The Effects of Sleep on Student’s Classroom Performance
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Abstract

In this study, 13 participants were selected from an introductory college computer science course to be surveyed. Participants were asked about their sleep habits (both in total and the night before a quiz). These habits are then compared with their average quiz grade for the course. A strong correlation between the amount of sleep a student gets throughout the week and the amount of sleep a student gets on the night before the weekly quizzes (Monday Sleep) was also found. This is then compared to the students' average weekly sleep and their performance in class. In addition, a correlation between the amount of sleep a student gets on the night before a quiz and the amount of sleep a student gets on average throughout the week is determined. It is found that there is a significant decrease in average quiz grades for students who sleep less than 6 hours on the night before a quiz compared to those who sleep more than 6 hours. This correlation is further emphasized by averaging quiz grades, a correlation was found between the weekly sleep and performance in class (measured by averaging quiz grades), a correlation was found between the weekly sleep and performance in class (measured by averaging quiz grades), a correlation was found between the weekly sleep and performance in class (measured by averaging quiz grades). A strong correlation between these variables is found. The correlation coefficient is 0.48, so the correlation is somewhat weak.

Methodology

The sample population of this study consists of college students enrolled in an introductory computer science course. The participants were selected from two workshops on a voluntary, anonymous basis. The participants were selected from two workshops on a voluntary, anonymous basis. The participants were asked about their average number of hours of sleep throughout the week and the amount of sleep they get the night before their weekly quizzes. The quiz averages throughout the semester were calculated. This data was then subjected to statistical analysis as shown in the section below.

Review of Literature

Numerous studies have been done on the effects of sleep deprivation, be it on the homeostatic factors (e.g., memory function), or on cognitive processes (e.g., sleep inertia). These studies further emphasize the importance of sleep on learning and memory processes. These long-term effects are much more difficult to ameliorate. This study investigated the specific effects of the sleep-deprived subject on the student’s ability to function.

The Harvard Business Review, in conjunction with the Harvard Medical School, established four sleep-related factors that affect cognitive performance: homeostatic sleep drive, cumulative exhaustion, circadian rhythms, and sleep inertia. The first, homeostatic sleep drive, is the brain’s way of waking up. “If you wake up at 7 a.m. and you haven’t slept for four or five days, you develop the level of cognitive impairment as if you’d been awake for 24 hours—equivalent to legal drunk driving.” Within ten days, the level of impairment is the same as you’d have going 48 hours without sleep. This greatly lengthens reaction time, impairs judgment, and interferes with problem solving. Circadian rhythms, the third factor, are the body’s internal and neurological clock for determining time of day (and, by extension, sleep). In a person who receives enough sleep, circadian rhythms work with the sleep drive to make a person want to sleep only when ready, and only keep them up when ready. However, if this pattern is skewed due to lack of sleep or irregular sleeping patterns, these circadian rhythms become skewed. The fourth factor, sleep inertia, is the grogginess one feels when attempting to wake up. “The part of your brain responsible for memory consolidation doesn’t function well for five to 20 minutes after you wake up and doesn’t reach its peak efficiency for a couple of hours.” There is a transitional period between the time you wake up and the time your brain becomes fully functional. This is why you never want to make an important decision as soon as you are suddenly awakened…” These four factors work together and each other based on the sleep patterns of an individual, causing disastrous consequences on performance if one has too great a sleep deficit.

The University of New Mexico (UNM) and the National Institute of Health’s Center of Biotechnology (NIH/CBIC), both studied the effects of sleep deficit on health and cognitive performance respectively. UNM studied both acute sleep loss – sleep-deprived subjects awake for 24-72 hours continuously – and chronic sleep loss – restricting subjects’ sleep time over a few consecutive nights. Although both kinds have detrimental cognitive effects, chronic sleep loss can also lead to severe health deficits because it activates the body’s sympathetic nervous system, “which can lead to an increase in the blood pressure and cortisol secretion (Alho & Polli-Kamal). Cortisol has been shown to stimulate appetite and leptin, the hormone that facilitates the deposition of fat, thus leading to weight gain (Bonferroni, 2011).” NIH emphasizes that although scientists do not entirely understand how or why the sleep process came to be, they can conclude that sleep deficits are detrimental to both cognitive performance and the physical health of the brain. Attentional lapses, or “microsleeps,” are to blame for the cognitive deficit; although it was once thought that cognitive ability remained intact between microsleeps, it has now been discovered that cognitive processes slow independently of these attentional lapses. Sleep deficit has also been observed to have effects on the brain’s frontal lobe, which further affects working and attentional memory processes. These long-term effects are much more difficult to ameliorate.

In this study, it was found that there is a significant decrease in the amount students sleep on the night before a quiz as compared to the amount they sleep on average. Although no correlation was found between the participants’ weekly sleep patterns, there was a positive correlation found between the sleep before the quiz and the quiz average. This correlation may be in part caused by sleep deprivation. Lack of sleep, both long term and short term, has effects on cognitive performance. This impairment of cognition due to lack of sleep can be studied further by testing students, in a laboratory setting, on their ability to perform mental tasks while under the influence of various amounts of sleep in the short term as well as the long term.

References


Results

In this section, the three variables are compared to test for their correlations by using the python scipy statistics and graphing libraries.

Sleep Weekly and on Mondays

The number of hours of sleep weekly and on Mondays is determined. This study investigates a specific aspect of the effects of sleep deprivation, be it on the homeostatic factors (e.g., memory function), or on cognitive processes (e.g., sleep inertia). These studies further emphasize the importance of sleep on learning and memory processes. These long-term effects are much more difficult to ameliorate. This study investigated the specific effects of the sleep-deprived subject on the student’s ability to function.

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