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What are the impacts of emotions on adolescents' sleep duration and short-term memory performance, and how does sleep mediate this relationship

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Abstract:

This study focuses on how positive, negative, and neutral emotions influence adolescents' sleep duration and short-term memory performance, and also tries to figure out whether sleep duration plays a mediating role in this process. This research carried out a mixed independent-measures experiment with eight valid Chinese participants aged between 10 and 19. In the experiment, the researcher used video clips and music to induce different emotional states, recorded sleep time through sleep-tracking devices, and measured short-term memory ability with a four-digit number string recall test. The results showed that emotional states had a significant effect on sleep duration: teenagers in the negative emotion group slept the longest on average, while those in the positive emotion group slept the shortest. Although negative emotions tended to slightly lower memory accuracy and positive emotions improved it to a small degree, the overall effect of emotions on short-term memory was not statistically significant. Meanwhile, Pearson correlation analysis showed almost no linear relationship between sleep duration and post-sleep short-term memory performance, which suggests that sleep duration does not mediate the link between emotions and short-term memory. These findings enrich the research on the interaction mechanism among emotion, sleep, and cognition in adolescents, and provide practical implications for improving adolescents' daily sleep management and supporting their cognitive health development.

Keywords: Sleeping, emotional states, short-term memory, adolescent

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1. Introduction

According to recent research, the average sleep duration for adolescents aged 10-19 is concentrated at 6-7 hours per day. Based on a survey of 177 adolescents aged 10-19 more than 65% of adolescents' sleep duration is influenced by negative emotions, over 60% of adolescents' sleep duration is influenced by positive emotions, and over 55% of adolescents' sleep duration is influenced by neutral emotions. More than 90% of adolescents believe that good sleep can better regulate their emotions and memory (Cao, 2025, personal survey data). Adolescence, defined by the World Health Organization as the period between 10 and 19 years of age, is a critical stage for emotional, sleep, and cognitive development.

Research suggests that there may be some connection between emotions, sleep, and short-term memory (The Oxford Handbook of Sleep and Sleep Disorders, 2024). Each of these will be defined below. According to the existing research, it has confirmed correlations between emotions, sleep duration, and Short-term memory (STM). Positive emotions have been linked to extended sleep duration among adolescents in prior research (Shen et al., 2018), whereas negative emotional states correlate with reduced short-term memory performance (Wang, 2022). Adequate sleep has also been shown to boost short-term memory retention in teenage populations (Budson, 2021). However, a critical gap persists in existing research: few studies have examined whether sleep duration functions as a mediating variable in the association between adolescents' emotional states and short-term memory (STM) performance. The present study aims to fill this gap by investigating how sleep duration mediates the relationship between emotional states and STM among adolescents.

According to the World Health Organization's (n.d.) definition of adolescence as the period from 10 to 19 years of age range, this research focuses on Chinese adolescents within this age. Moving forward, subsequent sections look at relevant theoretical frameworks, go into detail about the research methodology, share the results of the data analyses, and talk through the theoretical and practical implications of what the study found.

2. Literature review

2.1 Definitions

Emotions are generally divided into three categories: positive, negative, and neutral. To elaborate, positive emotions are basically those that feel good when we experience them—they bring a sense of satisfaction and joy (Cohn & Fredrickson, 2009). In contrast, negative emotions are usually unpleasant. They are affective reactions that someone feels a negative way toward a person, an event, or any situation they are in (Elizabeth Scott, 2025). Neutral emotions are the ones that are called adukkhamasukha—roughly translating to "neither painful nor pleasant" (Anālayo, 2017)—sit right in the middle of how we actually feel day-to-day. They are pretty mild and neutral, not really unpleasant like pain or clearly enjoyable like pleasure.

Sleep duration typically refers to the total amount of sleep obtained, either during the nocturnal sleep episode or across the 24-h period (Christopher Kline, 2013).

Short-term memory (STM) is A temporary storage space that holds information learned (Cleveland Clinic, n.d.). Information held in the STM can be used to hold items for a limited time for them to be used, and it typically lasts from a few seconds to a few minutes (Cleveland Clinic, n.d.).

