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Effective Strategies to Improve Sleep and Academic Performance Among High School Students

Sleep is a very complex and dynamic process. It is imperative for individuals of all ages to get enough sleep to form and maintain pathways in the brain. These brain pathways assist in the ability to learn and create new memories. Adolescence is a crucial time for brain maturation. As such, it is recommended that teenagers aged 13 – 18 years get 8 – 10 hours of sleep per 24 hours.¹ It is outlined that sleeping the number of recommended hours on a regular basis is associated with improved attention, learning, and memory. If high school students get inadequate sleep, brain maturation may be negatively impacted resulting in poor academic performance.² Sadly, according to Healthy People 2030, only 22.1% of students in grades 9 through 12 get sufficient sleep on an average school night.³ This data was collected from high school students at a national level. These students are recognizing and self-reporting that they feel they are not getting sufficient sleep. Therefore, it is critical to provide education to high school students about sleep hygiene and the various strategies they can utilize in order for them to get sufficient sleep and improve their academic performance.

In order to establish strategies to increase the number of hours as well as the quality of sleep for high school students, it is important to discuss the physiological process of sleep and the necessity for sleep. During sleep, the brain sorts and reinforces the newly encoded memories that were made during wakefulness. This process, called consolidation, leads to the generation of long-lasting memory traces or engrams whose activation during wakefulness supports the recall of information.⁴ If students are frequently sleeping only a few hours each night, the consolidation process is hindered. This memory hindrance can result in poor academic performance. In a

systematic review and meta-analysis, it was discussed how five studies found sleep duration to be positively associated with grades such that those reporting longer sleep durations also reported higher grades than their peers reporting shorter sleep durations.² Additionally, this same journal article found a significant correlation between sleep quality with overall academic performance. Students who had restful and undisturbed sleep had better grades when compared to their peers with poorer sleep quality.² It can be difficult to motivate individuals to advocate for their health, especially teenagers. As such, if high school students are aware of the potential academic repercussions of continued sleep deprivation, they might start implementing change in their current sleep habits. Furthermore, given that the audience are all high school students enrolled in a health careers course, there is a significant emphasis on attaining good grades for their future education and endeavors.

Consistency in sleep habits can promote healthy sleep. The American Academy of Sleep Medicine (AASM) discusses that alterations in daily routines and behaviors can have a deleterious effect on sleep quality.⁵ The suggested best practices include keeping a consistent sleep schedule in which students set a bedtime that is early enough to get 8 hours of sleep or more as well as getting up at the same time every day, even on weekends or during vacations. Additionally, it is recommended to limit exposure to bright light in the evenings, exercise regularly, maintain a healthy diet, don't eat a large meal before bedtime, and turn off electronic devices at least 30 minutes before bedtime.⁵ The American Academy of Pediatrics endorse these recommendations outlined by the AASM. In applying these techniques on a consistent basis, adolescents may experience longer durations of sleep as well as restful sleep. Parents and guardians of the high school students are encouraged to assist in the routine of their consistent sleep schedule.⁶ The consistency in teenagers' sleep habits is a collaborative effort between the

teenagers themselves and their guardians. If families are able to provide structure and support for their teenagers, they will be more likely to get the recommended hours of sleep each night.

In addition to parental and guardian assistance, changes within the schools can also support the sleep needs of high schoolers. When compared to children and adults, adolescents tend to fall asleep and wake up later. The current sleep-wake schedules set by schools do not fit with biological circadian and homeostatic processes regulating adolescent sleep patterns.⁷ As such, researchers wanted to review the latest studies that focused on the primary effects on sleep such as total sleep time and daytime sleepiness as well as the secondary effects on daytime functioning such as school performance when students in elementary, middle, and high school had a delayed start time. Most cross-sectional and longitudinal studies reported an increase in total minutes of sleep following later school start times.⁷ Additionally, it was found that students who had a later start time at school had a significant enhancement of attention level during class.⁷ This increase in attention can be attributed to longer sleep durations and a decrease in daytime sleepiness. There are many factors that interfere with school districts altering their current start times. A few of these factors include overlapping bus schedules, working parents, funding, and after school extracurricular activities. Even though it is unlikely that schools will be able to accommodate an indefinite “late start” schedule change, juniors and seniors in high school can be encouraged to opt for the “late arrival” option rather than the “early dismissal” option when creating their class schedule. By selecting a later start time, students will get more sleep and subsequently have an increase in attention within the classroom. This improved attention and lack of daytime sleepiness can assist in academic improvement.

