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PREVALENCE AND CORRELATION OF PSYCHOLOGICAL DISTRESS AND COGNITIVE DYSFUNCTION AMONG AI USERS MEDICAL STUDENTS: A CROSS-SECTIONAL STUDY

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Abstract

Objective:
This study aims to assess the prevalence and explore the correlation between psychological distress and cognitive dysfunction among medical students utilizing artificial intelligence.

Methodology:
The cross-sectional survey involved 330 medical students from various programs, aged 18 to 30 years, using non-probability convenience sampling. Participants completed the General Health Questionnaire (GHQ-12) to assess psychological distress and the Montreal Cognitive Assessment (MOCA) for cognitive function. Data collection included face-to-face interviews, with informed consent obtained prior to participation. SPSS version 25 was used for statistical analysis.

Results:
The findings revealed that 54.5% of participants had normal GHQ scores, while 42.8% experienced psychological distress, including 6.7% with severe distress. MOCA results indicated that 73% of participants scored normally, whereas 27% exhibited mild cognitive impairment. GHQ and MOCA scores showed a moderately positive correlation ($r = 0.543$, $p < 0.001$), indicating a negative relationship between cognitive performance and psychological distress.

Conclusion:
The study highlights a significant prevalence of psychological distress and mild cognitive impairment among medical students, emphasizing the need for targeted mental health interventions within medical education to improve overall well-being and academic performance.

Keywords:
Artificial Intelligence, Psychological Distress, Cognitive Function.

INTRODUCTION

Medical education is universally recognized as one of the most cognitively demanding academic disciplines, requiring students to develop and continuously refine advanced skills in critical thinking, clinical reasoning, metacognition, and ethical decision-making. These competencies are fundamental not only for academic success but also for the delivery of safe and effective patient care. Recent empirical studies have documented the significant cognitive and emotional challenges faced by medical students, including elevated stress, burnout, and mental health disorders, which can negatively impact learning outcomes and professional development (Ahmad et al., 2023, Götzl et al., 2022, Chaturvedi et al., 2024). The intense academic pressure often leads students to seek various coping mechanisms, including the use of cognitive enhancement strategies—both pharmacological and non-pharmacological—raising critical ethical, health, and regulatory concerns within the medical community (Doki et al., 2021, Lei et al., 2023, Huda et al., 2023).

Parallel to these challenges, the rapid evolution and integration of Artificial Intelligence (AI) technologies across healthcare and education sectors have begun to transform the landscape of medical training and practice. Due to its ability to improve human cognitive capacities, expedite data analysis, and customise learning, artificial intelligence (AI) has drawn significant investment; estimates indicate that global AI-related spending will reach $250 million by 2025 (Ahmad et al., 2023, McKinsey et al., 2023). In education, AI-powered tools such as adaptive learning platforms, virtual simulations, and intelligent tutoring systems are increasingly employed to enhance student engagement and learning efficiency. Notably, over 50% of educators in the United Arab Emirates have incorporated AI solutions to address pedagogical challenges, signaling a broader trend towards technology-enabled education (Chaturvedi et al., 2024, Oladimeji et al., 2023).

Simultaneously, the rise of mobile health (mHealth) applications reflects a growing reliance on technology to support mental health among young adults, including medical students who frequently experience psychological distress (Götzl et al., 2022, Lei et al., 2023). While AI and digital interventions offer promising avenues for mental health support and cognitive enhancement, concerns persist regarding their potential adverse effects. These include risks of emotional detachment, digital addiction, compromised privacy, and ethical dilemmas related to autonomy and informed consent (Doki et al., 2021, Graham et al., 2019, Araujo et al., 2020, Vayena et al., 2018). Such concerns underscore the necessity for a nuanced understanding of AI's role within the complex cognitive and emotional milieu of medical education.

Furthermore, cognitive abilities such as working memory, attention regulation, and metacognitive awareness are critical determinants of medical students' academic performance and psychological resilience. Research demonstrates that deficits in these domains correlate strongly with increased stress and burnout, while targeted pedagogical interventions—such as concept mapping, reflective practice, and problem-based learning—can enhance these skills and improve clinical reasoning (Ahmad et al., 2023, Wang et al., 2021, da Silva et al., 2025). Additionally, the diversity of cognitive models and learning strategies among medical students necessitates personalized educational approaches to optimize learning outcomes and well-being (Silva et al., 2024, Delavari et al., 2024).

Given the multifaceted pressures facing medical students, including the demands of mastering complex knowledge, coping with psychological stressors, and navigating an increasingly AI-integrated educational environment, it is imperative to investigate how cognitive abilities intersect with mental health and academic performance. This study aims to investigate the complex connections between medical students' mental health outcomes, namely stress levels, and their cognitive abilities, including intelligence, decision-making, ethical reasoning, and resilience. The goal of the research is to clarify these dynamics

in order to guide the creation of evidence-based teaching methods and support systems that promote both psychological health and cognitive brilliance in medical education.

