

© Макаренко С. Д., 2021

Иркутский государственный университет, г. Иркутск

В статье рассматривается влияние сна на учебную деятельность студентов, а также последствия нарушения режима сна. Как показывает анализ литературы, исследований об особенностях сна студентов недостаточно, что делает актуальным изучение связи между сном/бодрствованием и качеством обучения студентов. Для этой цели используются два метода: анкетирование и интервью. В результате исследования автор делает вывод о том, что многим студентам трудно поддерживать надлежащий баланс сна и бодрствования, что отрицательно сказывается на успеваемости студентов и их психоэмоциональном состоянии.

Ключевые слова: сон, студент, инсомния, мозговая деятельность, академическая деятельность высшее образование

The Impact of Sleep on Student's Academic Performance

Scientific research shows that there is a strong correlation between sleep and academic performance; however, the literature analysis reveals that there is a lack of materials on students sleep. The review of scholarly and credible trade literature on the impact of sleep on learning quality identified three main categories: the impact of sleep duration on student performance; the impact of sleep quality on stress resistance and student performance; the vicious circle of insomnia.

Human sleep is the main and irreplaceable type of rest and a way to restore strength and energy resources of the body, especially for a growing body. Healthy sleep is physiologically necessary for a person and is an important condition for physical and mental health. The quality of wakefulness depends on the quality of sleep. That is, how the body rests at night depends on how it will function during the day. To date, most scientists have concluded that healthy, sound sleep can be as important to health as nutrition and exercise. Reducing sleep by just two or three hours a night can have adverse health effects. Sleep is an important component of psychophysiological health and violations of its quality or duration negatively affect both well-being and the performance and academic performance of students (Rostam, Habibollah, Behnam, Zinab & Lida, 2020). In today's world, many students view sleep as a luxury, thinking that the benefits of being limited or not sleeping have more benefits. It's a delusion. This can be explained by the fact that sleep has a healing effect of maintaining the body in health and helps to increase vigor and performance (Micah, 2019). Accordingly, students need sufficient quantity and quality of sleep due to biological maturation and high academic loads.

Violations of the biological rhythms of the body, the sleeping mode, and duration of sleep lead to a deterioration in the physical and psycho-emotional state,

depression, behavior disorders, and aggressiveness of students (Felix, 2020). Also, a lack of sleep impairs memory, thinking, concentration, and attention span reduces the speed of psychomotor reactions, which negatively affects the results of studies.

The aim of the research was to examine the quality and quantity of sleep of students aged 20 to 22 in terms of academic performance and daytime wakefulness. This research is of practical importance, as it can show the scale of the problem under study and, as a result, encourage students to observe sleep hygiene for a good academic performance. Using both secondary and primary research methods, the author will discuss the literature describe her own research conducted at the Siberian-American School of Management.

The Effect of Sleep Duration on Students' Performance

Sleep has a significant effect on the quality of the perceived information since it is in this state that the processes of restoration of the body and its replenishment of energy reserves take place. After a day, not only muscles, but also many important organs get tired. The brain especially needs rest.

Various studies support the opinion that during sleep, namely during the four sleep phases, the process of transferring memory from the temporary storage (hippocampus) to the cerebral cortex occurs (Björn, Jan, 2013). Accordingly, with a reduction in the duration of sleep, a person is not able to fully restore the work of the cerebral cortex. This, in turn, directly affects the ability to learn, remember, come to logical conclusions, and make choices (Harvey, Bruce, 2006). According to theoretical resources, the optimal bedtime is 10–11 pm and the duration of sleep is 7–9 hours (Eric, 2020). However, due to changes in working and resting conditions, sleep hygiene is rarely observed by students. So, about 75 % of students go to bed later than 11 pm. About 95 % of students do not have a clear night sleep schedule, of which more than 40 % sleep less than 6

hours a day, which adversely affects their physical and psychological state and performance — hearing and speech memory and susceptibility to physical and mental stress decrease (Paula, Paivi, 2007). With prolonged lack of sleep, both physical and emotional fatigue accumulates, which in turn reduces concentration and stability of attention and perception, as well as increases irritability and susceptibility of students to stressful situations, which in the long term can lead to the development of anxiety-depressive states.

