



Benefits of Sleep

White Paper

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What is sleep?

Sleep: The natural periodic state of rest for the mind, brain and body, during which a host of system-wide repair mechanisms are initiated to repair cellular damage accumulated from the processes of daily metabolism.

A century ago, we slept on average 9-10 hours a night, with sleep cycles linked to sundown and sunup. The introduction of electric lighting has seen the extension of our “daytime”, and modern lifestyle factors such as changed working hours, television, the Internet, and other distractions have chipped away at sleep. Today, we average just under 7 hours a night; about one-third of us make do with 6 hours or fewer – and it’s having an impact on both individual health and workplace performance.

To understand why, we need to explore why we need sleep and what happens when we don’t get enough.

As we go about our activities of daily living, our bodies and brains accumulate damage from a myriad of sources - from workplace and other stressors, bombardment by solar radiation, exposure to toxins, the repetitive strain of work-related tasks like lifting or typing, muscle damage from exercise, and cellular damage from normal metabolic processes. In addition to this wear and tear, our brains take in an incredible amount of information about the world around us that needs processing and committed to memory.

All living organisms have developed the capacity to repair damage at a cellular level, respond to environmental challenges and process and store important information, committing it to memory. Much of this occurs in the process that we call sleep.

Sleep is essential for cognitive performance and the ability of our brain to function well – and a well-functioning brain controls a range of voluntary and involuntary actions, such as our sleep-wake cycle,

attention, perception, mood, emotions, hunger and memory ([Paula Alhola](#), 2007). During sleep, a small part of the brain called the suprachiasmatic nucleus governs what we know as our ‘circadian clock’, and this initiates a whole host of biological repair mechanisms – our brains clear out toxins, our cardiovascular system repairs itself, muscle and tissue undergoes repair, the endocrine system synthesizes hormones, and our DNA repair system kicks into action to delete cancerous and precancerous cells.

Our bodies and brains require long periods of sleep in order to allow these processes of restoration and rejuvenation ([Sleep Foundation](#), 2018). Although sleep needs vary from person to person, but the general consensus is that adults generally require at least seven hours of sleep daily, with teenagers and children requiring more.

Table 1: The American Academy of Sleep Medicine (AASM) Sleep Guidelines

AASM Guidelines for Sleep Time by Age	
Age	Recommended sleeping hours per 24 hours
3 - 5 years	10 to 13 hours
6 - 12 years	9 to 12 hours
13 - 18 years	8 to 10 hours
19 - 60 years	7 or more hours
61 - 64 years	7 to 9 hours
65 years and older	7 to 8 hours

Are you getting enough sleep?

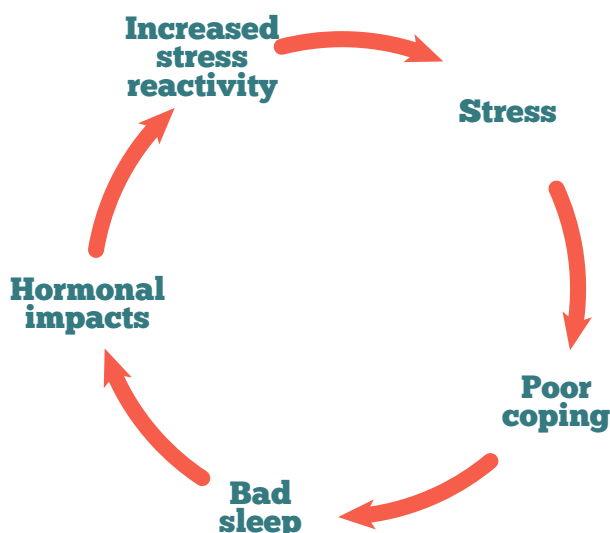
The Epworth Sleepiness Scale (ESS) is a questionnaire to measure daytime sleepiness, developed by Doctor Johns, an Australian Sleep Specialist. The ESS is a self-administered questionnaire with 8 questions. Respondents are asked to rate, on a 4-point scale (0-3), their usual chances of dozing off or falling asleep while engaged in eight different activities. The ESS score (the sum of 8 item scores, 0-3) can range from 0 to 24. The higher the ESS score, the higher that person’s average sleep propensity in daily life (ASP), or their ‘daytime sleepiness’. The questionnaire takes no more than 2 or 3 minutes to answer. Try the [sleep calculator here](#).

