

The importance of sleep on health and mental performance

Generally speaking, most adults need around seven to eight hours of sleep a night, but through factors such as insufficient time, distractions, and various medical conditions, one third of adults are suffering from sleep deprivation (SD), which can have negative effects on a person's mental and physical functions. While a prevalent issue, there are many ways to avoid or cope with SD, and lessen its effects on both body and mind. While there are many illnesses and disorders that affect sleep, insomnia is one of the leading causes of sleeplessness and can be a standalone condition. Insomnia is when a person is unable to fall, stay or even experience a restful, fulfilling sleep, reducing emotional intelligence and constructive thinking, while also affecting body weight, immune function, and much more. In more severe cases of insomnia, irregular heartbeats and skin disorders can be triggered or worsened.

Effects on the brain

Despite average sleep times being between 7 and 8 1/2 hours per day (Kripke et al 2002; Carskadon and Dement 2005; Kronholm et al 2006), The need for sleep is affected by many factors, and varies considerably between individuals (Shneerson 2000). Processes such as restitution of the body, energy conservation, and tissue healing are positively affected by sleep (Maquet 2001), and is essential for cognitive functions, predominantly memory consolidation (Maquet 2001; Stickgold 2005). Sleep deprivation has also been known to activate the sympathetic nervous system, leading to blood pressure rising (Ogawa et al 2003) and increased cortisol secretion (Spiegel et al 1999; Lac and Chamoux 2003). Over an extended period, immune response can be affected and metabolic changes such as insulin resistance have been known to occur (Spiegel et al 2005). Sleep deprivation may negatively affect sustained concentration, while also debilitating working memory. Working memory can be divided into two distinct parts: visual working and verbal working memory. Verbal memory encompassing fact recall from reading and listening, as visual memory encompasses our cognitive interactions with objects and shapes. Both are an important part of higher cognitive functioning, and both influence SD in different ways. Experiments have shown a difference between partial sleep deprivation and total sleep deprivation when it comes to their effect on visual working memory. When a person is sleep deprived, the capacity is about the same as it is in a rested person, however the ability to move items into and out of visual working memory is degraded substantially in people with total deprivation. Through advanced imaging systems and behavioural tests, lower levels of blood-borne oxygen being delivered to important areas in the brain can be observed in sleep deprived patients over 24 hours.

Sleep and health

Sleep plays a vital role in your body's ability to heal and repair your blood vessels and heart, and poor sleep conditions can heighten the risk of chronic health problems like high blood pressure, heart disorders, and strokes. According to research from Harvard Medical School, one night without enough sleep can cause elevated blood pressure throughout the next day for individuals suffering from hypertension. Sleep deprivation means your body is unable to properly build its immune system. According to the Mayo Clinic, studies show that if a person doesn't get enough healthy sleep, their defences against bacteria and viruses will be weakened, and it can take them longer to recover from illness. A side effect of sleep deprivation is micro sleep, where an individual may uncontrollably lose consciousness for only a few seconds or a few minutes without realising. This can be extremely dangerous if you're driving, and make you more prone to accidents. According to research from the National Heart, Lung, and Blood Institute, unsatisfactory levels of sleep have played a tragic and easily avoidable part in accidents involving planes, ships, and nuclear reactor meltdowns to name a few.

Sleep debt can also be associated with clinical depression and other melancholic disorders, however there are no consistent bio-markers for sleep debt, so most formal diagnosis' have to be behavioural. A person who loses one night's sleep will generally be slow and easily agitated until restfulness is restored, and will either become easily fatigued or overly energetic thanks to Adrenalin. After missing two night's sleep, a person will have issues with concentration and will begin to make mistakes on basic tasks. Three missed nights and a person may begin to hallucinate and lose their sense of reality.

Inflammation is associated with a number of long-term chronic illnesses such as heart problems and cancer, and sleeplessness has been known to heighten levels of inflammatory mediators. While is no smoking gun linking restricted sleep to these conditions, it's reasonable to assume poor sleep increases the chance of developing health problems. It may increase the severity of the chronic problems seen in conjunction with aging. It affects carbohydrate metabolism the same way diabetes does (at least in the short run) and produces higher levels of the stress hormone cortisol in the evenings and generally more activity of the sympathetic nervous system. People with sleep debt also take more risks. A test of sleep deprived card players found they correctly assessed the increased risk of certain bets in the same manner as their rested counterparts, but were more willing to place bets on the higher risk propositions.

Although an unhealthy sleep cycle increases the risk factor for obesity, total sleep deprivation has been observed as leading to weight loss. Animals that are subjected to extended sleeplessness lose weight at an increased rate, and anecdotally humans report feeling chills when forced to remain awake for extended periods. From this seemingly contradictory data, does sleeplessness lead to the losing or gaining of weight? Scientific investigations have shown that humans use more energy during periods of SD, but that how much energy is used depends on the rate of sleeplessness. In periods of total sleep deprivation, the brain accumulates sleep debt rapidly, and energy expenditure is heightened to a point that the animal or person will start to lose weight. In the more common situation of partial sleep deprivation, rate of extra energy expenditure is low and the body can usually accommodate for that which would be lost.

Chronic short sleep, a form of partial sleep deprivation, leads to raised levels of body mass (as opposed to short-term total sleep deprivation where levels are seen to lower). It is widely suggested that sleep deprivation can simply be the result of a lack of a healthy routine. If you encounter sleep deprivation on an ongoing basis, it is advised to ensure this is not the prominent cause before seeking professional advice.

References

https://www.researchgate.net/publication/221845091_Energy_Drinks_Psychological_Effects_and_Impact_on_Well-being_and_Quality_of_Life-A_Literature_Review
<http://www.chagrinschools.org/Downloads/researchfhSleep%20deprivation.pdf> <http://www.ozmattress.com.au/essential-tips-getting-perfect-nights-sleep/>
<http://postcog.ucd.ie/files/Harrison%20and%20horne.pdf> <http://www.sleepdex.org/insufficient.htm> <http://www.sleepdex.org/deficit.htm> <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2656292/>
https://books.google.co.uk/books?id=4Tkdm1vRFbUC&pg=PA98&lpg=PA98&dq=Shneerson+2000&source=bl&ots=Xaa9FJRPHU&sig=qpy4GcZxLbFNtsEUfgvGS5G2uZg&hl=en&sa=X&ved=0ahUKEwj93Z_2ic7NAhVEJ8AKHbR5Az
Sleep Difficulties and Autism Spectrum Disorders: A Guide for Parents and ... By Kenneth J. Aitken Handbook of Integrative Clinical Psychology, Psychiatry, and Behavioral ... By Roland A. Carlstedt, PhD Sleep, Health, and Society: From Aetiology to Public Health By Francesco Cappuccio, Dr. Michelle A. Miller,