

# ***Lack of Sleep among College Students Can Lead to Negative Emotions and Affect Memory***

Wenyi Li<sup>1,a,\*</sup>

<sup>1</sup>*Department of Psychiatry, North Sichuan Medical Colleges, Nanchong, 637000, China*

*a. 1518303334@qq.com*

*\*corresponding author*

**Abstract:** Sleep deprivation is associated with various disorders in most body systems. College students are one of the most significantly affected groups by sleep deprivation. However, the impact of sleep deprivation on emotions and memory has been fully demonstrated. No researchers have studied whether sleep deprivation causes social anxiety and affects college students' ability to remember words. This study aims to explore the effects of sleep deprivation on emotional control and memory abilities in adolescents. Thirty-four participants were investigated online to collect and evaluate sleep quality, Social anxiety, and vocabulary memory. The questionnaire included the Pittsburgh Sleep Quality Index (PSQI), Self Review Anxiety Scale (SAS), and vocabulary memory time under different sleep qualities. Correlation and regression analyses of sleep quality, Social anxiety, and memory foreword ability. There was no significant correlation between sleep deprivation, anxiety, and vocabulary memory. Research has shown that sleep deprivation does not cause stress or affect vocabulary memory. To improve the reliability of current research, future work can increase the sample size.

**Keywords:** sleep deprivation, anxiety, vocabulary memory, college students

## **1. Introduction**

Sleep occupies nearly one-third of our lives. In most people, sleep accounts for 20% to 40% of the day. Even prehistoric evidence suggests the importance of sleep in human life. This aligns with archaeological and historical descriptions of sleep's prominent and vital Role in early human society [1]. However, many people need to pay more attention to sleep; some even overlook the importance of sleep and need to understand it. Some may think sleeping is a waste of time or a way to rest after work, study, or exercise. By contrast, sleep is a critical process in our body's operation. When people sleep, the body and brain adjust the Organ system, affecting the respiratory, blood circulation, and immune systems. Insufficient sleep or sleep deprivation is associated with various disorders. Most body systems include endocrine, metabolism, two advanced cortical functions, three and Nervous system disease. The sleep disorder can be manifested as insufficient sleep, excessive sleep, or abnormal movement during sleep [2]. Sleep deprivation can lead to many sleep disorders. The central sleep disorders studied in recent years include insomnia, eye movement rhythm sleep disorders, sleep disorders, breathing obstructive sleep apnea, and central sleep apnea [2]. Sleep is also crucial to what the brain and brain experience, and sleep is an essential and recombinant intense active period for memory work.

Memory occurs with the help of a significant part of the brain called the Hippocampus. The form of memory is also associated with neurons in the cortical region. Sleep includes four necessary and extensive research stages: slow wave sleep and rapid eye movement. At these stages, monitoring human brain motor devices has shown electrical impulses moving between the brainstem, Hippocampus, thalamus, and cortex, which are used as relay stations for memory formation. Moreover, different stages of sleep have been shown to help consolidate different types of memory. There is a strong correlation between sleep and emotional function, and sleep deprivation can produce negative emotions, although it is associated with Mental normal. Research has shown that emotions can also affect memory and learning. Recent neuroscience research results show that the Amygdala and frontal cortex cooperate with the inner temporal lobe comprehensively, thus (I) Memory integration controlled by Amygdala;(2)Memory encoding and formation of the frontal cortex; And (III) Hippocampus for successful learning and LTM retention. We also reviewed the stacking degree of emotional cycle and cognitive control (bottom-up and top-down effects). To achieve optimal integration of emotional and mental processes in the brain. This review emphasizes the basic methods of dynamic evolution to understand the impact of emotions on learning and memory, as well as the Role of posture. The Brain and Its Interactions in Emotional Processing We also summarized the current state of knowledge about the impact of emotions on memory and the significance of maps in educational environments. In addition to clarifying feelings and enhancing memory, the discovery of Neuroimaging has expanded our understanding of the impact of emotion on learning and memory processes [3].

