Effects of Smartphone Use Before Bed On Amount of Sleep Acquired by Students

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Abstract

This experiment looks to examine the relationship between electronic media use before bed and the amount of sleep that a college student obtains. Sleep deprivation is very common for college students and can result in negative effects on the body and mind, such as fatigue or memory loss, thereby affecting their GPAs. This study consisted of 50 voluntary participants from the University at Buffalo, which included 25 freshmen students and 25 seniors students aged 18–24. Participants with greater electronic media before bed obtained significantly less hours of sleep. The results demonstrated a negative relationship between use of technology and sleep, suggesting that recommendations on healthy media use could include restrictions on electronic devices.

Keywords: electronic media, sleep, college students

Effects of Smartphone Use Before Bed On Amount of Sleep that Students Acquire

Globally, college students are highly dependent on technology. It is becoming more common for classes to enforce the use of online educational software and databases than it is to write in a notebook. The purpose of this study was to look at the amount of sleep both freshmen and seniors acquire after being on devices required to be used in school in order to complete tasks or studies such as homework. Since seniors have habituated to the college lifestyles, it is presumed they will understand the importance behind sleep, whereas freshmen are fairly new to being independent and more inclined to make decisions that don't benefit their health. This experiment examined the relationship between smartphone use and the amount of sleep that a college student acquires. We hypothesized that phone usage before bed would have an inverse correlation with the amount of sleep an individual acquires and that freshmen would get significantly less sleep than seniors.

Sleep is an important aspect to all humans because it is crucial to the recovery of all bodily functions. In a recent study by W. Chen and J. Chen (2019), the importance of sleep is emphasized. Chen and Chen (2019)’s research presented that the amount of sleep acquired by students who utilized the internet for more than two hours during the day significantly decreased by two hours. The aforementioned study determined that sleep deprivation is very common for students and results in negative effects on the body, such as memory loss, resulting in low GPAs. Results from previous studies indicate that depression, anxiety, and sleep quality may be associated with smartphone overuse. Such overuse may lead to depression and/or anxiety, which can in turn result in sleep problems. For the purposes of this experiment, sleep will be

operationally defined as the absence of alertness, which is typically accompanied by an individual in the prone position.

According to Khullar (2012), sleep is defined in terms of circadian rhythms, or the body's sleep and wake cycle. The circadian rhythm consists of an internal clock that works by either suppressing or synthesizing melatonin, which signals the body to either sleep or wake up. Melatonin is a hormone that helps regulate sleep and is normally secreted by the pineal gland in response to darkness. Suppression of the hormone may lead to sleep deprivation. Results from West's et al. (2011) experiment presented a positive correlation between the hazardous blue lights displayed from smartphones and increased melatonin suppression. Constant engagement with smartphones and other handheld devices, such as tablets or laptops, can keep the brain stimulated. Falling asleep becomes increasingly more difficult.smartphone overuse. A similar study by Gronli et al (2016) supported these findings. In contrast, results from a study by Curtis (2019) indicated that reading physical books before bed increased the amount of people obtained.

Adolescents are losing sleep for numerous reasons, one of which is due to phone usage before bed. Excessive electronic media use at night is a risk factor for both adolescents' sleep disturbance and depression. There are many articles supporting this claim, indicating that using handheld devices before bed decreases the amount of sleep an individual obtains. For example, research conducted by S. Kim, M. Kim, Park, J. Kim, and Choi (2018) indicated that individuals who utilize devices for internet use tend to acquire sleep loss more commonly than those who don't. The recommended amount of sleep for adolescents are between 7.5 to 8.5 hours a day. However, the average amount of sleep many obtain is approximately two or more hours less than the recommended time.

Method

Participants

This study consisted of 50 participants from the University at Buffalo, including 25 freshmen and 25 senior students aged 18–24 (M = 20.74, SD = 1.89), were recruited via their school e-mail, or flyers placed around the school and in lecture halls. The sample consisted of 24 males and 26 females, specifically 56% White/Caucasian , 20% Black, 16% Asian , 6% American Indian, and 2% Pacific Islander. Students chosen for this experiment were those who responded to an advertisement posted around the University. Participants each received a gift card to Insomnia Cookies as compensation. Each participant was required to complete a physical to ensure they had no prior medical history that would influence the amount of sleep they acquired. Participants with health issues such as depression, narcolepsy, or insomnia, etc were excluded from the experiment.

Materials and Procedure

This experiment was conducted using a two-by-two mixed factorial design. There were two conditions for the between subjects independent variable, the type of student, which were either freshmen or seniors. There were also two conditions pertaining to the within subjects independent variable, smartphone usage before bed, which were whether or not the participants used a smartphone before bed. Participants who did not receive the phone were considered the control group. For the purposes of this experiment, participants in the experimental condition were provided with smartphones, specifically Apple iPhones. In contrast, participants in the control condition were provided with reading materials to occupy their time. The participants sleep information was collected through a polysomnography.

This experiment was conducted for six nights and held at the Buffalo Niagara Sleep Medical Center. For each night of the experiment, shuttle bus services were made available to pick up participants and bring them to the lab. This service was offered again in the morning to take the participants back to their homes. The participants were assigned to nearly identical rooms, with all external conditions held constant. Each room was 11 by 12 feet, painted white, and equipped with a twix XL bed. Additionally, each room was room temperature (60-67 degrees fahrenheit).

For the purposes of the experiment, the sample was counterbalanced in order to prevent order effects. Participants in the experimental condition were allowed to use smartphones before going to sleep. Furthermore, they were required to use the smartphone provided for 30 minutes. Time spent using was determined using a built in application that measured how long the phone screen was turned on. After the 30 minutes, the smartphones automatically powered off in order to ensure that each individual experienced the same amount of time. Researchers did not restrict participants from specific applications on smartphones however they were not allowed to make personal phone calls.Those in the control condition were not allowed to use smartphones, and instead were provided with reading materials to occupy their time.

