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Effect of Academic Stress on Memory Recall

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Background	Medical education is associated with high academic stress which may adversely affect cognitive functions, particularly memory retrieval and recall. Stress-related memory impairment, colloquially termed "mental blank" by students during exams, could have negative implications on academic achievement and psychological well-being.
Objective	To find out the prevalence of stress-induced memory impairment in medical students and to identify stressors, physiological symptoms, coping strategies, and determinants for memory recall during academic activities.
Methods	A cross-sectional study was carried out using a questionnaire among medical students of different academic semesters. Data were collected through a structured online questionnaire, which included demographic data, sleep patterns, examination stress, memory performance, physiological symptoms, and coping methods.
Results	Many participants reported episodes of mental blankness during examinations, particularly during high-stakes examinations and difficult subjects such as physiology and anatomy. Stress often led to physical symptoms such as rapid heartbeat, tension headaches, and sleep disturbances. Social support, meditation, and physical exercise were the most commonly used coping strategies.
Conclusion	Academic stress significantly influences memory retrieval in medical students. Sleep loss, examination anxiety, and curriculum pressures all contribute to stress-related memory impairment. Institutional strategies focusing on stress management, sleep hygiene, and evidence-based study skills are strongly recommended.

Keywords: *Academic stress; Memory recall; Medical students; Examination anxiety; Sleep deprivation; Cognitive performance*

1. Introduction

Medical education is one of the most complex academic professional training programmes. Medical students are challenged with rigorous curricula, frequent testing, competitive academic environments, and pressure to perform at a high level. Future health care professionals are meant to be prepared by their education for dealing with complex clinical situations, and this places immense cognitive and emotional demands on them.

Stress is an organismic and psychological reaction to perceived demanding or threatening situations. A moderate amount of stress can increase alertness and motivation. However, chronic or high stress can impair learning, memory consolidation, and retrieval of information. One common phenomenon reported by medical students is going "blank" during exams — a stress-induced disruption of memory retrieval

known as stress-induced memory impairment.

Memory is crucial in medical training since learners are expected to have vast knowledge of scientific and clinical data. Research has shown that high levels of stress hormones, like cortisol, can negatively affect the brain's hippocampus and hinder memory retrieval. Stress in academia is not limited to the impairment of memory — it has been associated with physical and psychological health problems including anxiety, depression, and burnout.

Many researchers across the globe have indicated high stress levels among medical students, with stressors including examinations, heavy academic load, lack of sleep, fear of failure, and personal issues. Additionally, many medical students adopt different stress management strategies, for instance, seeking social support, exercising, and using relaxation techniques. However, the effectiveness of these coping strategies in preventing memory impairment has not been adequately studied.

Even though there has been increased interest in the well-being of students, there has been little research on the specific association between academic stress and stress-related memory problems among medical students. Knowing about the occurrence, causes, and ways of coping with memory problems arising from academic stress can be useful in the development of targeted interventions to enhance the welfare and academic achievement of students.

This study was done to determine the prevalence of stress-induced memory problems among medical students as well as the associated physical symptoms, academic stresses, coping strategies, and factors that affect memory during stressful situations.

2. Materials and Methods

Study Design and Setting

This is a descriptive cross-sectional study conducted on medical undergraduate students to assess the effect of academic stress on memory performance and recall. The study was conducted using an online questionnaire administered to medical students from various semesters of the medical course.

Study Population

The study population comprises medical undergraduate students enrolled in different semesters of the medical program. Participants who gave consent to take part in the study and filled out the online questionnaire were considered participants in this study, while incomplete answers were treated as exclusion criteria.

Tool for Data Collection

Data were collected from the respondents using a structured self-administered questionnaire administered using an online survey tool. The questionnaire included the following:

- Demographic information such as age, gender, and semester of study.
- Information about sleep behavior during the examination period.
- Information on experience with stress-induced mental blackouts.
- Assessment of stress level and stress symptoms.
- Performance in memory recall under academic stress.
- Difficulties in remembering things when stressed.
- Strategies to cope with academic stress.
- Effectiveness of cramming to recall memories.
- Recovery time after taking stressful exams.

- Use of digital tools for memorization.
- Academic stressors influencing memory performance.

