

**Sleep
and Educating
Your Child**

By Derek Pugh

BCEI Booklet #1

Sleep and Educating Y our Child



1. Sleep (or the lack of it)....

Looking for a looming health issue of the 21st Century? Today's youngsters are getting an average of nine hours sleep less each week than their parents did. That's a whole night's sleep or more missed every week. This is having increasing effects on learning and the functioning of students and whole schools.

Sleep and Educating Y our Child



Numerous studies link learning difficulties to inadequate sleep. In one study *every* student with a behaviour problem at school suffered from sleep issues (Blunden 2005). In fact 35 - 40% of children and adolescents suffer some form of sleep problem at some time. Those kids who regularly don't get enough sleep are those likely to use up remedial teaching, behaviour counseling and other school resources. 'Poor sleep equals poor learning, no matter how we looked at it' (Blunden 2005).

Sleep and Educating Y our Child

What does sleep deprivation do to kids? These kids are five times more likely to suffer nightmares or night terrors, sleep walk, have difficulty getting to sleep or staying asleep, and have daytime sleepiness. They are likely to display aggressive behaviour, be antisocial,

withdrawn, hyperactive, and unable to control or regulate behaviour. They can be moody - depressed, anxious, stressed, unconfident, and irritable.



Poor sleepers are poor time managers who repeat grades and forget lessons. They have a lack of concentration and are

continually falling behind in school. They have difficulty in solving problems and struggle with maths, science and abstract concepts. They are less sporty and more accident prone. They are more likely to be overweight or even obese. In one study 100% of children surveyed who slept less than six hours per night were overweight or

Sleep and Educating Y our Child

obese (Blunden 2006). Sleep deprived kids are also sick more often.

We can die if we don't sleep. The Guinness Book of World Records reports their record holder as Randy Gardner, who as a 17 year old in 1965, stayed awake for 11 days. Randy suffered hallucinations, paranoia and occasional losses in motor function. He was irritable and nauseous, though he still beat the sleep researcher at pinball even on the final day. A few days after his record he was back to his normal eight hours a night. He was lucky. There's a rare genetic disorder called Fatal Familial Insomnia. For these people insomnia develops in middle age and increases with time until it is permanent. They experience incredible depression and anxiety, lose control of their bodies, become psychotic, then comatose before dying. By the way, Guinness no longer seeks records for sleep deprivation – it is too dangerous.

Sleep and Educating Y our Child



Why then do we need sleep? A simple answer is to avoid all the issues caused by a lack of sleep already discussed. A more complex answer is more difficult to find but it seems particularly related to the process of learning, and it's a time for us to recharge our immune systems.

Regular inadequate sleep, say 75% of normal, may raise evening levels of blood sugar and after time this may result in a rise of insulin, the hormone which controls sugar metabolism. If this situation goes on for a long time, the result can be type 2 diabetes. (McEwan and Krahn 2006).

Sleep is so important we spend a third of our lives doing it, and, in the early days of our evolution, we certainly

Sleep and Educating Y our Child

put ourselves at personal risk when asleep. After all, leopards and lions hunted at night even then, so it must have been an investment of time that paid dividends

One of the curious things about sleep is that while the body is resting, our brains are disengaged from it and is really active. Our brains are running marathons while the body slumbers. Neuronal activity can be higher during sleep than when it's awake! So clearly, when we're asleep, our brains are not at rest. Sleep is a rhythmic activity of low and high brain activity. In the imaginatively named Rapid Eye Movement (REM) sleep characterized by, wait for it - *Rapid Eye Movement*, the brain is highly active and scientists can measure the increase in electrical activity and heat production associated with this activity. In fact there's only a short time during the other main stage, nonREM sleep, when the brain uses less energy than when it's awake, and this is only about 20% of a night's sleep. The 90 minute REM sleep cycle hosts our dreams, and most neuroscientists believe that it is also the major "memory consolidation" time. This means *learning*. If this is true,

Sleep and Educating Y our Child

then sleep deprivation will cut back on our brain's learning.

