

SLEEP DEPRIVATION

Sharon Ray

Eastern New Mexico University,
Portales, New Mexico, **USA**

ABSTRACT

Sleep deprivation is a problematic issue that exists throughout the entire human population and affects all age groups across the millennium. Lack of sleep can cause serious health issues, academic problems, and mistakes in the work place. It is imperative that individuals get enough sleep to be able to function mentally and physically throughout the day. Sleep is an essential part of human nature and is crucial for the brain and body systems to rest and regenerate. This enables college students, nurses, health care students, physicians, and surgeons to function safely in their work environment, at school, or at home. This paper will explore sleep deprivation among college students, nurses, residents/interns, physicians, and surgeons. Sleep deprivation will also be explored as to how it relates to automobile accidents, medical problems, mistakes in the work place, medication errors, and poor student functioning in the classroom setting due to lack of sleep.

Keywords: *sleep deprivation, cognitive, accidents, health problems, college students, nurses, surgeons, junior hospital doctors, physicians*

INTRODUCTION

Sleep deprivation or chronic sleep deficit, is a common scourge among society. The National Sleep Foundation (2010) reported that a sample of individuals, ages 13-64 years, whom were observed, indicated that most only sleep an average of 6.9 hours on work and school days. Observations in different countries and among different cultural settings have confirmed that the adolescent population was the highest individuals at risk for sleep deprivation (Oginska, Mojsa-Kaja, Fafrowicz, & Marek, 2013).

The real and ideal sleep patterns of secondary students showed a sleep deficit during the week of 100 minutes for secondary students and 40 minutes for university students (Oginska & Pokorski, 2006). The effect of sleep deprivation leads to physiological and cognitive consequence that causes impairments and poor judgments in performance (Sallinen et. al, 2013). Sleep loss varies from person to person and each person is affected differently.

COGNITIVE SYMPTOMS

Sleep deprivation symptoms include drowsiness, impaired immune responses, endocrine and metabolic functions, loss of appetite, and profound

cognitive deficits (Oginska, Mojsa-Kaja, Fafrowicz, & Marek, 2013). A list of cognitive symptoms that impairs cognitive functions are slowed reactions to situations, heightened errors of omission and commission, the decline in working memory, problem-solving decisions, and dilapidation of divergent thinking (Durmer & Dinges, 2005).

Intensive performance or attention becomes unstable and requires increased compensation to remain behaviorally effective (Oginska, Mojsa-Kaja, Fafrowicz, & Marek, 2013). Judgmental abilities and distractions interfere with different situations that occur due to lack of sleep. Research has shown that sleep deprivation is connected with augmented reactivity towards negative stimuli and imposes the bidirectional nature of imbalances (Gujar, Yoo, Hu, & Walker, 2011).

Sleep deprivation has also been shown to impair social intuition or the ability to recognize other people's emotions, especially when there are threats (Van der Helm, Gujar and Walker, 2010). Other cognitive functions that are impaired due to sleep deprivation are visuomotor performance, spatial attention, decreased oculomotor functioning, and the ability to reason (Alhola & Polo-Kantola, 2007).

Individuals between the ages of 20-25, underestimate their cognitive performance. Older individuals between the ages of 52-63, tend to overestimate their cognitive performance. Research has found that individuals who have not slept after a 24-hour period have decreased performance and the ability to make sound judgments (Alhola & Polo-Kantola, 2007).

The recovery period for cognitive performance, due to sleep deprivation, is still obscure because it was not researched or the results were not reported (Alhola & Polo-Kantola, 2007). Recovery sleep is very different from normal sleep. According to Alhola & Polo-Kantola (2007), sleep latency is much shorter, sleep efficiency is much higher, the amount of REM-sleep increases.

The basolateral portion of the amygdala transforms stressful experiences into anxiety and fear. It was found that an individual in the REM stage of sleep is able to consolidate those events into fears that intensify stress. These traumatic events can present as post-traumatic stress disorder (PTSD) and other anxiety disorders in individuals who are exposed to those events (Menz, et. al, 2013).

SLEEP CYCLES

The natural sleep cycle needs to be understood when assessing and assisting college students, nurses, other medical professionals who experience sleep deprivation. Two biological rhythms are involved in sleep. These two rhythms are the circadian and ultradian rhythms (Austin, 2007).