Previous studies have shown insufficient sleep can significantly affect emotional and memory functions. There is also a correlation between it and memory. However, the association between inadequate sleep, negative emotions, and vocabulary memory still needs to be studied. This study, therefore, adopted an online questionnaire format based on PSQI and SAS. Survey college students and memorize the same number and difficulty of English words under different sleep quality. The purpose is to investigate the correlation between these three factors, whether it is anxiety caused by sleep deprivation. Will this anxiety affect our memory? We reduce sleep deprivation to create and increase pressure, which slows down our memory rate. Through research, we hope to conclude that one of the reasons for the decline of College Students' memory is anxiety caused by sleep deprivation. So that today's college students can pay attention to sleep quality, reduce stress, improve memory, and obtain better learning efficiency by maintaining sleep quality.

## 2. Research summary

Many teenagers now lack sleep. This phenomenon may lead to severe problems. Insufficient sleep in adolescents can lead to negative emotions. For example, anxiety. Irritable, Depression. These negative emotions may affect the daily lives of teenagers. They may experience memory decline. For example, it is difficult to remember words and formulas.

Further research is needed to determine their impact and depth. Insufficient sleep can affect the blood circulation and metabolism of the brain [4]; Article S. Sleep is related to blood flow and blood oxygen. Insufficient sleep can indirectly damage physical or emotional health, cognitive impairment, accident rates, and absenteeism through Low morale, poor social relationships, and depression [5].

The relationship between sleep and health is bidirectional: insufficient sleep can harm health. Poor health can affect sleep. Lack of sleep can damage health by reducing immune function [6]. Sleep plays a vital role in our body and affects its function. Sleep is a necessary behavior for maintaining body balance and organ function. We already know what sleep means to our bodies and the consequences of insufficient sleep. Next, a Study on the Relationship between Sleep Deprivation and Emotion, predominantly negative emotions. Some experiments have shown that sleep is involved in regulating emotional assessment. Sleep deprivation, to some extent, affects the relationship between

dynamic changes. The emotional response after insufficient sleep is worth further consideration. Study the relationship between sleep deprivation, physical function, and negative emotions. We need to identify the relationship between sleep deprivation and memory.

What is the connection between these three things? Firstly, we know that insufficient sleep can affect overall function. No other organ is affected by sleep like the brain, whether it is memorizing knowledge keys or formulas before exams. Or learn skills. We need sufficient sleep to help the brain remember. Before memorizing, sleep plays an essential role in all aspects of memory. We need adequate sleep so the brain can place and receive new information or content during storage. We need to have a clear mind. Avoid sleep, sleep, and focus more on the information to be memorized; then, We need to maintain that information and content in the brain. Sleep helps us remember that information and reserve it in our brains.

The brain structure is needed to carry out these kinds of memory processes, which conform to these important roles of sleep-in memory function. A single night of sleep deprivation has been shown as a disturbance function connection in hippocampal circuits [3]. Furthermore, Sleep deprivation is associated with emotional changes and emotional biases. Sixty-five points [4]. The latest imaging data shows that the working connection in circuit 66 of the Amygdala is disturbed. Especially the relationship between the Amygdala and operation control area (posterior, outer, and anterior 68 segments, Front belt buckle, Below the forehead; Shao et al. [5] and 69 added connections between post and external links. Therefore, the frontal cortex demonstrates the therapeutic mechanism of the Type 71 hypothesis in depression [6]. Kaufmann et al. [7] research shows that the functions of the Hippocampus, cortex, and brain cells can obtain complete memory.

In addition, this is also one of the mechanisms of sleep. Research has shown that sleep is an excellent way to enhance memory. During sleep, the brain repeatedly releases memory signals to enhance memory expression. Sleep is more important than we imagine; not only our memories but also helps us connect them. Sleep can affect physical function, especially the brain, negative emotions, and memory. Therefore, insufficient sleep can generate negative emotions and affect memory. The structure of the brain is necessary for these memory processes. According to the critical role of sleep-in memory function, overnight sleep deprivation has been shown to interfere with the functional connections of the sleep—hippocampal circuit [3].