Brain activity patterns can be recorded for an activity when a subject is awake, and when the same patterns can be seen when the subject is asleep it is believed the brain is 'replaying' the experience, thus consolidating the learning. Scientists have observed birds "practicing" their songs soundlessly during sleep and lab rats "rehearsing" running through their mazes. Dreams, whatever they are, may be linked to this rehearsal and hence linked to learning.

How much sleep we need changes as we age but how much is enough? Even the experts debate our needs. Kripke (2004) says more than seven hours per night for adults is detrimental to our health and eight and nine hours leads to higher mortality! Most agree on a range of hours and Blunden at the Centre for Sleep Research gives the following list:

- Babies under 1: 14-18 hours throughout the day and night

Sleep and Educating Y our Child

- Toddlers: 12-14 hours per 24 hour period
 - Primary school: 10-12 hours per day
 - High school: 9-11 hours per day
 - Adults: 7-9 hours per day
- (<http://www.sleepeducation.net.au>)

In study after study, according to Blunden, *every* child came up as having less than these recommended times, some getting less than two thirds of what they need. Children who are unwilling to fall or stay asleep, who refuse to cooperate at bedtime, or have other sleep issues therefore appear to have become the norm.

2. Sleep Issues and What to Do About Them.

Nearly every teacher I speak to says that there are sleep issues in their classes. Children falling asleep by second period or struggling to keep their eyes open after lunch are common. We all struggle after lunch. Medina (2005) calls this the 'nap zone'. He describes a biochemical battle in the brain as some forces try to send you asleep, and some try to keep you awake. Around 2-3 pm, or 12

Sleep and Educating Y our Child

hours after the mid point of your last sleep, one force dominates and all the brain wants to do is sleep. Taking a nap at this time may well be a good idea. Lyndon B Johnson and Winston Churchill were both famous nappers, actually changing into pyjamas every afternoon for a sleep even during the height of a war. Medina says that a 26-minute nap improved NASA pilots' performance by 34 percent. Some elementary schools routinely provide a nap time for early years children. Perhaps they can teach the rest of us something.

Studies concerning school start time show what you may now expect. The 'early start' schools in an Israeli study (Epstein 1998) required children to be "early risers" to be at school by 7 am. These kids had significantly less sleep than the "regular risers" attending schools with an 8 am start. The early risers clearly suffered more fatigue and sleepiness, and had attention and concentration difficulties in class. Epstein concluded that "early starting of school negatively affects total sleep time and, as a consequence, has a negative effect on daytime behavior". This is particularly evident in teenagers.

Sleep and Educating Y our Child

Carskadon (1998) also found significant sleep deprivation and daytime sleepiness in teens that had an early start.

Early rising for school is a problem compounded by our biology. Adolescents, with all the hormonal changes and social expectations of their age have different sleep phases than they used to when younger. They get tired later than they did before and they are not necessarily ready to sleep when they're told to. As teenagers experience many sleep thieves - phone, TV, Facebook, texting, jobs, gaming, social activities, school, sports, homework, worry, exams - so sleep can seem a low priority in their lives.

Our circadian rhythm (when we're asleep and awake) is in part caused by the production of melatonin, a sleep hormone that is released from the pineal gland in the brain. During adolescence there is a delay in its release by perhaps several hours so kids' bodies are not ready to fall asleep until later. Teenagers are susceptible to boredom so they do things like computer games or

Sleep and Educating Y our Child

phoning friends, to entertain themselves. Then they get up in the morning early for school and over a few days they build up a sleep debt that needs to be repaid on weekends. Sleeping in till noon on weekends therefore is not laziness, but a biological necessity for many teenagers.



Sleep and Educating Y our Child

Because REM and nonREM sleep occur in roughly 90 minute waves, and memory formation, particularly in maths and language areas, is strongest towards the end of a REM period, it's likely that someone woken by parent or alarm rather than naturally may have their REM sleep cut short. This can impair memory formation. Even NonREM sleep disturbances affect learning. For example rote learning memories and motor skill development seem to occur during this time.