Effects of Poor Sleep on Health and Quality of Life

Short-Term Impacts

When individuals get less sleep than they need, a sleep debt accumulates until they can get enough sleep to restore balance. Each extra day without enough sleep increases the debt, and when it becomes large enough significant fatigue occurs. It may take several days before a person recovers from a sleep debt, and there are metabolic consequences associated with poor sleep.

Poor sleep impairs our ability to focus, and hampers of cognitive processes. We become more prone to distractions, and more stress reactive. This is because the stress hormone cortisol is increased the next day after a poor night's sleep, making us more irritable. This can create a damaging cycle, shown by the Stress-Sleep Cycle diagram. Stress can stop us from falling asleep, or wake us in the middle of the night, and that disturbed sleep makes us more stress reactive the next day, and less likely to be physically active (due to reduced levels of Leptin). This lack of physical activity is counter-productive, as exercise is a great way to reduce stress. Often, we can then resort to less productive coping strategies such as alcohol or comfort eating – both of which can negatively affect sleep. And so, the cycle continues.



“In the sleep world, stress is to sleep as yin is to yang — opposite forces that are forever linked. Stress prevents sleep. Sleep deprivation increases stress and its consequences.”

Chris Winter, M.D.

Poor sleep can also have an impact on waistlines, as a bad night's sleep can actually raise hunger levels the following day through changes in the expression of the hormones Leptin, Ghrelin and Cortisol.

Ghrelin is known as the hunger hormone, which is released when our body needs to refuel after a certain amount of time between meals. Leptin is the off-switch, which is released when we start to feel full and it tells the brain it's time to stop eating.

A bad night's sleep increases Ghrelin and reduces Leptin, which results in us eating more the next day – especially more unhealthy foods ([Taheri et al, 2004](#)).

Leptin also influences our voluntary physical activity. When we are sleep deprived and Leptin is lowered, it means we are less likely to move the next day, and a lack of exercise can worsen our fatigue by disrupting our sleep the following night – and so the negative cycle can continue.