Results

Phone usage before bed had an inverse correlation with the amount of sleep participants acquired (see Table 1). Freshmen during the no phone condition ($M = 6.41$, $SD = 1.46$) acquired more sleep than freshmen during the phone condition ($M = 5.52$, $SD = 1.18$). Likewise, seniors during the no phone condition ($M = 6.44$, $SD = 1.47$) acquired more sleep than seniors during the phone condition. ($M = 5.68$, $SD = 1.47$).

The data was analyzed with a factorial ANOVA for mixed groups design. The alpha level was set at .05. There was a significant main effect for smartphone usage, $F(1,48) = 18.86$, $p = < 0.001$, with participants who used the smartphone before bed demonstrating greater reduction in amount of sleep. Furthermore, there was no interaction between smartphone usage and the type of student on amount of sleep acquired, $F(1,48) = 0.119$, $p = 0.731$.

Discussion

This experiment served to examine how smartphone usage affects the amount of sleep attained by freshmen and senior students at the University at Buffalo. The results of this experiment suggest that participants who used a smartphone before bed obtain significantly less hours of sleep. Therefore, the first hypothesis was accepted. However, the second hypothesis was rejected. There were no significant differences between the amount of sleep an individual obtained and what year (freshmen or seniors) the student was in for college.

Previous studies have investigated the relationship between sleep and electronic media in school-aged children and adolescents, including television viewing, use of computers, electronic gaming, and/or the internet, mobile telephones, and music. This also suggests that melatonin suppression may play a role in sleep deprivation. Congruent with previous research conducted by S. Kim, M. Kim, Park, J. Kim, and Choi (2018), individuals who utilize devices for internet use tended to acquire less sleep.

One limitation of this study is not taking into account students who have trouble sleeping due to psychological issues such as insomnia, anxiety or depression. The validity of the responses of participants are also up for debate as to some students can falsify the results by not telling the truth. One weakness of my study was related to the length of time were asked to

participate in the study. Another limitation is that this experiment was a simulation and conducted in a laboratory setting. This was very costly and time consuming. Additionally, participants knew they were being reactivity could have altered their sleep patterns. Future studies can look to conduct a similar experiment in the homes of the participants.

Counterbalancing the sample served to prevent order effects from influencing the data and increased the validity of the results. With counterbalancing, the participant sample is divided in half, with one half completing the two conditions in one order and the other half completing the conditions in the reverse order. Overall, sleep is an essential component for the physical growth and development of young adults. Due to today's technological advances, it is increasingly more difficult to attain the recommended eight hours of sleep. College students have displayed their dependency on technology not only for personal use, but primarily to complete schoolwork inside and out of classes.

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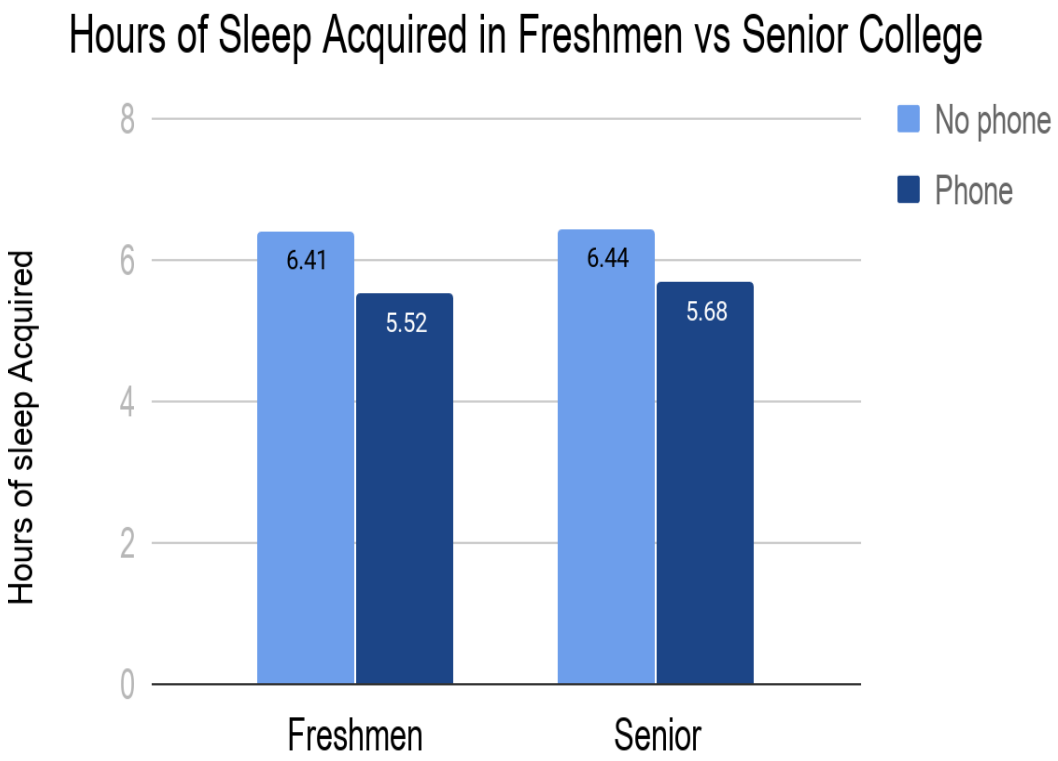
Hours of Sleep Acquired in Freshmen vs Senior College
Hours of sleep Acquired
8
6
4
2
0
6.41
5.52
6.44
5.68
Freshmen
Senior
No phone
Phone

Table 1