life in general. It is well known that shift work has many other implications other than the effects on sleep. As I discussed in part 1, there is a 60% divorce rate in those who have to shift work and this may be due to the fact that people have to work unsociable hours which also disrupts the persons personal life.

When workers enjoy their job and feel that there is a balance between effort and reward, many of the negative effects of organisational stress in general and shift work in particular are reduced.
Summary

In summary...

- Sleep is a dynamic and regulated set of behavioral and physiological states during which many processes vital to health and well-being take place. The sleep process occurs in 5 stages and includes both NREM sleep (for restoration) and REM sleep (for brain processing).
- Your circadian rhythm is basically a 24-hour internal clock that is running in the background of your brain and cycles between sleepiness and alertness at regular intervals (known as your sleep/wake cycle). We have our biggest dips in alertness at 2am and 2pm.
- We have a ‘sleep homeostat’ which controls our drive to sleep. Light and dark influence our ‘sleep-wake cycle’ and stimulate the brain to produce melatonin (sleep hormone).
- We sleep for a variety of reasons including for restoration, energy conservation and to improve brain functioning.
- The amount of sleep varies we require varies from person to person. But as adults we should be aiming to achieve a solid 7 ½ - 8 hours of good quality sleep per night.
- Napping can be beneficial to us providing that we do it night. 5-10 minutes twice a day or one long nap no longer than 30 minutes has been proven to provide psychological benefits.
- There are over 80 different sleep disorders which are caused by a number of factors including pain, medical issues such as breathing difficulties, psychiatric disorders which keep the alertness centre of the brain active and environmental issues. Insomnia is the most common type of sleep disorder.
- Sleep problems can also be caused by social implications such as ‘shift working’ and air travel causing ‘jet lag’.
- Sleep problems can be categorised as parasomnias (sleepwalking, sleep talking, teeth grinding etc.) and diagnosable sleep disorders (insomnia, narcolepsy, sleep apnoea etc.)
- ‘Sleep hygiene’ is the recommended behavioral and environmental practice that is intended to promote better quality sleep and includes five factors to be considered – diet, environment, thoughts, behaviours and exercise.
- We can use a variety of methods including sleep diaries, CBT-I, stimulus control, sleep restriction, cognitive control, cognitive distraction, sleep conditioning, paradoxical intention, sleep scheduling, as well as relaxation techniques including ‘Progressive Muscle Relaxation’ and ‘Mindfulness and Mediation practices’.

We can all benefit from improving the quantity and quality of our sleep and in most cases it is simply a case of making small adjustments to our bedtime routines and sleep habits. Using the knowledge and advice provided within this booklet should help you understand why sleep is important and how to get the best sleep for you. Sleep is a pragmatic response to good health and has many benefits, so remember to take your sleep seriously as it is vitally important for your overall health and wellbeing.