2.2 Theoretical basis of variable relationships

The regulatory mechanism of emotions on memory can be explained by neurotransmitter pathways: pleasant emotions promote dopamine release and enhance synaptic plasticity in the hippocampus (the core brain region for memory consolidation). In addition, anxiety and sadness will distract the synergistic action of the prefrontal cortex and hippocampus by overactivating the amygdala and depleting cognitive resources, respectively (V. Guttesen et al, 2026; Kazui et al., 2000). The impact of sleep on memory is based on the "sleep-dependent memory consolidation theory". To elaborate, NREM sleep promotes the organization and storage of neutral memories through slow-wave synchronization. On the other hand, REM sleep regulates the emotional intensity of emotional memories through theta oscillations, achieving an "emotional de-aromatization" effect (Zeng et al., 2021). In addition, theta coherence between the hippocampus and amygdala during REM sleep drives the pontine-geniculine-occipital (PGO) waves, whose density can predict an increase in plasticity-related gene expression, which supports the processing of emotional memory traces (The role of REM sleep theta activity in emotional memory, 2025). These theories provide a core framework for subsequent empirical research and clarify the physiological basis for the interaction between emotions, sleep, and memory.

2.3 Empirical Evidence on the Relationships Between Key Variables

Existing core literature supports the association between emotions, sleep, and memory, starting from different groups, scenarios, and research designs, and has formed some consensus conclusions.

In terms of the relationship between emotion and memory, the regulatory effect of emotion on memory exhibits significant type specificity. In positive emotions, pleasure enhances the efficiency of memory encoding by increasing dopamine release and enhances the persistence of emotional memory. Emotion-inducing experiments have shown that after watching a comedy video, participants' accuracy in remembering vocabulary is higher than that of the control group, and the recall advantage for emotion-related vocabulary persists even after several hours (Mark Feng Teng, 2023). The impact of negative emotions is more nuanced: strong emotional arousal (such as fear) can significantly enhance declarative memory. Even patients with Alzheimer's disease, their recall accuracy for emotional story passages is more than 30% higher than that for neutral passages, and this effect is positively correlated with amygdala volume (Kazui et al., 2000). Meanwhile, anxiety and depression exhibit inhibitory or interfering effects. Participants in a state of high anxiety tend to focus their attention on potential threats during memory encoding, leading to a decrease in vocabulary memory accuracy and an increase in retrieval speed (D. Hare & S. Duman, 2020). Sadness can distort memory details, with participants recalling negative event details with an accuracy rate of 88%, but recalling neutral events with an accuracy rate of only 65%, often omitting key information (Chen, 2025). No matter which emotion is most affected, it is only somewhat influenced by variables like age and illness severity (Kazui et al., 2000; Williams & Tabari, 2018), and it varies depending on the population in which it is most affected.

Regarding the correlation between sleep and memory, sleep is not only passive rest but a key part of memory consolidation, exerting both time-dependent and content-selective effects. In the short term (within 12 h), sleep equally preserves negative and neutral memories, as well as their emotional tones. Participants in the sleep group had 13% higher accuracy in remembering images compared to those in the sleep deprivation group, with no significant differences found in the scoring and encoding of emotional tones (Zeng et al., 2021). In the long term (after 60 hours), sleep leads to overall memory deterioration, whereas it significantly moderates negative emotional reactions. The emotional arousal scores for negative pictures in the sleep group decreased from 5.9 to 4.2, whereas those in the sleep deprivation group remained at 5.7 (Zeng et al., 2021). There is a significant positive association between sleep duration and short-term memory performance. Research indicates that both nocturnal sleep and daytime naps play an important role in the consolidation of newly learned words. Naps help maintain explicit memory for novel words and reduce forgetting compared with wakefulness, with developmental differences between children and adults (Elaine van Rijn et al., 2023). Furthermore, an inverted U-shaped relationship between sleep duration and scores on the Delayed Word Recall Test (DWRT) was further confirmed by research on senior populations; the 7-8 hours sleep group scored the highest, except for the sleep group. According to the Guangzhou Biobank Cohort Study, which was part of the short or long sleep duration of 2012, the groups with 3–4 hours and 10-hour groups are associated with increased risk of memory impairment by 29% and 52%, respectively (Xu et al, 2011).

