

## Sleep: Practical Solutions to a Modern Problem for Coaches

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### Background

Elite sport coaches are becoming increasingly aware of the connection between sleep, recovery and optimal athletic performance. Such awareness and increased interest by contemporary coaches has been brought about by noticing in athletes signs of sleep deprivation, now called *sleep restriction* by medical practitioners. Coaches are often faced with tired athletes before the training day has begun. Technological temptations to the current generation of athletes such as iPhones, X-Box, text messaging and even on-line gambling are creating considerable sleep related issues away from the training environment. Use of these or similar devices prior to hours of bedtime or simply resisting the urge to fall asleep can trigger a 'second wind,' which then can temporarily make it difficult to fall asleep afterwards.

Artificial light has been available in the industrialized West since at least the mid-19th century. As a result, sleep patterns have changed significantly, particularly in Western culture. However, what has not changed is human biology, and in particular, the circadian rhythm. Technology has not only been a recent problem in its negative effect on sleep practices but also contributing to the problem are Western 'industrial' attitudes to sleep, where sleep is seen as unproductive time and for the lazy. In the business world the first causality for poor time management and deadlines is sleep. Some of our best elite sporting coaches would admit they are not immune to sleep problems and Western 'industrial' attitudes to sleep.

However, Mediterranean countries and cultures have a very different outlook on sleep. The afternoon *siesta* is common and respected in these countries. The word *siesta* is Spanish, from the Latin *hora sexta* – "the sixth hour" (counting from dawn, therefore noon, hence 'midday rest'). On a recent trip to Spain, prominent Australian swimming coach, Bill Sweetenham, was amazed to note a lady was actually employed to teach young children how to siesta.

It is now becoming apparent that there are many broader social problems associated with sleep deprivation. For example, it is currently estimated that 15-20% of road accidents are a result of fatigue at the wheel. This now surpasses alcohol or drug related statistics in all modes of transport. Furthermore, many of the most infamous accidents in history have been attributed to sleep deprivation – including Chernobyl, Exxon Valdez and the Three Mile Island disasters<sup>1</sup>.

### Consequences of sleep deprivation

A range of functions such as decision-making, emotional well being, metabolic and immune processes can be negatively affected by sleep deprivation<sup>2</sup>. Current research suggests that sub-maximal prolonged tasks such as endurance capacity and reaction time may be more affected than strength and power qualities, particularly for several nights of partial sleep deprivation<sup>3</sup>.

### Common issues in elite sport

Given Western coaches are most likely to portray common practices and attitudes to towards sleep, the education of athletes surrounding sleep's importance is often overlooked. As such, athletes are often quite unaware of the consequences of sleep deprivation and what is required to achieve adequate sleep.

It is not uncommon for sporting competitions to take place across several continents and multiple time zones in time frames of less than 7 to 14 days. In these extreme circumstances, consideration is not always given to the scheduling of training and travelling and general logistics so as to maximize sleep and ultimately maximize performance. The circadian rhythm inheritably contains 'sleep' and 'sleepless' zones. These are periods of time when the body is at a low point or receptive to sleep, such as 1 am to 4 am. This is also the case exactly 12 hours later between 1 pm and 4 pm, which coincides with the time taken for siesta. Conversely, there are periods in the cycle where alertness and

physicality is at its peak, such as mid morning and late afternoon. Progressive elite sporting teams are now starting to take this natural cycle into consideration when planning international training and travelling schedules.

Since the World Anti-Doping Agency removed caffeine from its list of prohibited substances in 2004, many athletes now use and sometimes abuse caffeine prior to competition. Ingestion of large amounts of caffeine (500mg or more) prior to and during night games can result in players being able to sleep very little or not all. Over a series of weeks, this behaviour can drive players into a state of adrenal fatigue and severe sleep deficit. Often the use of caffeine in this way with these athletes is a way to combat excessively long day time naps, which sees them alter their normal sleeping pattern and present flat and lethargic at game time.

Sleep is universally acknowledged by coaches and athletes as vitally important and is the very best recovery agent available. Nevertheless, coaches and support staff will invest tremendous time and resources into many other performance parameters such as training, nutrition, sport science and sport medicine in an effort to gain the much sought after '1% performance edge', but most likely they overlook the most obvious and controllable variable: sleep. We are approaching diminishing returns in most performance parameters and cannot really train many of our elite athletes any harder, but it appears we can improve adaptation to training via sleep education and better sleep practice.

The perfect night's sleep is often an unattainable ideal for many athletes due to a variety of circumstances. Nonetheless, napping may be beneficial for athletes who have to routinely wake early for training or competition and for athletes who are experiencing sleep deprivation. Furthermore, athletes are often required to train early in the morning and late in the evening, and to carry out commercial tasks by their respective organisation during the day. As such, some progressive professional teams are now installing sleeping quarters to allow and encourage napping during the circadian low point from 1 pm to 4 pm prior to an afternoon training session. Some of the benefits of a 20 to 40 minute nap include:

- Naps can restore alertness, enhance performance, and reduce mistakes and accidents. A study at NASA on sleepy military pilots and astronauts found that a 40 minute nap improved performance by 34% and alertness by 100%
- Napping promotes the secretion of testosterone in males, which aids recovery
- Napping facilitates beneficial changes in cortisol and interleukin-6, which are associated with inflammation

### **Sleep deprivation compared to alcohol impairment**

According to a 2000 study published in the British Medical Journal, researchers in Australia and New Zealand reported that sleep deprivation can have some of the same hazardous effects as being drunk<sup>4</sup>. A 1997 study found that after 17 hours of sustained wakefulness, cognitive psychomotor performance decreased to a level equivalent of performance impairment comparable of a blood alcohol concentration of 0.05%<sup>5</sup>. The implication of this research for athletes is that their reaction times are significantly reduced under sleep-deprived conditions.

### **Practical coaching interventions**

Fortunately there are both high tech and low tech solutions to help modern coaches deal with the issue of sleep – both solutions start with education. Talking to your athletes about the importance of sleep and how it affects athletic performance is critical. It is not unusual for it to take several seasons for players to fully understand the importance of sleep; therefore, the message has to be reinforced as often as possible.

One of the ways to reinforce the message is to ask athletes to write down their 24-hour schedule for a week. The list should include time spent eating, studying, training, playing, travelling and sleeping. In this way the coaches and athletes can 'see' what the life of an athlete looks like and can discuss how athletes can make improvements to increase their sleep hours. Obviously the reliability of the information will rest on the accuracy and honesty of athletes and the fact that self reported sleep is normally not very accurate. However, it is a good first step to give the athletes the message that sleep is important and to show them where they need to make changes in their lives to improve their sleep.

Newer high tech solutions also start with education, but instead of asking athletes to self report their sleep, a more thorough analysis can be conducted utilizing a number of different systems that are currently on the market. ReadiBand™ is one model available, which simply requires wearing an actigraph. This is a small watch-like device that players can wear 24/7 for a week (except during competition and training). The information collected by the ReadiBand is then downloaded onto a laptop for automated analysis, and a personalized report is generated. The information contained in the reports is invaluable to coaches and athletes. It shows when athletes slept, and how long and how well they slept. More importantly, the analysis shows how athletes' sleep affects their reaction time and their ability to concentrate during competition. This is great feedback to athletes and is instrumental in changing their behaviours.

The aggregate information from all athletes gives coaches the ability to 'see' how long it takes their athletes to get to sleep after competition and training. Coaches can also determine how their players sleep on the road during travel, thereby allowing coaches to better plan travel and training schedules.

Modern problems like staying up late to be on the computer or long distance travel in short periods of time require modern solutions.

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