In addition, insufficient sleep is associated with emotional changes and biased emotional assessments [4]. The latest imaging data shows that the working connection in the Amygdala 66 circuit is disturbed, especially between the Amygdala and the operation control area. Sixty-eight front parts on the outer back, front belt, and lower forehead; Shao et al. [5] and 69 added connections between post connections and external connections. Therefore, the frontal cortex demonstrates the therapeutic mechanism of the Type 71 hypothesis in depression [6]. Kaufmann et al. [7], research shows that the functions of the Hippocampus, cortex, and brain cells can obtain complete memory.

### **3. Method**

#### **3.1. Participants and data collection**

This study explores whether sleep deprivation in college students affects vocabulary memory by creating negative emotions. In the summer of 2023, we conducted an online survey of students from different locations. Thirty-four students participated in this study. Furthermore, we do not differentiate between genders. Most of them are undergraduate or fresh graduates. No one has a history of medical, neurological, or mental illness and no history of taking medication or medication. In this questionnaire, all participants were recorded and filled out based on their situation. The survey recorded the sleep quality and anxiety level of these participants over the past month and their memory of vocabulary. Different sleep images

The questionnaire is divided into three parts. The first part is the Pittsburgh Sleep Quality Index (PSQI). The instrument is applicable to evaluate the sleep quality of patients with sleep disorders and general sleep quality. Spiritually. Participants fill in information based on their sleep status over the past month. The second part of the questionnaire is the Anxiety Self Rating Scale (SAS). This scale is also suitable for everyone. It reflects the subjective feelings of participants towards anxiety. The third part measures participants' vocabulary memory based on sleep quality. They recorded the time participants needed to memorize English words with the same difficulty and quantity. At the same time, there is sufficient sleep and poor sleep quality.

### 3.2. Measure three factors

PSQI measured sleep quality. Furthermore, sleep quality is judged by the score of the scale; a high score indicates poor sleep quality, a low score suggests good sleep quality, and SAS reflects anxiety level. Furthermore, Different scores correspond to mild or severe anxiety levels within the cut-off value time taken by memory to recite English words. The time participants take to memorize English words is shorter, and vocabulary recitation is better.

Statistical analysis statistical analysis statistical analysis statistical analysis statistical analysis

This study is quantitative. All analyses were based on the three proportional scores of each participant in the questionnaire mentioned above and were conducted using the SPSS 27.0 program. We remember words on average under different sleep quality conditions. An analysis involving two variables was conducted among all participants to determine the relationship between adolescent sleep quality, Emotional arousal, and memory function. Conduct a bivariate (two-tailed person) analysis between three factors (sleep, emotion, and memory). In addition, when emotions are set as control variables, the influence of mediators (double-tailed) is analyzed. Determine the impact of arousal on sleep quality and memory ability.

## 4. Result

This study used stepwise regression to test the mediating effect of anxiety levels. According to the above results, It can be seen that in Model 1, The combination of sleep quality is an independent variable in the regression model. The results indicate that sleep quality does not significantly affect memory time. [F (1,32)=0.671, P=0.419], [b=0.143, P=0.419] In version 2, Free variables, Sleep quality, And the anxiety level of the intermediate variable were included in the regression model, and the research results showed that sleep quality had no significant impact on memory time. [F (2,31)=0.331, P=0.721],[b=0.147, P=0.23], Anxiety levels have no significant impact on memory time( $\beta = 0.019$ , P=0.915). This indicates that there is no mediator between anxiety level and memory time. In other words, sleep quality does not affect anxiety levels or the time it takes to remember words.

Table 1: Analysis of the relationship between two variables of sleep quality (PSQI), Social anxiety (SAS), and memory level (Person, 2- tails)

		r	p
PSQI and SAS		-.210	.234
PSQI and memory		.143	.419
SAS and memory		-.011	.949

PSQI: Pittsburgh sleep quality Index; SAS: Self-rating anxiety scale

As shown in Table 1. There is no obvious relationship between sleep quality, Social anxiety level, and memory ability, which indicates that sleep quality does not affect the level of Social anxiety or the duration of personal memory;

Table 2: Regression Analysis between Sleep Quality Level (PSQI), Social Anxiety (SAS), and Memory.