With less sleep, the effects of sleep deprivation are selective; this disturbance is more pronounced than neutral memory. In the group with sleep deprivation, the accuracy of neutral memory dropped by 25%, whereas in the group without sleep, negative emotional memory only dropped by 8% (Zeng et al.,2021). Moreover, REM sleep is essential to the consolidation of emotional memory: the participants in the nap group had significantly better emotional memory consolidation effects than the no-nap group; however, these consolidation effects were positively associated with the REM sleep duration and right prefrontal theta power during the REM phase (REM Sleep, Prefrontal Theta, and the Consolidation of Human Emotional Memory, n. d.) in comparison to those in the no-nap group. On the other hand, there is no evidence to support the relationship between short-term memory and both the quality of sleep and dream recall. According to Williams and Tabari (2018), there was no statistically significant difference in the short-term memory scores between the high and low dream recall groups, and an analysis of 205 participants found that there was only a 0.105 correlation coefficient between the sleep quality scores and the frequency of dream recall.

In terms of the diversity of research situations and subjects, existing empirical research covers a wide range of areas. In terms of groups, it includes not only healthy adolescents, young adults, and older persons (Zeng et al., 2011; Williams & Tabari, 2018), but also special groups such as patients with Alzheimer's disease (Kazui et al., 2000). In terms of scenarios, it comprises many disciplines such as clinical care (e. g., memory rehabilitation for dementia patients), educational technology (e. g., emotion management in online learning), and daily cognition (e. g., the impact of sleep deprivation on working memory) (Kazui et al., 2000; Andrew E. Budson, MD, 2021), providing multidimensional support for understanding the relationships between variables.

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2.4 Research Gaps

Although the present research has clearly shown the basic relationships among emotion, sleep, and memory, there are still some deficiencies in mechanisms, scope of research, and methodological design. For example, there has been insufficient research on variable interaction mechanisms

Previous studies mostly examined the relationship between emotion-memory and sleep-membrance in binary ways, and they also looked into the interactive mechanism of emotion-sleep-memory in detail. Budson (2024), for example, verified that anxiety can affect memory retrieval, and Zeng et al. (2021) found that sleep can control the intensity of emotional memory. Nevertheless, neither of them answered the question of whether anxiety-related memory impairment can be alleviated by distinct sleep stages (REM/NREM)..

2.5 Research Aim, Questions, and Hypotheses

(I) Research purpose

To address this identified research gap, the study seeks to explore the mediating role of sleep duration (M) in the link between emotional states (X) and short-term memory (STM) performance (Y) in the adolescent population.The investigation is divided by three key research questions:

R1: Do adolescents' emotional states-positive, negative, neutral feelings-have a direct impact on their STM performance?

R2: Do adolescents' emotional states-positive, negative, neutral feelings-have a direct impact on their sleep duration?

R3: Does sleep duration act as a mediator in the relationships between adolescents' emotional states and their STM performance?

3. Methodology

3.1 Experiment Design

This experiment employs mixed independent-measures design to examine the relationship between emotions, sleep duration, and short-term memory performance in adolescents

Independent Variables:

(1) Emotional State: Three levels (positive, negative, neutral)

(2) Experimental Session: Two levels (session 1: short-term memory test, session 2: sleep-mediated memory test)

Dependent Variables:

(1) The number or accuracy of randomly generated digit strings correctly recalled by the participants

(2) Total sleep duration (measured in minutes)

Control Variables:

(1) Duration of emotional induction (video/music)

(2) Time of day for the initial memory encoding task

(3) Age range of participants

Ethical Consideration:

(1) Informed consent

(2) Participants were debriefed after each session.

(3) They can withdraw from the study at any time without penalty

3.2 Participants

A total of 16 people participated in the experiment (10-19 year-old), and the completely valid data consisted of 8 people.

Inclusion Criteria:

(1) Regularly use a sleep-tracking device, and are comfortable wearing it overnight.

(2) Report no history of sleep disorders (e.g.,insomnia), psychiatric conditions, or learning disabilities

Recruitment Method:

Participants were recruited via convenience sampling through school announcements, social media, or questionnaire.