Influence of Sleep Quality on Stress Tolerance and Student Performance

High-quality sleep, as an integrated approach to maintaining the physical and psycho-emotional health of a person, includes two aspects. The first aspect is called regularity of falling asleep and waking up (Yulia, 2019). However, the category of students is often prone to lack of regime. The time of going to bed depends to a large extent on the student's level of involvement in extracurricular activities and homework, as well as on the distribution of activity and work capacity throughout the day. This is shown in chronotypes (Sandra, & Margaret, 2001). For example, the morning chronotype «lark» is more efficient in the morning hours and is capable of getting up more easily in the morning and going to bed earlier than 10–11 pm. At the same time, the evening owl chronotype, which has a maximum capacity for work in the evening, is more inclined to go to bed late and have difficulty waking up in the morning. Thus, the sleep time of students belonging to the «owl» chronotype during the studies is sharply reduced, which negatively affects the health and academic performance of the student.

The second aspect of quality sleep is the absence or minimum amount of stress. It should be noted that students who do not observe bedtime, most likely, will not be able to minimize the possibility of stress. Sleep disorders can result from breaking the sleep schedule (Mind, 2020). Students with sleep disorders have a schedule that does not correspond to biorhythms, they constantly want to sleep throughout the day, they cope worse with the flow of information, have difficulty in formulating their thoughts, note memory impairment, low efficiency and distraction (lack of attention) during the day, which is reflected on the perception of educational material.

The Vicious Circle of Insomnia

Insomnia is a disorder that makes it hard to maintain sleep. In other words, it is lack of sleep. According to studies, students report significantly poorer sleep quality compared to other population groups (Dunay, Arinchina & Sidorenko, 2013). Students tend to feel increased fatigue, sleep disturbances, excessive daytime sleepiness, anxiety, irritability and depression.

As noted earlier, the better people sleep at night, the faster they cope with the processing of information received during the day and unpleasant memories. Insomnia, on the other hand, deprives a person of the energy and time for the brain to successfully process negative episodes and mitigate their impact (Eric, 2020).

This results in the accumulated stress not being compensated for during the resting state. Moreover, in such conditions, the body begins to produce the stress hormone cortisol, which further exacerbates the situation. The bottom line is that a student who slept less than necessary receives a triple share of stress — the unprocessed stress of the past day, the stress hormone released, and the upcoming stress during the day (Eui-Joong, & Joel, 2014). What is the vicious circle of insomnia? Due to poor-quality, short-term sleep, and activity during the work day, the student receives stress and, consequently, a bad mood, rapid fatigue, and irritability. These feelings create a new stress that will affect the student's sleep the next night. The next night, in its turn, will affect the student's condition similarly, leading to a cycle of accumulating sleep deprivation and stress.

The average student sleeps for about six hours a night (Elit, 2019). During this time, brain waves are unable to the «vicious circle» will contribute to a decrease in a student's academic performance.

Methods

Both quantitative and qualitative methods were used to analyze the relationship between sleep and academic performance. Quantitative data were collected with the help of the survey. It helped to determine the students study priorities.

This survey contained several categories of questions about possible causes of sleep deprivation, physical activity level, and the relationship between sleep and tasks. The survey consisted of 10 questions (7 closed-ended and 3 open-ended questions) and was conducted in an electronic format. The first seven questions were as follows. How many hours do you sleep? How often do you miss classes because feel unwell? Do you always have the same bedtime and wake up times? Are you trying to establish a schedule and manage your time efficiently? If yes, then how do you implement this?). Open-ended questions were aimed to obtain quality data. These questions were as follows: What are the main causes of the ailment; why do you think your grades are not as good as you would like; describe with what regularity you keep the regime and why you can break it. For more objectivity, the students were also interviewed. The interview was to reveal to what extent workload is related to sleep quality.

Results and Discussion

Let us start with the survey results. The respondents were a group of 14 students aged 20–22. When asked about the amount of sleep, 86 % of students answered that they experience a lack of sleep, as they sleep less than normal (about 6 hours). The other 14 % sleep for 8–10 hours. The question of how often students skip classes due to lack of sleep and, as a consequence, poor health, also showed interesting results. About half (49.8 %) of the respondents miss for the above reason. 28.6 % respondents chose the answer «even if I feel bad, I attend lessons». The remaining 21.2 % answered that such situations do occur, but extremely rarely. The question of the regularity of adherence to the regime of going to bed and waking up showed the expected result.