METHODOLOGY

Study Design and Setting

This cross-sectional study was carried out at two prestigious medical institutions, the United Medical and Dental College (UMDC) and the United College of Physical Therapy (UCPT), between December 2024 and June 2025. The study targeted medical students enrolled in diverse programs, including Bachelor of Medicine and Bachelor of Surgery (MBBS), Bachelor of Dental Surgery (BDS), Doctor of Physical Therapy (DPT), and Nursing.

Participants and Sampling

A non-probability convenience selection technique was used to choose participants in order to effectively recruit qualified medical students over the study period. According to the inclusion criteria, participants had to be between the ages of 18 and 30, currently enrolled in medical programs such as MBBS, BDS, DPT, or Nursing at UCPT or UMDC. Additionally, participants needed to demonstrate active and consistent utilization of artificial intelligence (AI) technologies in their academic or clinical activities, including but not limited to AI-assisted learning, research, diagnostic support, or data analysis (Ahmad et al., 2023). To guarantee accurate comprehension and completion of the study tools, fluency in English was also necessary. Additionally, before to enrolment, informed consent was obtained from each participant.

Conversely, individuals were excluded if they had a formal diagnosis of psychological or neurological disorders that could significantly impact mental health or cognitive function, as self-reported or documented in medical records. Students with minimal or no exposure to AI technologies—defined as less than three months of regular use or usage frequency below once per week—were also excluded to maintain the relevance of AI engagement to the study objectives. Additionally, students not currently enrolled in the specified medical programs at the participating institutions were excluded. Participants taking medications known to affect cognitive function or mental state, or those concurrently involved in other research studies potentially influencing their psychological or cognitive status, were also excluded to reduce confounding factors. Finally, individuals unwilling or unable to complete all required assessments were not considered eligible for participation (Götzl et al., 2022, Chaturvedi et al., 2024).

Ethical Considerations

The Institutional Review Boards (IRBs) at UMDC and UCPT provided ethical approval prior to data collection. After being told about the study's goals, methods, confidentiality protocols, and their freedom to discontinue participation at any moment without facing consequences, all participants gave written informed permission.

Data Collection Instruments

Two validated psychometric tools were utilized to assess mental health and cognitive function:

General Health Questionnaire (GHQ-12): It is a 12-item screening tool for mild psychological discomfort. Every item is scored using a four-point Likert scale, and the scoring techniques produce a composite score that represents the psychological health of the participants. According to Cronbach's alpha, the reliability coefficient for the GHQ-12 is 0.87, indicating strong internal consistency (Wojujutari et al., 2024)

Montreal Cognitive Assessment (MoCA): A well-known cognitive screening test, the MoCA is intended to identify moderate cognitive impairment in a variety of areas, such as executive functioning, language, attention, memory, and visuospatial skills. The evaluation has 30 points and takes about 10 minutes to administer on average. With a stated internal consistency of 91.9%, it exhibits exceptional dependability (Aguilar et al., 2018)

Data Collection Procedure

Data collection was conducted in a controlled, quiet environment within the respective institutions. Participants first completed the GHQ-12 questionnaire, following standardized instructions emphasizing the importance of honest and reflective responses. Completed questionnaires were reviewed immediately for completeness to minimize missing data.

Subsequently, trained research personnel conducted face-to-face interviews to administer the MoCA assessment. Participants received individualized feedback on their cognitive performance upon completion to promote awareness and engagement.

Data Analysis Procedure

Before being analysed, all gathered data was anonymised and safely stored. IBM SPSS Statistics version 25 was used for data entry and statistical analysis. First, the Shapiro-Wilk test, which tests the null hypothesis that the data are normally distributed, was used to determine whether continuous variables were normal. A considerable departure from normalcy was indicated in this study by the Shapiro-Wilk test, which produced a p-value of less than 0.05. As a result, non-parametric statistical techniques were used. To summarise demographic traits and scores on the GHQ-12 and MoCA scales, descriptive statistics such as means, standard deviations, frequencies, and percentages were computed. Because of the data's non-normal distribution, Spearman's rank-order correlation was used for inferential analysis to look at relationships between AI use, psychological distress, and cognitive function. Where suitable, multivariate regression models were also used. The threshold for statistical significance was $p < 0.05$.

RESULTS

The study included 330 individuals in total, 80 of whom were male (24.2%) and 250 of whom were female (75.8%). The sample's age distribution looked like this: Seven (2.1%) of the participants were older than 19, 72 (21.8%) were older than 20, 82 (24.8%) were older than 21, 73 (22.1%) were older than 22, 83 (25.2%) were older than 23, 9 (2.7%) were older than 24, 3 (0.9%) were older than 25, and 1 participant (0.3%) was older than 27 (refer to Figure 1). With a preponderance of female participants, this distribution shows a fairly balanced representation into the early twenties (Figure 1).