With technological advancements, teenagers rely heavily on these types of devices for academic learning and benefits. However, it is no secret that teenagers also rely heavily on

technology for the social benefits. Therefore, it can be difficult to find incentives to encourage teenagers to put away these devices at bedtime. Prior to addressing this hurdle, it is important to provide students with the data regarding the relationship between screen time and sleep. There are a multitude of previous studies that have found that higher use of passive devices such as television and interactive devices such as laptops, phones, tablets, and videogames have delayed bedtimes as well as shorter self-reported sleep duration in children aged 4 – 18 years.⁸ However, little is known regarding the objective sleep measures. Because of this, researchers wanted to investigate the relationship between the use of screen devices and subjective and objective sleep measures in adolescents aged 17-18 years. To assess subjective sleep, the Pittsburg Sleep Quality Index was utilized by participants which is a self-rated questionnaire which assesses sleep quality and disturbances. To assess objective sleep, the ActiGraph watch which measures activity through light and movement to assess sleep-wake cycle was worn by participants for seven nights. It was found that mean adolescents' amount of sleep was approximately 6 hours and 48 minutes. Daytime sleepiness was correlated with lower sleep quality and correlated with shorter total sleep time.⁸ The results of this study demonstrated that higher tablet use and mobile phone use were associated with decreased sleep efficiency and increased minutes of wake time after sleep onset. As such, these findings demonstrate that blue light screen exposure and mental arousal play an important role in sleep. In another study, it was found that active screen time was associated with more sleep-onset difficulties among adolescents compared to passive screen time.⁹ As such, if the students initially find it difficult to limit screen time, it is preferred they watch television rather than play videogames as passive screen time does not result in sleep-onset difficulties when compared to active screen time. Small goals that high school students set for themselves can ultimately result in big strides in the improvement of their sleep habits.

As mentioned earlier, the audience for this community outreach presentation is comprised of high school students enrolled in a health careers course. Many of these teenagers will continue to be students in the many years to come. If they develop poor sleep habits in their younger years, there can be long-term detrimental consequences in their future education. Therefore, it is worth sharing the insight from students enrolled in graduate level health education programs. In an effort to adjust and cope with the strenuous workload and stressful environment, many students in graduate school tend to reduce their sleep. As such, a cross-sectional study was conducted to estimate the prevalence of and the relationship between poor sleep quality and stress among medical students.¹⁰ It was found that there was a high prevalence of poor sleep quality (76%) and stress (53%), with a statistically significant association ($p < 0.001$). Within the article, it was recommended that medical colleges establish academic counseling centers focused in promoting good sleep hygiene, strengthening students' study skills, and coping with their stressful environment.¹⁰ This recommendation should be implemented not only in the medical colleges but the high school programs as well. Support from an advisor or academic counselor is vital to the academic success of their advisees. Establishing strong sleep habits & techniques now while in high school will prepare students for their future schooling as well as to avoid possible burnout.

Substantial research has been conducted to develop guidelines and tips for individuals who have poor sleep habits. These beneficial sleep strategies are known as “sleep hygiene.” There is much evidence to suggest that these strategies can provide long-term solutions to sleep difficulties.¹¹ A few of these tips have been mentioned earlier which include keeping a consistent sleep schedule in which individuals set a bedtime that is early enough to get 8 hours of sleep or more as well as getting up at the same time every day (even on weekends or during vacations),

limiting exposure to bright light in the evenings such as technological and/or blue light devices as this can alter circadian rhythm, exercising regularly, and maintaining a healthy diet while avoiding heavy meals before bedtime. Additional sleep hygiene tips include differentiating between bedtime (going to bed) vs. shuteye time (lights off), utilizing the bed only for sleeping in which individuals don't use the bed to watch TV, eat, read, or work so that your body comes to associate the bed with sleep, and utilizing a sleep diary in which individuals track their sleep at home. A sleep diary allows teens to record when they went to bed, woke during the night, and woke in the morning. In completing the diary over the course of a two-week period, teenagers can better understand their sleep pattern, how much sleep they're getting each night, and how often they have disrupted sleep.¹² The diary also includes tracking the time of day when they exercised or drank caffeine. If printing out the diary log and handwriting within the diary seems archaic to students, there are many apps and sleep trackers teenagers can download and use on their cell phones. Headspace and Calm are popular apps utilized by many individuals who encounter sleep difficulties. With regards to stress management, these two apps have meditations that can help promote good sleep. However, it is important to note that few sleep apps demonstrate empirical evidence to support their claims, and if they do, this evidence can be based on significant methodological limitations.¹³ There are many online resources for students to utilize. Providing information via videos as well as handouts with infographics are simple ways to engage students and promote better sleep hygiene.

It is imperative that collaborative efforts are made to increase the proportion of high school students getting sufficient and high-quality sleep. Similarly to Healthy People 2030, the most recent national data in 2021 from The Centers for Disease Control and Prevention (CDC) reported that 77.3% of 13,615 high school students felt they weren't getting 8 or more hours of

sleep each night.¹⁴ Additionally, the CDC found that the prevalence of short sleep duration among high school students increased from approximately 70% in 2009 to approximately 78% in 2019.¹⁵ These worsening statistics demonstrate that this is a major public health issue. We are farther from meeting our target than we were at the beginning of the decade. In order to improve these numbers, a synergistic effort among students, families, administrations, and communities is required. Through utilization of the many effective strategies outlined, high school students can improve their sleep as well as their academic performance.

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