Only 7.2 % of students follow the schedule, including weekends. The remaining 92.8 % are guided by the principle of «sleep off on the weekend.» The question of managing time puzzled the respondents. Many (71.6 %) answered that they only occasionally make such attempts. The remaining students try to regularly monitor the daily routine by maintaining paper and electronic diaries/notes. Concerning daytime sleep, the survey showed expected results. 92.8 % stated that they consistently resort to this method several times a week, as they feel a strong fatigue after spending half a day at the university. And only 1 student out of 14 answered that even with a lack of sleep, he does not resort to this method, as he feels bad after a day's sleep. Students with 6.5 hours of sleep had a 50 % decrease in academic performance compared to those who slept an hour more on average. Another interesting result of the study is the fact that if the difference in sleep duration from night to night changed by at least half an hour, academic performance fell by 45 %. Sleep habits were another important finding from the survey. If students went to bed after 2 am, their grades were lower no matter how many hours they slept. In general, students with regular sleep habits fared better than those with chaotic daily routines, even though they slept alone for the same amount of time.

In terms of academic performance, the results obtained from the individual interviews also provide interesting qualitative data. Discussing the degree of influence of workload on sleep quality, more than half of the students (75 %) stated that a high workload, for example, during a session, significantly impairs sleep quality. This is mainly due to feelings of anxiety and fear about the upcoming exams. The remaining 25 % admitted to having correlation but stated that their sleep quality also depended on the amount of time spent playing computer games, social networks, etc. The bedtime topic was the most discussed. 11 students reported a long period of falling asleep (from 15 minutes). They also associated this indicator with a high workload and other factors (active sport an hour before bedtime, watching Youtube shows, personal problems, and obsessive thoughts). The final topic of the interview was to identify the degree of satisfaction with the quality of students' night sleep. Only 1 student, who had previously answered that he always adhered to the daily routine, replied that he was completely satisfied with the quality of his sleep. The other 13 respondents were only partially satisfied and reported academic problems and lengthy preparation for training seminars as the main arguments for reducing this indicator.

Thus, the analysis of the primary data provided evidence to support the hypothesis about the existence of a strong correlation between the quantity, quality of sleep, and a student performance. Balanced sleep patterns improve academic performance. Many scientists support the idea that the inability to go through all 4 stages of sleep leads to the formation of weak neural connections in schoolchildren and, as a result, to a low level of memorization and analysis of information (Elit, 2019). Research conducted among students shows

that the rational distribution of learning tasks increases the possibility of improving the quality of sleep and increasing it to normal (Elit, 2019). The logical result of conversations with students was that the quality of education is greatly influenced not only by the duration of sleep but also by the bedtime.

Studies in this area show that prolonged sleep has a positive effect on academic performance (Elit, 2019). The researchers compared the effects of sleep habits with specific results across subjects. Observations confirmed the effect of prolonged sleep on the quality of learning but found no improvement in the scores of students who invariably got enough sleep before the exam. It turned out that it is not the night on the eve of an important day that is more important, but the quality and duration of sleep during the terms. Interviews with students of the Siberian-American School of Management showed similar conclusions: students had not previously noticed an improvement in their condition on the exam in the case of sufficient sleep, justifying this by being in a stressful situation.

Research results make it possible to formulate some recommendations for students. First of all, it is necessary to distribute learning tasks rationally. This will allow you to unload time before going to bed. Besides, for physical and mental health, to be able to effectively perceive and assimilate information at the university, students need to determine the regular time of going to bed and the time of awakening. This will help students to avoid feeling unwell because even with an irregular but sufficient amount of sleep student will experience fatigue and lack of desire for learning.

Sleep, like many other things, does not tolerate extremes: too much sleep is sometimes just as harmful as a lack. Still, it is difficult to determine the exact number of hours needed for sleep, given human individuality. The best option seems obvious: calculate the optimal time for sleep, follow it, and also get into the habit of falling asleep and waking up at about the same time (including weekends).