3.3 Materials

Stimuli for Session 1 (Memory & Emotion induction):

(1) A list of 12 sets of 4-digit random number sequences (e.g. "3721", "8159")

(2) Emotional induction video clips:

Positive: A 2-3 minutes clip from a comedy show

Negative: A 2-3 minutes clip from a dram film depicting a conflict

Neutral: No video, participants will do some very simple math questions in

2 minutes in order to prevent rehearsal. People always engage in behavior called rehearsal to improve their memory, and rehearsal plays an important role in maintaining memory (Klaus Oberauer, 2019). Rehearsal is divided into two types: the first one is articulatory rehearsal, the repetition of verbal information to oneself. Another is elaborative rehearsal: verbal and non-verbal memory traces through associations with other contents. Both types of rehearsal can improve memory.

Previous research has shown that the number of independent chunks that a person can maintain simultaneously in short-term memory is approximately 7 plus or minus 2 (A. Miller, 2016). According to Miller's theory, this study used 12 sets of four-digit numerical strings, each treated as an independent chunk. Therefore, the 12 chunks significantly exceeded the short-term memory upper limit of typical adolescents. The purpose of doing so was to make participants inevitably forget, observe the limits and decline patterns of short-term memory, and reduce randomness in the experiment. Therefore, a researcher designed test papers with 12 target 4-digit number sequences blanked out, for participants to write down the corresponding numbers from memory..

Stimuli for Session 2 (Sleep & Emotion induction):

Emotional induction music tracks (3-5 minutes each):

(1) Positive: Upbeat, happy music

(2) Negative: Slow, melancholic music

(3) Neutral: Light music or Ambient instrumental music

Data Collection Tools:

(1) Sleep-tracking devices provided by participants

(2) Consent forms and debriefing sheets

(3) Digital timer

3.4 Procedure

Session 1: Emotion&Sleep&Short-term Memory Test

(1) Preparation:

All participants were explained the basic process of the session. Then, get them to sign the informed consent form.

(2) Experiment Briefing:

Participants were required to complete three experimental tasks respectively, focusing on positive emotions, negative emotions, and neutral emotions

(3) Instruction:

Researcher told the participants that they should wear a sleep-tracking device while sleeping, and listen to a piece of music before go to bed.

(4) Pre-sleep Intervention (3–5 minutes):

On the night of the sleep experiment, researcher arranged different music listening tasks for each group

① □Task 1(Positive):

Day one, participants listened to a 3–5 minute segment of upbeat, rhythmically vibrant happy music, carefully selected for its high tempo and positive lyrical themes.

② □Task 2 (Negative):

Day two, participants listened to a 3–5 minute piece of slow-tempo melancholic music, chosen for its low pitch and emotionally sombre tonal qualities.

③ □Task 3 (Neutral):

Day three, participants listened to a 3–5 minute track of soft ambient instrumental music or bedtime story such as novels with no distinct melodic or rhythmic patterns, designed to induce a calm and neutral pre-sleep state.

(5) Sleep Monitoring:

Asked participants to wear the sleep-tracking device all night until they wake up next morning.

(6) Data Collection:

On the following morning, participants were guided step-by-step to export the sleep data recorded by the device and shared the complete data set with researcher, and researcher verified the integrity and validity of the collected data on-site.

(7) Encoding Phase:

All participants were given the same list of 12 sets of 4-digit random number sequences, and let them spend 1.75 minutes studying and memorizing those numbers.

(8) Memory Retrieval:

Handed out the test papers, which lists the serial number of the 12 number sequences, but leave the numbers blank. Participants were given 1 minute to write down the exact 4-digit numbers they remember.

(9) Debriefing & Transition:

The test papers were collected all completed test papers, then offered participants a 5-minute short break to rest. During this break, a brief verbal debrief was conducted by researcher to inform participants about the core purpose of Session 1, which focused on exploring the immediate impact of emotional states on short-term memory performance.