Variables Under Study

The main dependent variable was stress-related memory impairment, involving the ability to recall learned information during academic stress. Independent variables included sleep time, level of stress, physical signs, stress coping measures, examination type, and academic stressors.

Procedure of Data Collection

A questionnaire link was shared with eligible participants, who were given an opportunity to take part in the study. Participation was voluntary and anonymous. Before taking the questionnaire, participants were provided with details about the purpose of the study and confirmed their informed consent online.

Statistical Treatment

Data was input into Microsoft Excel where descriptive statistical tools were used. Frequency and percentage statistics were used in the analysis of categorical data, and results were reported in tables and narratives.

Ethical Considerations

Voluntary participation in the study was ensured through the anonymity of respondents and confidentiality of their responses. Respondents gave online informed consent to participate in the study.

3. Results

Segment 1: Demographics, Sleep, Mental Blank Episodes, Stress Level and Physiological Symptoms (Questions 1–5)

Sleep duration among the 100 respondents varied considerably during examination periods. The most prevalent category included respondents who slept 7 to 8 hours (29%), followed by more than 8 hours (28%). A further 23% slept for 4–6 hours while 19% admitted they had slept for less than 4 hours.

Concerning cognitive challenges, 53% reported having experienced a mental blank episode during major exams, while 46% had never experienced one. Among those who did, mental blanks occurred rarely (40%), only during challenging subjects like anatomy and physiology, or consistently in all major exams.

Stress level evaluation indicated considerable variation. The largest share of students rated themselves at 5/5 (26%) followed by 4/5 (22%), implying approximately half of respondents experienced very high stress during normal school days. The most prevalent physiological manifestations included palpitations (26%), sleep disturbances (21%), tension headaches (20%), sweaty palms (19%), and gastrointestinal disorders (13%).

Table 1. Demographic Characteristics, Sleep Pattern, Mental Blank Episodes, Stress Level and Physiological Symptoms (Questions 1–5)

Variable	Most Common Answer	Percentage (%)
Sleep duration during exams	7–8 hours	29%
Mental blank occurrence	Yes	53%
Frequency of mental blank	Rarely	40%
Level of stress	5/5 (Maximum)	26%

Variable	Most Common Answer	Percentage (%)
Physiological symptoms	Palpitations	26%

Segment 2: Recall Ability, Memory Issues, Coping Methods, Cramming and Recovery Period (Questions 6–10)

Analysis of recall ability under pressure showed that 44% of respondents viewed their memory performance as average — managing to remember most things despite the pressure. Nevertheless, 28% experienced poor recall, while only 27% thought pressure helped improve their recall.

The most prevalent memory issue was confusing similar ideas (24%). Additionally, 20% reported forgetting medical terminology, while 16%, 14%, and 14% mentioned trouble concentrating, mental fog, and delayed post-exam recall respectively.

Social support was the most used coping method, with 28% opting to talk to friends and colleagues. Meditation or prayer (21%), exercise (19%), caffeine/energy drinks (16%), and avoidance behavior (15%) were also reported. Cramming before an exam was rated as very helpful by 42%, while 30% found it confusing and 27% found it useful only for short-term recall. Regarding recovery, 38% recovered immediately after examinations, while others needed several days.

Table 2. Recall Ability, Memory Issues, Coping Methods, Cramming and Recovery Period (Questions 6–10)

Variable	Most Common Answer	Percentage (%)
Recall capability under pressure	Average	44%
Most common memory problem	Mix-up of related subjects	24%
Preferred coping method	Spending time with friends	28%
Impact of cramming	Great improvement in recall	42%
Recovery period post-exam	Immediate	38%

Segment 3: Technology, Stress Perception, Energy Drinks, Recall Format and Subject-wise Stress (Questions 11–15)

Among digital learning tools, Anki/Flashcards (23%) and PDF annotations (23%) emerged as the most commonly used, with 22% relying on paper resources. Nearly half of all participants (47%) felt that perceived academic stress was higher than they had anticipated prior to enrollment. Energy drink consumption was common: 27% consumed them daily, while 29% never used them.