Long-Term Impacts of Poor Sleep

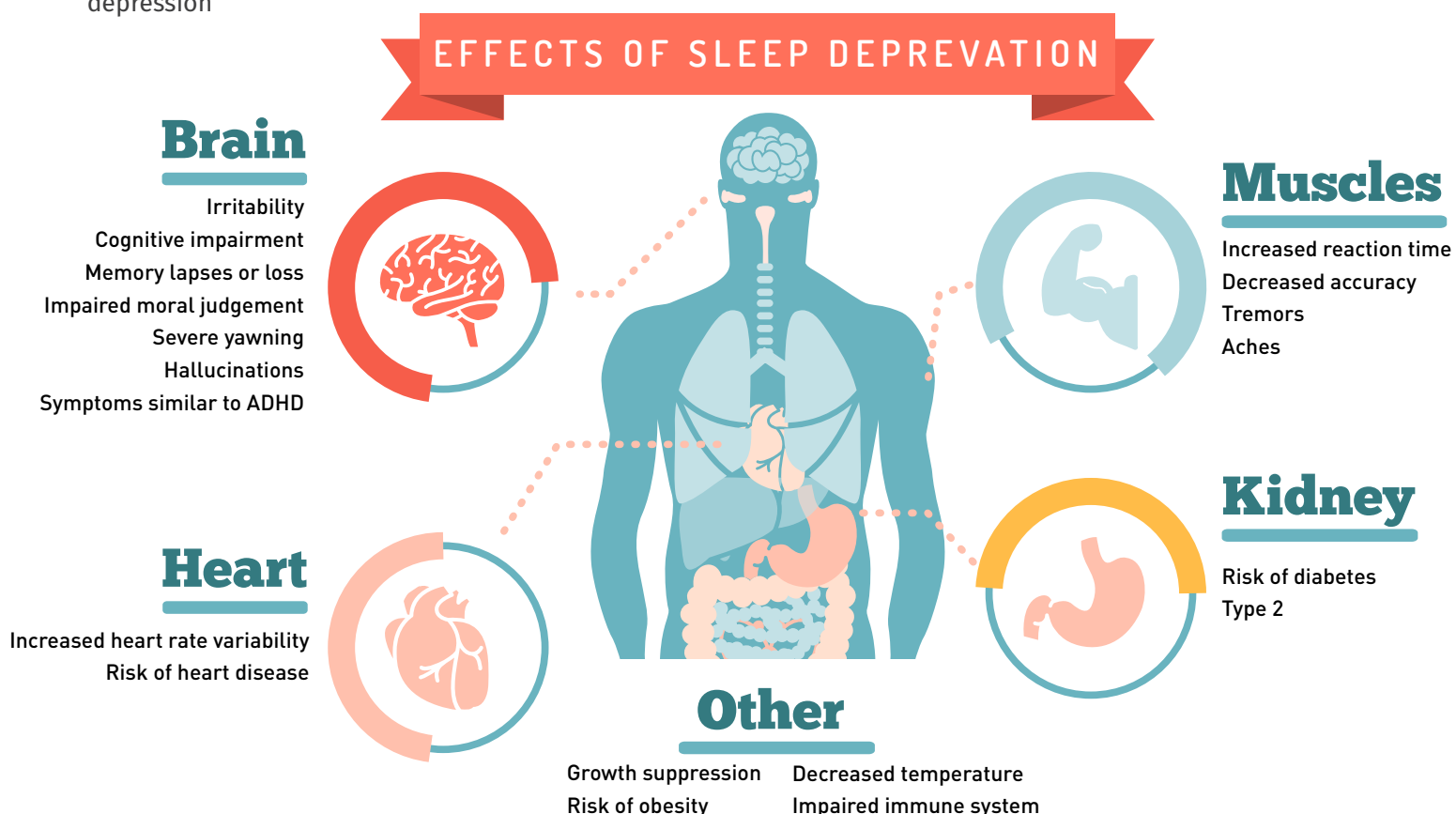
When you lose sleep, it interferes with the functioning of certain brain areas and people who are exposed to Sleep Deprivation (SD) experience a decline in cognitive performance. While losing sleep here and there won't have much effect, ongoing loss of sleep can have a big impact over time and can impair our ability to do well at work, and in our daily life.

Sleep Deprivation and fatigue can impact negatively on the immune system and significantly increases risk of a whole range of chronic conditions, such as Cardiovascular Disease, Alzheimer's disease, Type 2 Diabetes, Obesity and some types of Cancer ([Harvard Med & Musiek](#) et al, 2018).

- One large US national study showed that an individual's risk of Cardiovascular Disease doubled with 6 hours sleep, and tripled with 5 hours sleep, when compared to those with 7 hours average sleep.
- Obesity risk increases five-fold when sleep is one hour less than ideal
- Those with sleep apnoea are 2.6x more likely to develop depression

"In total, there were estimated to be 7.4 million Australian adults who did not regularly get the sleep they need in 2016-17. This lack of sleep was estimated to result in 3,017 deaths in 2016-17. It is expected that more than one Australian will die every day (394 over the year) from falling asleep at the wheel of a vehicle or from industrial accidents due to lack of sleep."

[Sleep Health Foundation](#), 2017



The Business Impact of Poor Sleep

In a work context, fatigue is a state of mental and/or physical exhaustion which reduces a person's ability to perform work safely and effectively. It can occur because of prolonged mental or physical activity, sleep loss and/or disruption of the internal body clock and makes it significantly harder for individuals to focus, and pay attention and be productive. Researchers from the Cooperative Research Centre (CRC) for Alertness, Safety and Productivity estimate that poor alertness alone costs Australia over \$5 billion in lost productivity and healthcare costs.

A chronic lack of sleep substantially reduces workplace productivity through absenteeism and presenteeism – reduced working days and reduced productivity while at work. While the costs of treating sleep disorders themselves are relatively small, the costs of treating the many conditions caused by lack of sleep are not.