Session 2: Emotion and Short-term Memory Test

(1) Experiment Briefing

Participants are required to complete another three experimental tasks respectively, focusing on positive emotions, negative emotions, and neutral emotions

(2) Emotion Induction (2-3 minutes):

Task 1 (Positive):

Day four, participants were instructed to watch a 2-3 minutes clip from a well-known comedy show, selected specifically for its ability to elicit genuine positive emotions like amusement and joy.

Task 2 (Negative):

Day five, participants viewed a 2-3 minutes excerpt from a realistic drama film that depicts an interpersonal conflict, chosen to trigger mild negative emotions such as tension and discomfort without causing distress.

Task 3 (Neutral):

Day six, participants were asked to sit quietly, distraction-free room for 3 minutes with no audio or visual stimuli. In order to maintain a neutral emotional state.

(3) Encoding Phase:

All participants were given the same list of 12 sets of 4-digit random number sequences, and let them spend 1.75 minutes studying and memorizing those numbers.

(4) Memory Retrieval:

Handed out the test papers, which lists the serial number of the 12 number sequences, but leave the numbers blank. Participants were given 1 minute to write down the exact 4-digit numbers they remember.

(5) Final Debriefing:

Researcher thanked all the participants who were re-

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cruited to this experiment, and thanked for their time and cooperation. Then, gave a full explanation of the study's goals and the role of sleep as a possible mediator in the research.

4. Findings and results

The results were obtained by carrying out the 3 experiments outlined in the methodology. Results from each experiment are discussed below.

4.1 The effect of emotions on short-term memory capacity

Table 1 bar chart of STM capacity

As can be seen from the diagram, the result shows the mean of accuracy rates of participants in memory tests under different emotions. The accuracy rate of the negative emotion group is the lowest, at 76.9%, while the positive emotion group has the highest accuracy rate, at 84%.

Table 2 ANOVA test of emotional group and STM capacity

Variance analysis results					
	Emotional group (mean ± standard deviation)			*F*	*p*
	negative(*n*=8)	neutral(*n*=8)	positive(*n*=8)		
STM capacity	0.77±0.12	0.83±0.19	0.84±0.17	0.410	0.669
* *p*<0.05 ** *p*<0.01					

According to the table, this experiment investigated the impact of three emotional states (negative, neutral, and positive) on short-term memory capacity. To elaborate, the results from one-way analysis of variance (ANOVA) showed that the mean short-term memory capacity was slightly affected by different emotional states. The variance analysis results indicated that the STM capacity of the negative group was 0.77 ± 0.12; the STM capacity of the neutral group was 0.83 ± 0.19; and the STM capacity of the positive group was 0.84 ± 0.17. However, variance analysis results and statistical tests indicated that the main effect of emotional state on short-term memory capacity was not significant, because in this experiment, the variance analysis results showed $F(2,21)= 0.410$, $p = 0.669$ ($p > 0.05$), which suggests that different emotional states did not significantly affect short-term memory capacity.

Nevertheless, the results of one-way analysis of variance (ANOVA) showed that the main effect of emotional state on short-term memory accuracy did not reach a statistically significant level, $F(2, 21) = 0.410$, $p = 0.669$ in this experiment. Although the average accuracy of the negative emotion group is lower than that of the positive and neutral groups, and the accuracy of the positive group is slightly higher than that of the neutral group, this intergroup difference is still not statistically significant. This indicates that under the conditions of this experiment, although the data shows a trend of "slightly lower short-term memory accuracy with negative emotions and slightly higher with positive emotions", this trend is not stable.

Therefore, emotional states do not have a significant impact on short-term memory, and the observed mean differences are more likely to be random fluctuations..

4.2 The effect of emotions on sleep duration

Table 3 ANOVA test of Emotional group and sleeping duration

Variance analysis results					
	Emotional group(mean ± standard deviation)			*F*	*p*
	negative(*n*=8)	neutral(*n*=8)	positive(*n*=8)		
sleeping duration /min	507.13±58.15	487.25±60.38	422.88±77.29	3.580	0.046*
Post-sleep accuracy rate	0.77±0.16	0.85±0.18	0.81±0.17	0.366	0.698
* *p*<0.05 ** *p*<0.01					

This experiment investigated the effects of different emotional states on sleep duration and the accuracy of short-term memory after sleep. Firstly, from descriptive statistics of variance analysis results, there were significant differences in the mean sleep duration among the three groups of participants: the negative emotion group had a sleep duration of 507.13 ± 58.15 minutes, the neutral group had a sleep duration of 487.25 ± 60.38 minutes, and the positive group had a sleep duration of 422.88 ± 77.29 minutes.

