**SLEEP**

**SUMMARIES**

* Sleep is an altered state of consciousness because it differs markedly from normal waking consciousness. Sleep is a natural occurrence and each day/night we have periods of being awake and asleep. The sleep/wake cycle is an example of a circadian rhythm.
* Sleep is not just one state of consciousness; it comprises a number of predictable states and follows a highly organised sequence of events. Throughout sleep, we shift between non-rapid eye movement (NREM) and rapid eye movement (REM) sleep, beginning with NREM sleep. NREM sleep consists of four stages and accounts for about 80 per cent of our total sleep time.
* On average, we go through one cycle of NREM and REM every 90 minutes. The NREM/REM cycle is an example of an ultradian rhythm. Most adults typically experience 4–6 NREM/REM cycles per night.
* The percentage of time spent in REM sleep increases and NREM sleep decreases as the night progresses.
* When we are awake and alert, our brainwave activity consists of beta waves.
* Just before we fall asleep, we usually close our eyes and relax. Our brainwave patterns are predominantly alpha waves during this time.
* During the transition from being awake to being asleep or falling asleep, we enter a relaxed state known as a hypnogogic state, in which we may experience hallucinatory images and hypnogogic (hypnic) jerks.
* Stage 1 NREM sleep is brief, lasting around 5 minutes for most people. It is a very light sleep, one from which we can be easily awakened. If awakened at this stage, we will usually think that we haven’t been asleep at all. Alpha waves are replaced by slower theta waves. Our eyes roll slowly, our muscles relax, and our heart and breathing rates decrease.
* We then spend about 20 minutes in stage 2 sleep. Although this is a deeper stage of sleep it is still fairly easy to be woken from it. If awakened at this stage, it is likely that we still will not believe that we were asleep. Stage 2 sleep is characterised by the appearance of sleep spindles and K-complexes. Our eyes stop rolling, muscles become further relaxed and breathing and heart rates continue to decrease. Stage 2 sleep accounts for about 50 per cent of our total sleep.
* Stage 3 NREM sleep is a brief transitional stage that marks the start of deep sleep (slow wave sleep). During stage 3, we become less responsive to external stimuli and are more difficult to wake. Delta waves begin to replace theta waves and sleep spindles and occur between 20 and 50 per cent of the time. The eyes are not moving, our muscles are relaxed and heart and breathing rates continue to become slower and more regular.
* Stage 4 NREM sleep is the deepest of sleeps. It is extremely difficult to wake from this stage. In the first NREM/REM sleep cycle, we spend about 30 minutes in stage 4 sleep, usually about an hour since we first fell asleep. In the last two or three cycles of NREM/REM sleep, we often do not descend into stages 3 or 4 sleep. Brainwave patterns consist of regular, slow and large delta waves for more than 50 per cent of the time. There is no eye movement, little, if any, muscle activity (muscles are very relaxed) and heart and breathing rate are at their slowest and most regular during sleep. While body temperature follows a circadian cycle, it drops slightly during NREM sleep with the greatest drop during stage 4 sleep. Episodes of sleepwalking and night terrors are most likely to occur during stages 3 and 4 NREM sleep.
* The first cycle of REM sleep lasts for about 10 minutes. REM sleep is a lighter sleep than stages 3 and 4 sleep and easier to wake from. Unlike NREM sleep, if we wake during REM sleep we are likely to report that we were dreaming. This is true for everyone, even those who say they don’t dream!
* Our brain is very active during REM sleep, resembling that of a person who is awake and alert (beta-like waves). Compared to stages 3 and 4 sleep, brainwaves are irregular (desynchronised), faster (high frequency) and smaller (low amplitude) and exhibit sawtooth patterns.
* There are repetitive bursts of rapid eye movement, and heart rate, blood pressure and respiration increase and fluctuate.
* Body temperature is less regulated so tends to match the surrounding environment.
* There is virtually no muscle tension – the voluntary muscles, especially those below the neck, are very relaxed to the point of being essentially paralysed (except for occasional muscle twitching). (hence being referred to as paradoxical sleep)
* NREM dreams are less frequent (around 10 per cent of all dreams) and are more difficult to remember than REM dreams. NREM dreams tend to be more similar to waking thought patterns. Compared to REM dreams, they tend to be brief, less intense and have little storyline.
* There are several theories of sleep function and most of these belong to two broad categories: the survival (adaptive and evolutionary) theories of sleep and the restorative (restore and recovery) theories of sleep. The restorative theories provide a thorough and well-developed account of *why* sleep is important, whereas survival theories focus on *when* and *why* different species sleep. While the two theories take a different view of the purpose of sleep, they are complementary and work together to contribute to our understanding of the purpose of sleep.