Regarding recall difficulty by examination format, 34% found oral viva examinations more difficult than written MCQs, while 31% reported equal difficulty across both formats. Subject-wise, Physiology (31%), Biochemistry (23%), and Anatomy (19%) posed the greatest memory challenges.

Table 3. Learning Tools, Stress Perception, Energy Drink Use, Recall Format, and Subject-wise Stress (Questions 11–15)

Variable	Most Common Answer	Percentage (%)
Preferred digital learning tool	Anki/Flashcards	23%
Perception of greater-than-expected stress	Agree/Strongly Agree	47%

Variable	Most Common Answer	Percentage (%)
Frequency of energy drink use	Never	29%
More difficult recall format	Viva (oral) exam	34%
Most stressful subject	Physiology	31%

Segment 4: Factors Influencing Memory and Integrated Analysis (Question 16)

Regarding the factors students felt needed to decrease in order to enhance memory performance, both lack of adequate sleep and volume of syllabus ranked first equally (28% each), followed by personal/family issues (23%) and examination frequency (20%).

Analysis confirms a clear connection between stress level and difficulty with memory. The majority (55%) experienced mental blank moments, many reported difficulty recalling material, and confusion between similar concepts was the predominant type of memory error. These findings collectively indicate that exam-related stress adversely affects both encoding and retrieval of academic knowledge.

Table 4. Factors Influencing Memory Performance (Question 16)

Factor	Percentage (%)
Lack of adequate sleep	28%
Quantity of syllabus	28%
Personal/family pressure	23%
Frequency of examinations	20%

4. Discussion

This study examined the relationship between academic stress and memory recall amongst medical students. From the results, it is evident that academic stress is very common and substantially affects cognitive processes, especially memory recall during examinations.

Over fifty percent of the sample reported blank-mind episodes during critical exams. As suggested by cognitive theories, this finding indicates that excessive stress activates the hypothalamic-pituitary-adrenal (HPA) axis, leading to an increase in cortisol which impairs hippocampal function and retrieval of information. This is consistent with existing neuroscientific evidence demonstrating that acute psychosocial stress disrupts prefrontal cortex-dependent working memory.

Sleep proved to be another critical factor. A considerable proportion of students reported sleeping less than the recommended amount during examination periods. Lack of sleep has been proven to result in poor attention, decreased working memory, and difficulties in memory consolidation — all essential cognitive processes for academic performance. The dual burden of sleep deprivation and examination anxiety likely compounds the adverse effects on memory retrieval.

Physiological consequences of stress — palpitations, tension headaches, and gastrointestinal disturbance — were widely reported. These somatic symptoms can further distract cognitive resources from the study process and contribute to a cycle of declining performance and heightened anxiety.

Social activities, meditation, and physical activity were among the most prevalent coping mechanisms

adopted, representing relatively healthy means of reducing physiological stress and improving emotional regulation. The excessive use of caffeine and energy drinks among some students raises concerns, however, as high caffeine intake may disrupt sleep architecture and paradoxically worsen stress-related cognitive dysfunction over time.

An interesting finding was that nearly half of participants found medical school stress higher than anticipated. This may reflect inadequate pre-entry preparation or awareness, and suggests the need for orientation programs that set realistic expectations. The subjects identified as most stressful — Physiology, Biochemistry, and Anatomy — are consistent with those reported in international literature, attributable to their high conceptual density and requirement for precise terminology recall.

5. Conclusion

The findings of this research show that academic stress plays a key role in affecting the memory recall ability of students studying medicine. The majority of respondents indicated that they had experienced mind blanks during their exams, confirming that stress affects cognitive function negatively and that this is a prevalent phenomenon in medical education.

Sleep loss was identified as one of the major factors contributing to poor memory functioning, alongside a heavy syllabus volume. Memory problems were mostly related to confusion of ideas and inability to recall medical terminology under pressure. Coping strategies such as social interaction, meditation, and physical exercise were commonly used, though their effectiveness varied among individuals.

These results underscore the importance of institutional support structures. Medical universities should consider implementing evidence-based stress management programs, promoting sleep hygiene, and incorporating retrieval-practice study techniques such as spaced repetition into academic curricula. Early identification of students at risk of stress-related cognitive impairment, combined with accessible mental health resources, is essential for optimizing both student well-being and academic outcomes.

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