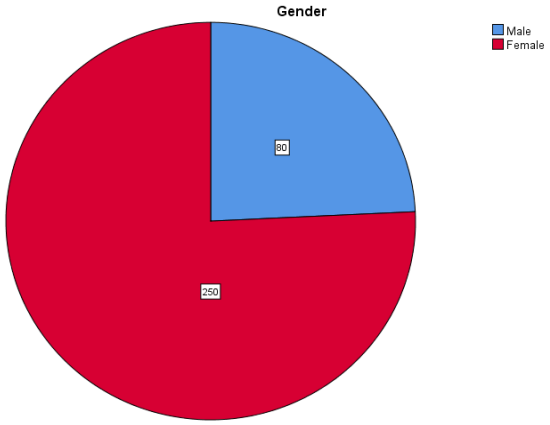

Figure 1: Gender of Participants

General Health Questionnaire (GHQ) Scoring

The individuals' psychological distress levels were assessed using the General Health Questionnaire (GHQ). The scoring results revealed that 180 individuals (54.5%) scored within the normal range, indicating no significant psychological distress. However, 119 participants (36.1%) exhibited mild psychological distress, while 22 participants (6.7%) demonstrated severe distress (Figure 2). Collectively, these findings highlight that approximately 42.8% of the study population experienced some degree of psychological distress, underscoring the relevance of mental health concerns within this demographic. The presence of severe distress in a notable minority further emphasizes the need for targeted interventions.

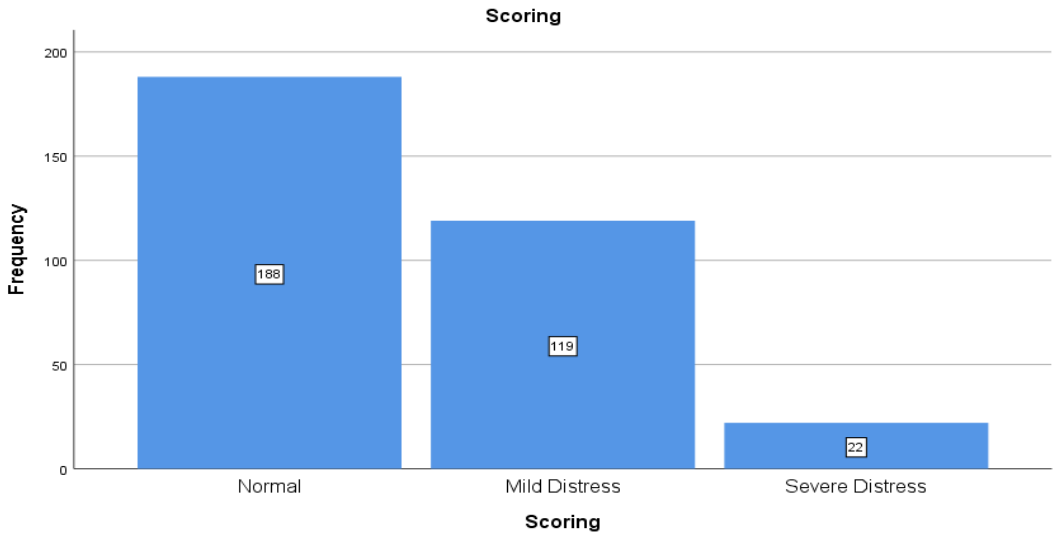

Figure 2: Moca Scoring

Montreal Cognitive Assessment (MOCA) Scoring

The Montreal Cognitive Assessment (MOCA) was used to evaluate cognitive function. The results indicated that 241 participants (73.0%) scored within the normal cognitive range, whereas 89 participants (27.0%) were identified as having mild cognitive impairment (Figure 3). This distribution suggests that while the majority of the cohort maintained intact cognitive function, a substantial subset exhibited early signs of cognitive decline, which may warrant further clinical attention and monitoring.

Correlation Between Psychological Distress and Cognitive Function

The Shapiro-Wilk test was used to assess the data distribution's normality in order to choose the best statistical techniques for further investigations. With a p-value of less than 0.05, the test revealed a highly significant departure from normality. Because of this non-normal distribution, correlation analysis had to be done using non-parametric statistical methods.

A Spearman rank-order correlation was performed to investigate the relationship between psychological distress (GHQ scores) and cognitive function (MOCA scores). The analysis revealed a moderate positive correlation ($r = 0.543$, $p < 0.001$), indicating that higher levels of psychological distress were significantly associated with lower cognitive performance. This finding suggests a meaningful interplay between

mental health status and cognitive abilities within the study population, highlighting the potential impact of psychological distress on cognitive functioning.