A 2015 article in the Journal Sleep reported that workers who slept 5 hours or less per night had a 2.5 fold increase in absenteeism compared to well rested workers, and the study concluded that combating sleep issues would reduce worker sick days by approximately 30%. This study suggested that the optimal sleep duration for minimizing absenteeism is 7.6 hours for women and 7.8 hours for men.

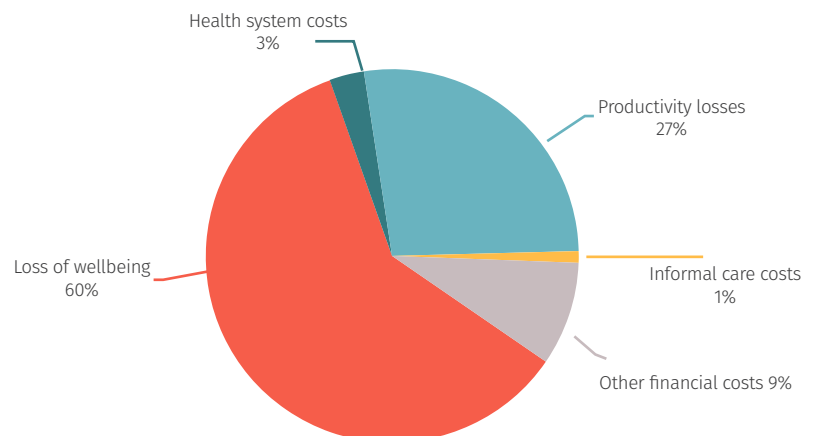
In 2016-2017, the total cost of inadequate sleep in Australia was estimated to be \$66.3 billion, comprising \$26.2 billion in financial costs and \$40.1 billion in the loss of wellbeing (Sleep Health Foundation, 2017). This equates to approximately \$8,968 per person affected in both financial and wellbeing costs.

The components of financial costs (total \$26.2 billion in 2016-17) were estimated to be:

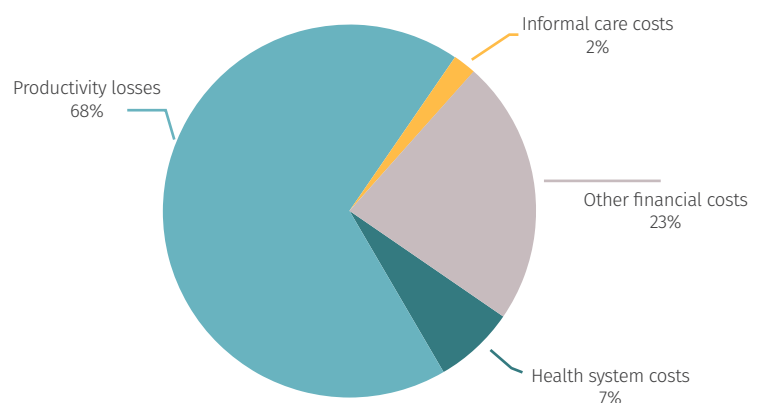
- Health system costs of \$1.8 billion, or \$246 per person with inadequate sleep;
- Productivity losses of \$17.9 billion, or \$2,418 per person with inadequate sleep;
- Informal care costs of \$0.6 billion, or \$82 per person with inadequate sleep; and
- Other financial costs, including dead-weight losses, of \$5.9 billion, or \$802 per person with inadequate sleep.

[Asleep on the Job, Sleep Health Foundation, 2017](#)

Components of total costs due to inadequate sleep in Australia, 2016-17



Components of financial costs due to inadequate sleep in Australia, 2016-17



Safety Issues

A fatigued person is also accident prone, judgment impaired and more likely to make mistakes and bad decisions. Staying awake for 24 hours leads to a reduced hand-to-eye coordination that is similar to having a blood alcohol content of 0.1, where someone is legally drunk ([Better Health Victoria](#), 2014).

Fatigue that comes from both short and long-term sleep debt has a negative impact on cognitive performance and this can impact upon workplace safety, with sleep-related fatigue is reported to cause 10,000 serious workplace injuries and more than 25,000 serious injuries from road accidents.” ([Haydee, Safety Culture](#), 2016).