The circadian rhythm is also known as the sleep-wake cycle and is guided by the dark-light cycle within a 24-hour period. The circadian rhythm determines the rhythmic changes of an individual's behavior and physiology (Austin, 2009). The body makes changes throughout the day to make internal adaptations in the time of day (Austin, 2009).

There are certain internal factors that can influence the circadian cycle. These factors are hypersensitivity to noise, worry, psychiatric illnesses, medical illnesses, and alcohol (Austin, 2009). There are two cycles of sleep patterns non-rapid eye

movement (non-REM) and rapid eye movement (REM). Sleep always begins with non-REM and generally lasts between 70-90 minutes. This is followed by the REM stage of sleep that lasts between 10-30 minutes. During the sleep period, this cycle repeats itself while the individual sleeps (Austin, 2009).

The non-REM sleep cycle has four distinct cycles. Stage one consists of a light sleep stage that has slow muscle movement of the eyes and it is easy to around the individual. Stage two occurs when brain waves begin to slow down and are interspersed with occasional rapid brain waves. This is when eye movement tends to stop (Austin, 2009). Stage three is when the individual falls into a deep sleep that is characterized by Delta brain waves that are very slow. Occasionally this phase produces short rapid brain activity. Stage four is a deep sleep stage that is characterized by predominant Delta waves. In this stage, there is no eye or muscle movement (Austin, 2009).

The REM phase of sleep is characterized by rapid, irregular, shallow breathing, rapid eye movement, no muscle movement of the body or extremities, and dreams (Austin, 2009). It is imperative that the REM stage of sleep is uninterrupted because it gives the person the feeling of being rested when they wake (Austin, 2009).

AUTOMOBILE ACCIDENTS

In the last decade, traffic accidents have significantly increased due to sleep-deprived individuals who were driving with various sleep quandaries (Inoue & Komada, 2014). It has been proven that excessive daytime sleepiness is a common physiological phenomenon among the general population. This has been linked to the continuing increase in traffic accidents (Inoue & Komada, 2014).

COLLEGE STUDENTS AND SLEEP DEPRIVATION

According the Health Research Funding (2014), a study was performed at Brown University on college students and sleep deprivation. It was found that 11% of Brown University's student population was found to have no sleeping problems. However, 73 % of Brown University's college students were found to have sleep issues (Health Research Funding, 2014).

Sleep problems are not all linked to sleep deprivation among the college population. Thirty percent of female college students and 18% of college males were found to have issues with insomnia within the past months (Health Research Funding, 2014). College students, both male and female, are at the greatest risk of sleep deprivation on a regular basis. College students who must sit in an environment they must be still in for a semi-long period of time can cause the student to fall asleep. Many students will forgo sleep in order to complete intensive assignments or to student for exams (Health Research Funding, 2014).

Sleep deprivation impairs the college student's ability to pay attention in their classes and these inevitable cause lower grade point averages (GPAs). The inability to concentrate, retain information, and to learn is greatly effected in college students (Health Research Funding, 2014). Approximately twenty out of

every 100 students in college sleep an average of five hours during weekdays. Each individual has different requirements for sleep. Some need to sleep more hours in order to function while others do well with less sleep (Health Research Funding, 2014).

The American College Association conducted a survey of 139 different schools and of the 97,712 responses received about how college students handle sleep, most felt well rested only half the time and the other half felt sleepy most of the time (Health Research Funding, 2014).

Most college students admitted that they slept at least eight hours or more during the weekend on a regular basis. Student schedules and time management are the largest influence on how much time a college student sleeps (Health Research Funding, 2014).

NURSES AND SLEEP DEPRIVATION

Nurses play an important role in the health care of others, however, they often compromise their own health due to lack of sleep. Many nurse work twelve hour shifts that can cause fatigue, burnout, and illnesses due to sleep deprivation (Eanes, 2015). Nurses are often work extended shifts due to the nursing shortage. Due to sleep deprivation, nurses are more often prone to make mistakes in the workplace (Earnes, 2015).

Nurses and nursing students often go to work or to clinicals tired. Sleep loss and sleep deprivation jeopardizes the nurse's health and patient safety. Most errors that occur are medication errors in the health care and clinical settings (Hughes & Rogers, 2004). When nurses work more than 60 hours a week due to shortages, patient safety is at a high risk.

