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 1/2 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

Age Group	Estimated Hours of Sleep
Infants	16-20 hours
Toddlers	12-14 hours
Pre-School	11-13 hours
School Age	10-11 hours
Teenagers	9 1/2 - 10 hours
Adults	7 1/2 - 8 hours

On average, we are getting between 1 1/2 - 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 1/2 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

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'

EPWORTH SLEEPINESS SCALE Patient self-assessment questionnaire	
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: Would never dose = 0 Slight chance of dozing = 1 Moderate chance of dozing = 2 High chance of dozing = 3	
Sitting reading a book	
Watching television	
Sitting inactive in a public place e.g. in a meeting	
Lying down to rest in the afternoon	
Sitting talking to someone	
Sitting quietly after lunch without alcohol	
In a car, stopped in traffic or at lights	
In a car, as a passenger for an hour	

RESULT	WHAT YOUR ESS RESULT INDICATES
< 10	**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.
10-16	**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.
16+	**You are dangerously sleepy**

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 1/2 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 3060 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.