The results of one-way analysis of variance (ANOVA) showed that the main effect of emotional state on sleep duration was close to a significant level, $F(2, 21) = 3.580$, $p = 0.046 (p < 0.05)$. This indicated that under the conditions of this experiment, emotional states have a significant impact on sleep duration. Indeed, the negative emotion group had the longest sleep duration, while the positive emotion group had the shortest, and this difference is statistically significant. In the interview after the experiment, four participants reported difficulty falling asleep. This may also be the reason why more sleep supplementation is needed in the future.

Secondly, in terms of short-term memory accuracy after sleep, the mean values of the three groups are negative group 0.77 ± 0.16, neutral group 0.85 ± 0.18, and positive group 0.81 ± 0.17. This data showed that sleep duration has a slight effect on short-term memory. To elaborate, the sleep duration from the neutral group was 487.25±60.38, and the post-sleep accuracy rate was 0.85±0.18, which was higher than that of the negative group. However, variance analysis results showed that the main effect of emotional state on post-sleep accuracy was not significant, with $F(2,21)=0.366$, $p=0.698$ ($p>0.05$). Although the accuracy of the neutral group was slightly higher than the other two groups in numerical terms, this difference did not reach a statistically significant level, which indicated that emotional state did not have a significant impact on short-term memory performance after sleep.

Overall, this experiment found that emotional state significantly affected the sleep duration of participants, but did not significantly affect their short-term memory accuracy after sleep. This result suggests that emotional regulation may be an important factor affecting sleep duration, and post-sleep memory performance depends more on other variables rather than the emotional state itself..

4.3 The correlation between regular sleep duration and short-term memory capacity

Table 4 Pearson correlation between Sleeping duration and STM capacity

Pearson correlation	
	Sleep duration/min
Short-term memory capacity (after sleep)	r=0.052

This experiment investigated the correlation between regular sleep duration and short-term memory capacity. In the previous experiment, a researcher obtained a set of data: When the sleep duration was 507.13±58.15, the post-sleep accuracy rate was 0.77±0.16; When the sleep duration was 487.25±60.38, the post-sleep accuracy rate was 0.85±0.18; When the sleep duration was 422.88±77.29, the post-sleep accuracy rate was 0.81±0.17. In addition, the results of Pearson correlation showed that $r=0.052$ in this experiment, which means regular sleep duration has no linear correlation with short-term memory capacity. Thus, there was no correlation between regular sleep duration and short-term memory capacity.

In summary, based on the above research, it can be concluded that short-term memory ability is affected by negative emotions, but the results are not significant. Emotions can affect sleep duration, and positive emotions can shorten sleep duration. The duration of sleep does not affect emotions, so sleep is not a mediating variable.

4. Discussion

This research investigated the effects of induced emotions on short-term memory and sleep duration among adolescents, examining whether sleep duration is a mediating variable. Overall, the results show partial consistency with previous research. However, there are also some differences between the research results and previous research.

4.1 The effect of emotions on short-term memory capacity

With regard to the influence of emotion on short-term memory, even though negative emotion correlated with a decrease in accuracy (76.9%) in comparison to positive (84%) and neutral (82.69%) conditions, the primary effect was not statistically significant ($F = 0.410$, $p = 0.669$). This pattern mirrors the results of Wang (2022), Chen (2025), and Kazui et al. (2000), in which negative emotion typically seems to impair memory function and positive emotion aids memory encoding. Such consistency might be due to the similar age range of the participants and the emotion-induction techniques used. However, in contrast to Chen (2025) and Kazui et al. (2000), who reported substantial effects, the current study did not observe significant effects. This is likely due to the neutral numeric stimuli as opposed to emotion-evoking stimuli,

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the emotion induction being relatively mild, and the limited sample size, which collectively diminish the effect size. Thus, although the current study's findings do align with many existing studies, it does not provide strong evidence on the effects of emotion on short-term memory.