Lack of sleep and fatigue can greatly debilitate the nurse or nursing student's alertness, productivity, and safe patient care (Nurok, Czeisler, & Soleymani-Lehmann, 2010).

Research has shown that nurses get less sleep than the general population. It is a well-known fact that the combination of sleep deprivation and working long hours is associated with serious health issues. This, in turn, can impair learning, memory, judgment, performance, and can contribute to chronic diseases, obesity, diabetes, cardiovascular disease, and cancer (Earnes, 2015).

The American Nurses Association (ANA) released a position statement in 2014 that recognized the dangers related to inadequate sleep and the resulting fatigue (Earnes, 2015). The ANA encouraged employers to carefully consider the nurses need for adequate sleep before offering the nurse on-call, voluntary, or mandatory overtime (Joint Commission, 2011).

PHYSICIANS, JUNIOR HOSPITAL DOCTORS AND SURGEONS

Physicians, junior hospital doctors, and surgeons experience sleep deprivation due to long hours and the need to be on-call for emergencies and hospitalized patients (British Medical Journal, 2002). The American College of Surgeons (ACS) has addressed the issue of sleep deprivation among surgeons.

The ACS has acknowledged that it is imperative that surgeons be trained in understanding how fatigue will degrade their mental and physical capabilities in the operating room (Pellegrini, Britt, & Hoyt, 2010). It has been shown that surgeons often suffer from fatigue due to working 24 hours shifts and that they are unable to perform highly complex procedures safely (The New England Journal of Medicine, 2010).

Sleep deprivation has adverse effects on the clinical performance of physicians and surgeons. It has been found that sleep deprivation impairs the physicians and surgeon's performance as much as a person who has alcohol intoxication (Nurok, Czeisler, & Soleymani-Lehmann, 2010). Due to sleep deprivation and the medical student's inability to function in a safe manner, the Accreditation Council for Graduate Medical Education revised their regulations. Medical students are now restricted working 16 continuous hours in their first postgraduate year and must have at least eight hours of rest between shifts (Nurok, Czeisler, & Soleymani-Lehmann, 2010).

Surgeons who are sleep deprived are at an 83 percent risk for complications during surgery. Patients who are undergoing elective surgeries are at a high risk due to surgeons who have had approximately six hours of sleep between procedures on during the previous day of on-call duty (Nurok, Czeisler, & Soleymani-Lehmann, 2010). It is imperative to ensure that patients' safety is protected during elective surgeries, therefore, policies are set in place to avert sleep deprivation in surgeons and surgical students (Nurok, Czeisler, & Soleymani-Lehmann, 2010).

IMPROVING SLEEP

It is imperative that the individual is evaluated carefully in order to determine the persons sleeping disorder. Treatments that are being recommended include behavioral and medication but only for a short period of time if needed (Porkka-Heiskanen, Zitting & Wigren, 2013). Other methods that can be used to decrease sleep deprivation are to avoid nicotine, a consistent bedtime, engaging in a relaxing activity before bed (e. g prayer, warm bath, calming music), comfortable positions in bed, and a dark, quiet environment (Porkka-Heiskanen, Zitting & Wigren, 2013).

In conclusion, sleep deprivation is a common quandary among college students, nurses, physicians, junior hospital doctors, and surgeons. Sleep deprivation among college students is commonly caused by lack of discipline and organization. College students often do not sleep in order to complete written papers, assignments, to study for tests at the last minute, or due to partying instead of concentrating on their schoolwork. This can cause unnecessary stress, anxiety and sleep deprivation. This puts the student at high risk for failing courses and lower GPAs.

Nurses, physicians, junior hospital doctors, and surgeons who have sleep deprivation put themselves and their patients at a high risk for errors and complications. The health of the health care worked can be greatly affected and can cause major illnesses due to lack of sleep. Sleep deprivation among nurses,

physicians, and surgeons puts patients at a higher risk for medication errors, surgical complications, medical errors, or even death. It is imperative that college students, nurses, health care students, physicians, and surgeons gets adequate rest before each shift in order to practice in a safe professional manner.