Other brain functions are affected by sleep loss as well. Children who have less sleep or a snoring problem have a lower IQ and may have problems controlling their emotions and can present as hyperactive (Gozal, 1998). IQ is now known to not be fixed but “plastic”. Solve the sleep problem and the IQ can rise.

3. What Can Schools, Teachers and Parents Do?

Firstly, teachers need to recognize that some of their students, if not most, may have sleep issues at home and that parents may not be particularly concerned. Many people do not understand the importance of sleep and are unable to set and follow through on bedtime routines because of lifestyle. Children may be very resistant to their parent's bed time rules. School newsletters, parent information nights with guest speakers can help educate parents about sleep.

Next, schools need to examine their own role in sleep disturbances. An early starting time for adolescents means they have to rise early and build up sleep debts during the week. This, as we have seen, can ensure behaviour problems and poor learning in some students. Also timetabling carefully may improve learning. Adolescents will probably struggle with maths in second period or after lunch so careful planning may alleviate this, at least on some days.

Sleep and Educating Y our Child

Teachers can find professional development training about sleep and other brain compatible education issues. Much of what we now know about how the brain works is new. Neuroscience is an exciting and fast developing field. Many teachers will have out of date information.

None of us have degrees in parenting so any learning parents can do may be of benefit to our children. Parents can request workshops from their school councils. Workshops in Behaviour Management, Sleep Management, Brain Compatible Learning and Child Development are all being offered somewhere at some time. A quick internet search may locate some, or the people who provide them. Many internet sites give parents ideas and support in their parenting. For more sleep information try www.sleepeducation.net.au.

At home poor sleep habits lead to sleep deprivation. Young children can be taught how to put themselves to sleep at regular bed times and wake up according to soothing and gentle routines. Learning the signs of fatigue in a child during the day - such things as

Sleep and Educating Y our Child

hyperactivity or irritability in young kids and surliness, aggression, poor learning or inattention in adolescents, will provide cues to change activities, organize rest times etc. Most children like to read or be read to as they slow down towards sleep, and teeth brushing, warm milk, goodnight kisses etc can all be part of a soothing routine before bed.

Parents can encourage their children, of any age, to nap in the afternoon, and should be realistic and non-judgmental about a teenager's desire to lie in bed on the weekend. Parents should discuss new information about the importance of sleep with their children and agree on strategies to ensure enough.

The evidence for the importance of sleep cannot be underestimated and good sleep patterns give kids one of the 'greatest opportunity for healthy development and academic success" possible. (Dahl R 2005)

FACT SHEET for ADOLESCENTS on SLEEP

By Derek Pugh

- An hour of sleep loss each night lowers your cognitive age by two years and increases the chance of you becoming obese by 80%
- High school seniors now average less than seven hours sleep per night. That's more than an hour less per night than their parents at the same ages. That's a whole night's sleep lost every week.
- During sleep the day's learning is shifted from short term memory areas to more efficient storage systems in the brain. The more you learn during the day, the more sleep you need to remember it.
- Brains are under reconstruction in the teenage years. Sleep scientists are beginning to discover what effect this lost hour has on teenagers' brains. They found that sleep problems cause permanent changes in brain structure and

that some classic teenage behaviors (moodiness, depression, binge eating) may be sleep loss related.

- In a study of 7000 students, teens who received A averages had fifteen minutes more sleep than the B averages and they had eleven minutes more than the C averages who had ten minutes more than the Ds. Every fifteen minutes of sleep counts.
- Sleep loss impairs your brain by making it less ‘plastic’ and less able to form synaptic connections to create memories. Emotional contexts of memories affect where it gets processed. The amygdala handles negative stimuli, the hippocampus handles positive. The hippocampus suffers more than the amygdala from sleep loss. The result is the sleep deprived can fail to recall pleasant memories, but have no trouble remembering the gloomy. This may be a physical link to teenage depression.
- Kids who miss an hour sleep per night operate their brains at a cognitive level of two years below where they should be. Grade 10s may operate as grade 8s. A teacher

with knowledge of how sleep affects students can often point out those in the class who are sleep deprived.