4.2 The effect of emotions on sleep duration

For the effect of emotion on sleep duration, a significant main effect was found ($F = 3.580$, $p = 0.046$). Participants under the influence of the negative emotion condition, on average, had the longest sleep duration ($M = 507.13$ minutes), and those under the influence of the positive emotion condition, on average, had the shortest duration of sleep ($M = 422.88$ minutes). This result confirms the effect of emotion on the sleep duration of adolescents. This conclusion is consistent with the findings of the NeuroLaunch editorial team, whose research suggests that sleep as a coping mechanism can be defined as the habitual use of excessive sleep or napping to avoid coping with stressful situations, negative emotions, or challenging living environments. People may fall asleep for various reasons, including feeling overwhelmed by responsibility, experiencing anxiety or depression, or simply lacking the motivation to face the day ahead. However, this is contrary to Shen et al. (2018), who found positive emotion to be associated with increased sleep duration. The contradiction could result from the study designs. While Shen et al. conducted a correlational survey, this study was experimental, with emotion induction done before sleep. Positive high-arousal emotion, when experienced just before sleep, may heighten cortical activation, thus prolonging the time it takes to fall asleep and consequently, the total duration of sleep. These findings demonstrate the influence of the level and timing of the emotion on the relationship between emotion and sleep duration.

4.3 The effect of the correlation between regular sleep duration and short-term memory capacity

For the correlation between regular sleep duration and short-term memory capacity, the result found that $r=0.052$, which means there was no correlation between regular sleep duration and short-term memory capacity. Through the experiment conducted by V. Guttesen et al. (2026), it was found that sleep is the key to long-term memory. Although sleep can reduce hippocampal load and sleep deprivation can impair new learning, there is no significant direct correlation between the degree of memory consolidation during sleep and the ability to learn and remember the next day. In addition, in Ali Williams' article published in 2018, it was found that there is no relationship between sleep quality and short-term memory, only that the older the age, the worse the short-term memory performance. This is also similar to the results of this study.

6. Evaluation

This research looks into how sleeping might explain the link between adolescents' feelings and their short-term memory, using a mix of methods to check this three-part connection with careful control over how long emotions are stirred up and when tests happen. It gathers data through objective sleep trackers, and the ways feelings are brought out (through video or music) are focused and easy to put into practice, while sticking closely to ethical rules to keep the study solid.

The study used a very small group with just 8 people who completed it, making the statistical strength weak and the emotion-memory findings not significant. The emotion trigger was light and didn't last long, so it didn't really copy real emotional experiences. Moreover, due to the lack of emotion measurement in the experiment, it is impossible to determine whether the effect of emotion induction meets the standard. The memory test only used 4-digit numbers, which is a narrow way to check short-term memory. They only looked at how long people slept, missing other important sleep details like REM sleep or how well they slept — things that really matter for memory.

In order to improve the experiment, more adolescents could be used from different age groups and backgrounds to make the findings apply better to a wider group. In order to have a fuller picture, researchers should make the emotional prompts stronger and last longer, and include different kinds of short-term memory tests, such as words and pictures. Researchers should add checks for sleep stages and quality using proper equipment to see how they each play a part in the process. Finally, researchers could change the timing of the tests to cut down on tiredness and stop memories from one session messing with the next..

7. Conclusion

This research looks at whether feelings change how long teenagers sleep and their short-term memory, and if sleep plays a middle role. The results show that feelings do make a difference in sleep length. Adolescents with negative moods slept longer, while those feeling positive slept less. But emotional state didn't really change how well they remembered things, though there was a slight pattern — lower STM with negative feelings and higher with positive ones. Sleep time didn't act as a go-between for emotion and memory, since the link between sleep length and

STM after sleep was barely there. Also, memory scores after sleeping didn't differ much across groups. So, feelings do steer how long teens sleep, but in this test, neither emotions nor sleep length had a real effect on short-term memory, meaning sleep time can't bridge the two. The future research could focus on exploring the impact of different age groups on memory and sleep duration, initiate long-term research, track real-life scenarios, and reveal the interaction between the three.

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