model	variable	B	Standard error	Trial version	T	P	VIF	P
Module 1	(Constant)	51.524	26.587		1.938	0.061		0.419
	PSQI	2.705	3.301	0.143	0.819	0.419	1	
Model 2	(Constant)	45.895	59.016		0.778	0.443		0.721
	PSQI	2.782	3.429	0.147	0.811	0.423	1.046	
	SAS	0.106	0.985	0.019	0.107	0.915	1.046	
DEPENDENT VARIABLE: MEMORY								

## 5. Discussion

This study explores whether sleep deprivation leads to anxiety and affects vocabulary memory. We conducted correlation analysis (Pearson, 2-tail) and regression to test the relationship between sleep quality, emotion, and memory function. Our research results indicate that sleep deprivation does not significantly affect anxiety levels ( $r=-.210$ ,  $p = .243$ ). Similar effects on vocabulary memory under different sleep quality ( $r=.143$ ,  $p = .419$ ) indicate that insufficient sleep among college students does not cause anxiety or affect their ability to remember words. One of the implications is that college students' sleep patterns may not affect their emotions, and their ability to remember words may not significantly correlate with anxiety caused by sleep deprivation. In this way, the data push from basic science to clinical needs to be improved. In addition to the relationship between sleep deprivation and anxiety, the research on evaluating intervention has also become soft. Since the correlation between sleep and anxiety has not been established in experimental science, it is not rigorous to evaluate additional variables [8]. According to previous studies, we did not show clinical experiments on the correlation between sleep deprivation and anxiety. There is a bidirectional causal relationship between sleep and brain emotional function. If there is no sleep, the ability to fully control and express emotions will be impaired at both the brain and behavioral levels, which is normal in positive aspects. And the negative impact of emotional waves.

In contrast, sleep, especially REM sleep, provides appropriate emotional responses and significant differences on the second day. Primary emotional stimulation response, sleep, and sleep FAM Continuously promote offline processing and dynamic memory integration [9]. Other experimental studies have shown that sleep quality may affect emotions the next day, but whether it triggers anxiety is unclear. In this study, insufficient sleep was not the cause of inadequate sleep, and there was no significant relationship between the two factors (emotions and sleep quality). The research results in this section are consistent with those of our predecessors.

It is worth noting that any single form of memory integration at Each stage, or combination of all forms, requires sleep, or even a combination of all forms, requires sleep, or even sleep promotion. On the contrary, there is convincing evidence that sleep plays a vital role in different ways. As well as learning and Memory consolidation that are systematically developed, like arousal [10]., T.(=2001).In our study, insufficient sleep resulted in participants remembering words for more extended periods than insufficient sleep. However, when we add moderate anxiety factors, the results are different. The research results indicate that symptoms of depression (without anxiety) impair the immediacy of memory and the amount of new information obtained. (Not acquisition rate), However, it does not harm retrieval or preservation (long delay, no memory, and recognition rate of 3, respectively). However, anxiety symptoms (without depression) have no significant deletion effect on any aspect of memory functionalization [11]. These findings are the same as our current results. Anxiety did not significantly affect word memory.



## 5.1. Limitations

The current research also has some biases and limitations that should be addressed. Only 34 college students participated in our online questionnaire and were randomly selected from different places in China. In this case, our sample size needs to be increased to improve its significance and thus demonstrate the credibility of the current research. In addition, gender differences were not collected in this study. Our experimental investigations are all conducted by college students. So, we believe that gender differences are not one of the influencing factors for this study. Male and female college students are likelier to experience the same sleep quality, anxiety, and vocabulary memory problems. Therefore, gender differences lead to subtle biases. However, this may not result in differences in the results of this study based on the three factors mentioned above.

In addition, participants are college students of different age groups who may face various external factors, such as academic pressure. Avoid subjective differences in sleep quality assessment criteria and anxiety levels between PSQI and SAS participants. It is a unified method to monitor participants' sleep quality and depression levels. The scores of these two parts are used as evaluation criteria. Due to differences in the memory of English words among students of different disciplines and grades, we chose English word levels 4 and 6. Graduate school is the standard for memory assessment. These three types of English words are similar in difficulty and content overlap. Therefore, we avoided vocabulary memory evaluation errors caused by different standards. However, the content of these two words may be rarely supplemented, which may affect the duration of memory. Meanwhile, participants may remember a portion of the words, which limits the accuracy of memory function measurements to some extent.