The recommendations will help to balance studies and personal life, as a balanced sleep is a crucial for the most effective learning.

Conclusion

Analysis of the relationship between sleep quality/quantity and academic performance clearly demonstrated the correlation. For this reason, students should be made aware of the importance of adequate sleep for their academic performance and health. In addition, it was revealed that students with sleep disorders form «the vicious circle of insomnia», in which each element burdens the other. This leads to the increased level of stress. If the workload increases, students' productivity drops during the day. Conversely, when the load decreases, students have the opportunity to regulate sleep, which is vital for a growing body. To avoid overloading and, as a consequence, stress, it is necessary to rationally manage time.

This is important for undergraduates during examination sessions, senior & students of the dual Russian-American degree program whose academic

load is especially high. Another point that should pay attention to sleep/work balance is first-year students who are likely to experience sleep disorders due to the adaptation on period. Moreover, the results of the study can be used by university teachers & administrators to balance program requirements and syllabus of student's assignments. ■

1. Björn, R., & Jan, B. 2013. About Sleep's Role in memory. *Psychological Reviews*. Retrieved from <https://journals.physiology.org/doi/full/10.1152/physrev.00032.2012>

2. Elit, T. 2019. The vicious circle of insomnia. FISHKI. Retrieved from <https://fishki.net/2962843-porochnyj-krug-insomnii.html>

3. Eric, S. 2020. How Much Sleep Do We Really Need? Sleep Foundation. Retrieved from <https://www.sleepfoundation.org/articles/how-much-sleep-do-we-really-need>

4. Eric, S. 2020. Stress and Insomnia. Sleep Foundation. Retrieved from <https://www.sleepfoundation.org/insomnia/stress-and-insomnia>

5. Eui-Joong, K., & Joel, D. 2014. The Effect of Psychosocial Stress on Sleep: A Review of Polysomnographic Evidence. NCBI. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4266573/>

6. Felix, T. 2020. What Are Sleep Disorders? American Psychiatric Association. Retrieved from <https://www.psychiatry.org/patients-families/sleep-disorders/what-are-sleep-disorders>

7. Harvey, R. & Bruce, M. 2006. Sleep Disorders and Sleep Deprivation. NCBI. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK19956/>

8. Micah, S. 2019. The Healing Powers of Sleep: There Is So Much More To The Nightly Slumber. Phoenix Society. Retrieved from <https://www.phoenix-society.org/resources/the-healing-powers-of-sleep-there-is-so-much-more-to-the-nightly-slumber>

9. Mind, M. 2020. How does sleep relate to mental health? Mind. Retrieved from <https://www.mind.org.uk/information-support/types-of-mental-health-problems/sleep-problems/about-sleep-and-mental-health/>

10. Paula, A., & Paivi, P. 2007. Sleep deprivation: Impact on cognitive performance. NCBI. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2656292/>

11. Rostam, J., Habibollah, K., Behnam, K., Zinab, H., & Lida, M. 2020. The Effect of Sleep Quality on Students' Academic Achievement. NCBI. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7381801/>

12. Sandra, L., & Margaret, M. 2001. Circadian rhythmicity of cortisol and body temperature: Morningness-eveningness effects. ResearchGate. Retrieved from https://www.researchgate.net/publication/11958542_Circadian_rhythmicity_of_cortisol_and_body_temperature_Morningness-eveningness_effects

13. Лебедева Ю.С. Инсомния как проявления тревоги-депрессии среди студентов медицинской академии [Электронный ресурс] / Ю.С. Лебедева // Научная электронная библиотека «Киберленинка». – Электрон. дан. – URL: <https://cyberleninka.ru/article/n/insomniya-kak-proyavleniya-trevogi-depressii-sredi-studentov-meditsinskoy-akademii>

14. Газенкамф К.А. Влияние нарушений продолжительности и качества сна на состояние психофизиологического здоровья и успеваемости студентов [Электронный ресурс] / К.А. Газенкамф // Международный журнал прикладных и фундаментальных исследований «Рае» – Электрон. дан. – URL: <https://applied-research.ru/ru/article/view?id=7897>