Some workers are also at a high risk of fatigue because their work either involves excessively long shifts, involves patterns that cause disruption to a worker’s internal body clock, or involves prolonged and intense mental and physical activity ([Safe Work Australia](#)). Some examples include:

- Shift workers
- Night workers
- Fly-in, fly-out workers
- Drive in, drive out workers
- Seasonal workers
- On-call and call-back workers
- Emergency service workers
- Medical professionals and other health workers.

“Workers suffering high levels of sleep related fatigue were 70 percent more likely to be involved in accidents than workers reporting low levels.”

How can you tell if someone is fatigued?

▶ The following signs or symptoms may indicate a worker is fatigued:

- Excessive yawning or falling asleep at work
- Short term memory problems and an inability to concentrate
- Noticeably reduced capacity to engage in effective interpersonal communication
- Impaired decision-making and judgment
- Hand-eye coordination or slow reflexes
- Other changes in behaviour, for example repeatedly arriving late for work
- Increased rates of unplanned absence.

▶ A fatigued worker may also experience symptoms not obvious to others including:

- Feeling drowsy
- Headaches
- Dizziness
- Difficulty concentrating
- Blurred vision or impaired visual perception
- A need for extended sleep during days off work.

Claims

Workplace injuries can be divided into two main categories, physical injury and mental injury. Mental injury, resulting in psychological harm, is the second most common cause of workers' compensation claims in Australia. One of the leading causes is work related stress – which, as described previously, is strongly intertwined with poor sleep.

WorkCover data obtained by Fairfax shows the average individual compensation payout for psychological injuries has risen from \$73,000 in 2008-09 to almost \$90,000 in 2013-14.

What Employers Can Do

While sleep and fatigue management is a shared responsibility between employers and employees, it is employers who are responsible for using a risk management approach to manage fatigue. If an employer fails to adequately manage fatigue and an employee is injured then that employee may be able to bring a claim for negligence against their employer. It also makes good business sense to try to minimise any workplace factors that may be contributing to an employee's problematic sleep, so that the impacts on absenteeism and presenteeism are minimised.

Hence, using a 2-pronged strategy of making reasonable adjustments to minimise causative workplace factors, and taking steps to address fatigue when it occurs, would be optimal.

“It is paramount that frameworks and solutions are incorporated in the workplace to minimise the cost of injuries to your workplace.”
Work Safe Victoria

Employers can minimise causative factors by:

Identifying workplace factors that may be causing stress and fatigue in the first place, and making reasonable adjustments to minimise the source of stress or fatigue. The following are recognised as common drivers of psychological strain on employees:

- Lack of role clarity
- Role overload
- Poor meeting or email culture
- Emotional demands

Some progressive employers are limiting times when people can send email to ensure they have a break from work in the evening. Reducing the number and duration of meetings and ensuring that employees have role clarity are also helpful strategies.

Employers can manage fatigue by:

- Educating employees on good sleep hygiene practices (our soon to be released e-book will address that)
- Limiting total hours worked per week to 55 or lower;
- Limiting overtime to 4 hours for 8 hour shifts and 2 hours for 10 hour shifts;

For shift workers;

- Limiting the number of consecutive night shifts for shift workers to 4;
- Ending night shifts by 8am;
- Ensuring there is a minimum of 12 hours between consecutive shifts;
- Ensuring the roster allows for at least two full night's sleep after the last night shift;
- Having a room for workers to sleep before commuting home;
- Minimising early morning starts before 6am;
- Avoiding more than 5 consecutive early morning starts;
- Avoiding safety critical tasks during the early hours of the morning (3am-5am).

In conclusion, sleep is one of the most critical daily practices for good health and cognitive performance and a combination of changing workplace practices and a modern, fast-paced life are contributing to concerning declines in sleep with a concomitant negative impact on business performance.

Chronic sleep issues can have a host of negative effects on an individual's health and quality of life and should be addressed for the good of the individual and the business.

Hence, all businesses should seriously consider surveying their employees sleep habits as well as workplace factors that may be contributing to them, and following those surveys with a 2-step process of making reasonable adjustments to workplace practices, combined with a serious sleep hygiene education program.



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