DISCUSSION

This study highlights the significant mental health burden and cognitive vulnerabilities faced by medical students, emphasizing the intertwined nature of psychological distress and cognitive function within this demanding educational environment.

This study indicated that 42.8% of participants experienced some level of psychological distress, with 6.7% exhibiting severe distress as measured by the General Health Questionnaire (GHQ). This prevalence aligns with the findings of Halperin et al. (2021), who reported elevated anxiety (30.6%) and depression (24.3%) rates among U.S. medical students during the COVID-19 pandemic, noting a significant increase compared to pre-pandemic levels. The heightened psychological burden observed in both studies reflects the vulnerability of medical students to stressors inherent in their training, exacerbated by external crises such as the pandemic.

Similarly, Zafar et al. (2024) highlighted a pervasive negative attitude toward seeking professional mental health care among Pakistani medical students, with over half demonstrating reluctance to pursue counseling. This attitudinal barrier, coupled with the high prevalence of distress observed in our study, suggests that mental health challenges in medical students are compounded by stigma and limited help-seeking behaviors, which may impede timely intervention.

Hawsawi et al. (2023) further emphasized the multifactorial contributors to medical students' psychological well-being, identifying both positive influences such as supportive relationships and negative factors including academic pressures and cultural stigma. Our findings resonate with this holistic perspective, as the moderate correlation between psychological distress and cognitive impairment underscores the need for integrated mental health support that addresses both emotional and cognitive domains.

The Montreal Cognitive Assessment (MOCA) results from our study revealed that 27% of medical students exhibited mild cognitive impairment. This finding is comparable to a recent study in China where 28.3% of medical students reported insomnia and 29.5% showed symptoms related to post-traumatic stress disorder (PTSD), both of which can negatively impact cognitive function. The use of MOCA provides an objective measure to detect subtle cognitive deficits, particularly in executive function and attention, which are crucial for medical students' academic success.(Cheng et al., 2023)

Kuznetsov et al. (2021) reported that cognitive functions among medical students generally correspond to normal values, with improvements observed in executive functions and working memory as students advanced in their training. Our findings of mild cognitive impairment in a substantial subset may reflect early cognitive challenges linked to psychological distress or other stressors, highlighting the importance of early identification and cognitive support.

The moderate positive correlation ($r = 0.543$, $p < 0.001$) between GHQ and MOCA scores in our study aligns with Richard-Devantoy et al. (2021), who demonstrated that poorer cognitive performance, as measured by MOCA, was associated with increased suicidal ideation in elderly depressed patients. Although our population differs demographically, this association reinforces the broader notion that psychological distress adversely impacts cognitive function across age groups and clinical contexts.

The relationship between anxiety and cognitive function in medical students has been explored in various contexts. Surbakti et al. (2024) found no significant association between anxiety levels and cognitive function in students preparing for Objective Structured Clinical Examinations (OSCE), suggesting that acute exam-related anxiety may not impair cognitive performance measurably. Conversely, Dhillon et al. (2025) reported a significant negative association between anxiety levels and academic achievement, indicating that chronic anxiety may detrimentally affect overall academic outcomes.

This study findings suggest moderate correlation between psychological distress and cognitive impairment suggest that sustained psychological distress, rather than transient anxiety, may more profoundly influence cognitive domains essential for medical education. This distinction underscores the need for longitudinal studies to disentangle the temporal dynamics of anxiety, distress, cognition, and academic performance.

Despite the valuable insights provided by this study, several limitations should be acknowledged. The cross-sectional design restricts the ability to establish causal relationships between psychological distress and cognitive impairment. Additionally, reliance on self-reported measures may introduce response biases, including social desirability and recall inaccuracies. The sample, although adequate, may not fully represent the diversity of medical students across different regions or educational settings, potentially limiting the generalizability of the findings. Future research employing longitudinal methodologies is warranted to elucidate the temporal dynamics between mental health and cognitive function and to assess the long-term impact of targeted interventions.

CONCLUSION

This study reveals a substantial prevalence of psychological distress and cognitive dysfunction among medical students who use artificial intelligence tools. The significant correlation between distress and cognitive impairment suggests that AI use may interact with mental health and cognitive performance, potentially influencing students' academic functioning. These findings highlight the need for further research to understand how AI integration affects psychological well-being and cognition in medical education. Meanwhile, educational institutions should consider providing mental health resources and cognitive support tailored to the unique challenges faced by AI-using medical students to promote their overall well-being and academic success.

RECOMMENDATION

The findings highlight a concerning prevalence of psychological distress and cognitive impairment among medical students, reinforcing the need for targeted interventions to support mental health in this demographic. The comparison with prior studies underscores the urgency of addressing these issues within medical education frameworks to foster better health outcomes for future healthcare professionals.

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