REFERENCES

- 1) Alhola, P., & Polo-Kantola, P. (2007). Sleep deprivation: Impact on cognitive performance. *Neuropsychiatric Disease and Treatment*, 3(5), 553-567.
- 2) Austin, B. (2007). *Sleep Deprivation in the college student*. Spokane: Bess Austin.
- 3) British Medical Journal (2002). Sleep deprivation (A memorable patient). *British Medical Journal*(325.7359), 318.
- 4) Durmer, J. S., & Dinges, D. F. (2005). Neurocognitive consequences of sleep deprivation. *Semin. Neurol.*, 252, 117-129.
- 5) Earnes, L. (2015). CE: The Potential Effects of Sleep Loss on a Nurse's Health. *Americal Journal of Nursing (AJN)*, 115(4), 34-40.
- 6) Gujar, N., Yoo, S., Hu, P., & Walker, M. P. (2011). Sleep deprivation amplifies reactivity of brain reward networks, biasing the appraisal of positive emotional experiences. *Journal of Neruoscience*, 31, 4466-4474.
- 7) Health Research Funding (2014, July 20). *10 sleep deprivation in college students statistics*. Retrieved from HealthResearchFunding.org: <http://healthresearchfunding.org/category/psychological-articles-and-infographics>
- 8) Van der Helm, E., Gujar, N., & Walker, M. P. (2010). Sleep deprivation impairs the accurate recognition of human emotions. *Sleep*, 33, 335-342.
- 9) Hughes, R. G., & Rogers, A. E. (2004). Are you tired? Sleep deprivation compromises nurses' health-and jeopardizes patients. *American Journal of Nursing (AJN)*, 104(3)
- 10) Inoue, Y., & Komada, Y. (2014). Sleep loss, sleep disorders and driving accidents. *Sleep and Biological Rhythms*, 12, 96-105.
- 11) Joint Commission (2011). Health care worker fatigue and patient safety. *Sentinel Event Alert*(48).
- 12) Menz, M. M., Rihm, J. S., Born, J., Kalisch, R., Page, H. C., Marshall, L., & Buchel, C. (2013). The role of sleep and sleep deprivation in consolidating fear memories. *NeuroImage*, 75, 87-96.
doi:10.1016/j.neuroimage.2013.03.001
- 13) National Sleep Foundation (2010). *How much sleep do we really need?* Washington, DC: National Sleep Foundation. Available at <http://www.sleepfoundation.org/article/how-sleep-works/how-much-sleep-do-we-really-need>.
- 14) Nurok, M., Czeisler, C. A., & Soleymani-Lehmann, L. (2010). Sleep deprivation, elective surgical procedures, and informed consent. *The New England Journal of Medicine*, 363;2577-2579.
doi:10.1056/NEJMp1007901

- 15) Oginska, H., Mojsa-Kaja, J., Fafrowicz, M., & Marek, T. (2014). Measuring individual vulnerability to sleep loss-the CHICa scale. *European Sleep Research Society*, 23, 339-346.
- 16) Oginska, H. & Pokorski, J. (2006). Fatigue and mood correlates of sleep length in three Age-social groups: School children, students, and employees. *Chronobiology International*, 23(6), 1317-1328.
- 17) Pellegrini, C. A., Britt, L. D., & Hoyt, D. B. (2010). Sleep deprivation and elective surgery. *The New England Journal of Medicine*, 27.
- 18) Porkka-Heiskanen, T., Zitting, K. M., & Wigren, H. K. (2013). Sleep, its regulation and possible mechanisms of sleep disturbances. *Acta Physiologica*, 208(4), 311-328. doi:10.1111/apha.12134
- 19) Sallinen, M., Onninen, J., Tirkkonen, K., Haavisto, M. L., Harma, M., Kubo, T., Mutanen, P.,
- 20) Virkkaia, J., Holm, J., Tolvanen, A., Porkka-Heiskaren, T. (2013). Effects of cumulative sleep restriction on self-perceptions while multitasking. *J. Sleep Res.*, 22, 273-281.
- 21) The New England Journal of Medicine (2010). Sleep deprivation and elective surgery. *The New England Journal of Medicine*, 363(27), 2672-2673.
- 22) Van der Helm, E., Gujar, N., & Walker, M. P. (2010). Sleep deprivation impairs the accurate recognition of human emotions. *Sleep*, 33, 335-342.