## 5.2. Research Disclosure

The findings of this study highlight the association between sleep quality, anxiety, and vocabulary memory. In future research, we need to expand the sample size and extend the testing time for sleep quality and anxiety levels. The gender and age of the participants are included in the questionnaire. The content of recognizable words should be filtered more accurately and uniformly. Alternatively, it can be modified to a random letter organization so students will not remember some words. Another direction is to study the relationship between sleep quality, anxiety, or other negative emotions and different types of memory. Such as Short-term memory, Long-term memory, and Working memory.

## 6. Conclusions

The current research results indicate no significant correlation between sleep deprivation, anxiety, and vocabulary memory ability among college students. Based on online questionnaire surveys and quantitative research, correlation and retrospective analysis were conducted on 34 participants. Research has shown that sleep deprivation does not cause significant anxiety that affects vocabulary memory. However, this does not mean we can ignore sleep quality's impact on emotions and memory. We should continue to pay attention to sleep, negative emotions, and memory in different populations. Studies can make progress in the relationship between sleep, other emotions, and memory, such as work and long-term memory. Further work can expand the sample size and study different groups.

## References

- [1] Grandner, M.A. (2017) *Sleep, health, and society. Sleep Medicine Clinic.*, 12: 1-22.
- [2] Gaultney, J.F., Collins McNeil, J. (2009) *Insufficient Sleep in the Workplace: Psychologists and Managers Should Understand Sleep. Journal of Psychologists- Manager.*, 12: 132-148.
- [3] Yoo, S.S., Gujar, N., Hu, P., Jolesz, F.A., Walker, M.P. (2007) *The human emotional brain without sleep—a prefrontal amygdala disconnect. Current Biology.*, 17: R877-8.

- [4] Anderson, C., Platten, C.R. (2011) Sleep deprivation lowers inhibition and enhances impulsivity to negative stimuli. *Behavioural brain research.*, 217: 463-466.
- [5] Shao, Y., Lei, Y., Wang, L., Zhai, T., Jin, X., Ni, W., Yang, Y., Tan, S., Wen, B., Ye, E., Yang, Z. (2014) Altered resting-state amygdala functional connectivity after 36 hours of total sleep deprivation. *PLoS One.*, 9: e112222
- [6] Bosch, O.G., Rihm, J.S., Scheidegger, M., Landolt, H.P., Stampfli, P., Brakowski, J., Esposito, F., Rasch, B., Seifritz, E. (2013) Sleep deprivation increases dorsal nexus connectivity to the dorsolateral prefrontal cortex in humans. *Proc. Natl. Acad. Sci. U. S. A.*, 110: 19597–19602.
- [7] Kaufmann, T., Elvsåshagen, T., Alnæs, D., Zak, N., Pedersen, P. Ø., Norbom, L. B., Quraishi, S.H., Tagliazucchi, E., Laufs, H., Bjørnerud, A., Malt, U.F., Andreassen, O.A., Roussos, E., Duff, E.P., Smith, S.M., Groote, I.R., Westlye, L.T. (2016) The brain's functional connectome is robustly altered by Lack of sleep. *Neuroimage.*, 127: 324-332.
- [8] Pires, G.N., Tufik, S., Andersen, M.L. (2012) The relationship between sleep deprivation and anxiety: experimental research perspective. *Einstein (S ã o Paulo).*, 10: 519-523.
- [9] Goldstein, A.N., Walker, M.P. (2014) The Role of Sleep in the emotional function of the brain. *Annual Review of Clinical Psychology.*, 10: 679-708.
- [10] Graves, L., Pack, A.T. (2001) Sleep and Memory: A Molecular Perspective. *Trends in Neuroscience.*, 24: 237–243.
- [11] Kizilbash, A.H., Vanderploeg, R.D., Curtiss, G. (2002) The impact of depression and anxiety on memory performance. *Archives of Clinical Neurology.*, 17: 57-67.