

SLEEP

Healthy children learn better. One aspect of health that is important for the development of children is sleep. For most of the past century, the focus of healthy living was on diet, then on exercise - now it is on sleep.

About sleep - some facts

Our need for sleep changes from about 20 hours a day as an infant to 8-10 hours for adults. All sleep is divided into cycles called 'non-rapid eye movement' (NREM) sleep and 'rapid eye movement' (REM) sleep. Each cycle of NREM and REM sleep lasts between 90-110 minutes. Sleep is critical for development and is believed to serve many purposes including rest, growth, tissue repair, and information processing. For education professionals, this last point is of the greatest significance.

The impact of sleep on learning and behaviour

- Sleep, or lack of it, significantly affects memory, which is the basis for learning. By the same token, sleep deprivation or inadequate sleep significantly impairs learning. For example, if a new or difficult task is to be learned on Monday, there must be adequate sleep on Sunday night to optimise concentration and attentional capacity but there must also be adequate sleep on Monday, Tuesday and even Wednesday to maintain learning potential and retention of that task. It is understandable that insufficient sleep the night before will decrease concentration but why is it that adequate sleep after a new task has been learned increases learning capacity and retention?
- The answer to this question is linked to the fact that different stages of sleep have been implicated in memory and information consolidation. It is known that REM and NREM sleep stages are important so the brain can undertake cognitive processes such as information consolidation and storage of different types of memory. These cognitive processes include divergent thinking (creative, problem solving), convergent thinking (rote learning), procedural memory (how to do things and some concept formation – mathematics) and semantic memory (memory of events and dates). All these cognitive functions are integral to academic success. Inadequate amounts of REM or NREM sleep can effect the consolidation of these cognitive functions. For example, uninterrupted sections of NREM sleep are important for subsequent rote learning and motor skills acquisition (procedural memory). Similarly uninterrupted sections of REM sleep are needed for other types of memory as it is during REM sleep that we organise, store and consolidate memories, particularly more difficult memories such as mathematical concepts and language. REM periods increase in duration and frequency over the night. Therefore, the last stages of REM sleep in the early morning before waking up are especially vital because during this time, the brain is very busy in consolidating memories and information from yesterday and preparing for tomorrow. Shortened or interrupted REM and NREM sleep can therefore interfere with different memory and learning functions. Memory deficits may well result, making learning difficult, with a possible negative effect on academic potential
- Memory is not the only thing effected by sleep disruption. Recent evidence suggests that certain sleep problems may cause permanent damage to areas of the brain (frontal lobes) which control complex learning and result in permanent but subtle performance decrements. With impaired learning and performance, knowledge is

difficult to accrue and may explain why children with poor sleep (particularly those who have a chronic snoring problem) display lower IQ than children with sufficient sleep.

- Finally, sleep loss influences the regulation and control of emotions. Due to the inability to control emotions, children with sleep problems display problematic behaviours similar to those seen in children diagnosed with Attention Deficit Hyperactivity Disorder, not just during the sleep deprivation, but also subsequent to that. Uncontrolled emotions hinder learning

Issues of interest for teachers

- Pre-school and junior school children are particularly busy learning and refining motor skills. These can be significantly impaired by shortened sleep duration, particularly NREM sleep.
- Young children who are having insufficient sleep may not be tired in the day but instead overactive and disruptive in an effort to keep themselves awake.
- Teenagers need more deep sleep (NREM) sleep than at any other stage in their lives. They therefore need to sleep longer. However during puberty, adolescents' internal body clocks change to a later sleep cycle (delayed sleep phase cycle), so they want to go to sleep later but still having to comply with early start times for school. Result? Most adolescents are sleep deprived. This sleep deprivation has been implicated in poor school performance in adolescents, during the years when they need it most. It has also been recognised that sleep deprivation negatively effects social skills and sporting performance at a time when they are under strong pressure to succeed at both.
- 'Good' sleepers perform better on tests in the morning as they have had restorative sleep compared to 'poor' sleepers who perform better in the evening. Furthermore, a child suffering sleep loss (which effects divergent or creative thinking) will be more creative in the morning than in the afternoon.
- Some topics, like mathematics and second languages have a high cognitive component and require adequate sleep for optimal learning potential. Timing of presentation of this material with respect to expected subsequent sleep could result in increased learning efficiency. For example, offering maths on Fridays when it is likely that many children will stay up late on the weekend beyond normal bedtimes, is problematic.
- If a child is falling asleep in class, is withdrawn, socially inactive or on the contrary, hyperactive, disruptive and aggressive, these may be indicative of a sleep problem. If this is coupled with learning difficulties it may be even more suggestive. Presented separately or together, these symptoms may be an indication of a sleep disorder.

Addressing the problem

- A teacher may be able to identify symptoms described above that may not be evident to a parent and may therefore be in an ideal position to discuss these issues with parents
- Increasing awareness of the importance of sleep can be increased by initiating in your school a 'SLEEP SMART PROGRAM' which includes educational packages and

quiz/problem solving questions for students that may be incorporated into health education in schools.

References

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Dr Sarah Blunden
Sleep psychologist
Further information:
www.focusededucation.com.au or
(08) 0414 700 953