- In tired people the prefrontal cortex cannot metabolize glucose well enough. Their ‘executive functioning’ suffers; they have lower impulse control and get distracted more easily.
- School start times maybe too early. In the US schools which altered start times to 8.30 am or later found dramatic results (maths and verbal SAT scores rose 15%). In another school they found teenage car accidents dropped 16% after later school starts. If you consider accidents, sleep can affect whether you live or die.
- Sleep loss may be linked to the increasing level of childhood obesity. On average, children who sleep less are fatter than those who get their full 10 hours of sleep. In fact kids who get less than eight hours sleep per night are 300% more likely to be obese than others. The University of Texas says your chances of becoming obese rise 80% with each hour of lost sleep. This may be because sleep loss increases the level of the hormone ghrelin which signals hunger, and lowers leptin, which

decreases appetite. It also raises cortisol, the famous stress hormone, which also has a role in making body fat.

- The University of Michigan discovered that 25% of kids diagnosed with ADHD were actually sleep deprived and once the sleep issues were solved the other symptoms of ADHD disappeared.

REFERENCES:

Blunden, Dr Sarah, (2005)

<http://www.sleepeducation.net.au/links.php> Australian Centre for Education in Sleep.

Dr Sarah Blunden (2006), “Sleep” in www.focusededucation.com.au

Bonson, Po (2007) *Snooze or Lose* New York Magazine (2007)

<http://nymag.com/news/features/38951/>

Carskadon MA, Wolfson AR, Acebo C, Tzischinsky O, Seifer R. Adolescent sleep patterns, circadian timing, and sleepiness at a transition to early school days. *SLEEP* 1998; 21:871-81

Dahl, Robert E, MD (2005) *Sleep, Learning and the Developing Brain: Early-to-bed as a Healthy and Wise Choice for School Aged Children* *SLEEP* Vol 28, No 12, 2005

Epstein R, Chillag N, Lavie P. Starting times of school: effects on daytime functioning of fifth-grade children in Israel. *SLEEP* 1998; 21:250-6

Gozal, D. (1998). Sleep disordered breathing in school aged children: Impact on school performance. *Pediatrics* 102 (3): 616-620.

Kripke *SLEEP*, Vol. 27, No. 1, 2004 **13** Do We Sleep Too Much? Comment on Tamakoshi A; Ohno Y. Self-reported sleep duration as a predictor of all-cause mortality: results from the JACC study, Japan. *SLEEP* 2004; 27(1):51-4

Medina, J (2008) *Brain Rules 12 Principles for Surviving and Thriving at Work, Home and School*, Pear Press www.brainrules.net

McEwan and Krahn 2006 *The Response to Stress* www.naturalhealthweb.com/articles/McEwen.html

www.sleepfoundation.org/articles: National Sleep Foundation (US) *Children and Sleep*.

www.worldamazingrecords.com/2008/01/sleep-deprivation-guinness-world-record.html

www.abc.net.au/health/quizzestools/quizzes/2010/02/04/2810124_answers.htm



Visit www.derekpugh.com.au for more free information booklets about brain compatible education.

1. Conference, Sydney, Dec 2009 <http://blip.tv/file/3001938>



Derek Pugh is an experienced Principal and teacher in both Australian and International Schools. He now runs workshops in Brain Compatible Education for students, teachers, parents and corporate groups

www.derekpugh.com.au

worldwide. Workshop participants discover the latest in neuroscience and why knowledge of the brain is a powerful tool in education; the 'SEWBaD model' of preparation for learning; what brain 'plasticity' means to education; individual learning profiles and how to use them for effective learning and teaching; how to teach or learn efficiently; and models of brain operation and function.

He is the author of "The Owner's Guide to the Teenage Brain"

www.derekpugh.com