**SLEEP DEPRIVATION**

**SUMMARIES**

* The amount of sleep we need varies from person to person. When we are not getting the amount we need, we are sleep deprived.
* Sleep needs vary between individuals and depend on factors such as age, lifestyle and genetics.
* Partial sleep deprivation (having some sleep in a 24-hour period but not getting enough to meet your needs) and total sleep deprivation (going without sleep for an entire 24-hour period) may occur for one night or for several nights. Both partial and total sleep deprivation can have serious consequences.
* Total sleep deprivation leads to discomfort and can be hard to sustain after one night. Tasks requiring concentration (sustained attention) are seriously impaired, especially if they are simple, repetitive or boring. Periods of microsleep (about 3 seconds of staring blankly into space and losing awareness) are unavoidable after three days. After four days, the ‘hat phenomenon’ occurs, a feeling of tightening around the head as though a hat that is too small is being worn. There may be irritability, confusion and even delusions. Day six typically makes us become depersonalised with a loss of sense of personal identity and increased difficulty with coping with other people and the environment. This is known as ‘sleep deprivation psychosis’.
* Total sleep deprivation for one or two nights is unlikely to cause long-term psychological and physiological effects providing that we are in a safe environment (so accidents can be avoided), a good night’s sleep follows and there are no other individual problems (risk factors). On the other hand, going without sleep for an extended period of time may be detrimental to your health (and even lead to death).
* Partial sleep deprivation can lead to psychological (affective, cognitive and behavioural) effects and physiological effects. Chronic sleep deprivation (not having enough sleep over an extended period of time) is associated with several serious conditions such as cardiovascular disease, mood disorders and immune deficiencies including cancer.
* REM sleep deprivation has been linked with memory and learning problems, mood disturbances such as grumpiness, irritability and sadness, and interfering with protein synthesis in the brain. NREM sleep deprivation has been linked with disturbances in growth and restoration of the body’s resources. The evidence for the purpose of REM and NREM sleep is not conclusive and still hotly debated. It is important not to overgeneralise by thinking REM sleep is just for psychological well-being and NREM sleep is only for physiological well-being. Physiological and psychological processes interact and overlap, and both stages of sleep are important for psychological and physiological well-being.
* Usually a good night’s sleep and being able to sleep in (i.e. sleep longer than usual) is enough to recover from sleep deprivation. Depending on the amount of sleep deprivation, a few nights of slightly more sleep than usually needed may be required. Most sleep deprivation effects are temporary and we are likely to fully recover without any long-term psychological and physiological problems.
* When we sleep after being deprived of REM sleep, we experience a significantly larger amount of time in REM sleep. This is known as REM rebound. Dream intensity tends to be increased during REM rebound.
* A microsleep is a brief involuntary period of sleep in the midst of a wakeful activity – we tend to drift off and stop concentrating on what we are doing. Microsleeps assist us in overcoming or preventing sleep deprivation and usually last 3–15 seconds. We are usually unaware of a microsleep.
* During teenage years, most of us experience:
  + a delayed onset of sleep (going to sleep later)
  + The need for more sleep (9–10 hours' sleep per night).
* The sleep/wake pattern shifts towards the evening in adolescence. Increased need for sleep tends to be universal (found in all cultures), suggesting that the shift in sleep patterns is biological and a normal part of life in the teenage years.
* Good quality sleep can lead to better health, better relationships, better school marks, and fewer accidents. Researchers have invented pills to prevent sleep and pills to make us sleep, but as yet they have not succeeded in creating a pill to stop us needing sleep. While life is exciting and full of opportunities, we need to make sure we don’t sacrifice sleep and put aside at least nine hours a day for sleep.