15. Вахонина Ю. Спим правильно: как восстанавливаться за время отдыха [Электронный ресурс] / Вахонина Ю. // Электронный журнал «РБК» – Электрон. дан. – URL: <https://style.rbc.ru/health/5c9c9b209a79471ca0ef11e9>

СПИСОК ЛИТЕРАТУРЫ:

Björn, R., & Jan, B. 2013. About Sleep's Role in memory. *Psychological Reviews*. Retrieved from <https://journals.physiology.org/doi/full/10.1152/physrev.00032.2012>

Elit, T. 2019. The vicious circle of insomnia. FISHKI. Retrieved from <https://fishki.net/2962843-porochnyj-krug-insomnii.html>

Eric, S. 2020. How Much Sleep Do We Really Need? Sleep Foundation. Retrieved from <https://www.sleepfoundation.org/articles/how-much-sleep-do-we-really-need>

Eric, S. 2020. Stress and Insomnia. Sleep Foundation. Retrieved from <https://www.sleepfoundation.org/insomnia/stress-and-insomnia>

Eui-Joong, K., & Joel, D. 2014. The Effect of Psychosocial Stress on Sleep: A Review of Polysomnographic Evidence. NCBI. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4266573/>

Felix, T. 2020. What Are Sleep Disorders? American Psychiatric Association. Retrieved from <https://www.psychiatry.org/patients-families/sleep-disorders/what-are-sleep-disorders>

Harvey, R. & Bruce, M. 2006. Sleep Disorders and Sleep Deprivation. NCBI. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK19956/>

Micah, S. 2019. The Healing Powers of Sleep: There Is So Much More To The Nightly Slumber. Phoenix Society. Retrieved from <https://www.phoenix-society.org/resources/the-healing-powers-of-sleep-there-is-so-much-more-to-the-nightly-slumber>

Mind, M. 2020. How does sleep relate to mental health? Mind. Retrieved from <https://www.mind.org.uk/information-support/types-of-mental-health-problems/sleep-problems/about-sleep-and-mental-health/>

Paula, A., & Paivi, P. 2007. Sleep deprivation: Impact on cognitive performance. NCBI. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2656292/>

Rostam, J., Habibollah, K., Behnam, K., Zinab, H., & Lida, M. 2020. The Effect of Sleep Quality on Students' Academic Achievement. NCBI. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7381801/>

Sandra, L., & Margaret, M. 2001. Circadian rhythmicity of cortisol and body temperature: Morningness-eveningness effects. ResearchGate. Retrieved from https://www.researchgate.net/publication/11958542_Circadian_rhythmicity_of_cortisol_and_body_temperature_Morningness-eveningness_effects

Вахонина Ю. Спим правильно: как восстанавливаться за время отдыха [Электронный ресурс] / Вахонина Ю. // Электронный журнал «РБК» – Электрон. дан. – URL: <https://style.rbc.ru/health/5c9c9b209a79471ca0ef11e9>

Газенкамф К.А. Влияние нарушений продолжительности и качества сна на состояние психофизиологического здоровья и успеваемости студентов [Электронный ресурс] / К.А. Газенкамф // Международный журнал прикладных и фундаментальных исследований «Рае» – Электрон. дан. – URL: <https://applied-research.ru/ru/article/view?id=7897>

Лебедева Ю.С. Инсомния как проявления тревоги-депрессии среди студентов медицинской академии [Электронный ресурс] / Ю.С. Лебедева //

Научная электронная библиотека «Киберленинка». – Электрон. дан. – URL: <https://cyberleninka.ru/article/n/insomniya-kak-proyavleniya-trevogi-depressii-sredi-studentov-meditsinskoy-akademii>

Influence of quality and quantity of sleep on the academic achievement of students

© **Makarenko S., 2021**

The article examines the influence of sleep on students' academic activity, as well as consequences of disturbed sleep patterns. Literature analysis reveals that there is lack of materials on students' sleep, which makes it relevant to study the association of sleep/ wake ratio and the quality of learning in students. For this purpose, the author uses two methods: a questionnaire and an interview. The paper concludes that for many undergraduates it is difficult to maintain a proper sleep/wake balance, which has a negative impact on the students' academic performance and their psycho-emotional state.

Keywords: sleep, health, student, insomnia, brain activity, higher education
