

Impact of COVID-19 on Student Mental Health and AI Support

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Abstract: This research explores the impact of the COVID-19 pandemic on students' mental health. It examines the psychological pressures, such as social isolation and changes in learning patterns. Additionally, the study highlights the use of artificial intelligence as a tool to support students' mental health during this challenging time. Several technological solutions, including chat bots and mental health apps, were discussed for their effectiveness in providing psychological support and counseling to students. The study concludes that these AI-driven solutions can play a vital role in improving students' mental well-being, underscoring the importance of integrating AI into future mental health support strategies

Keywords: Artificial Intelligence; Mental Health; Covid19 pandemic

1. INTRODUCTION

The novel corona virus (COVID-19) has significantly impacted global mental and physical health, spreading rapidly and triggering diverse psychological responses such as stress, anxiety, and panic. University students have been among the most vulnerable groups, experiencing heightened psychological distress due to the combined challenges of social isolation and remote learning (Hua Cao et al., 2021).

Research has highlighted the profound effects of crises like the COVID-19 pandemic on the mental health of university students, emphasizing the urgent need for effective psychological support systems to mitigate these impacts and provide sustainable mental health care solutions.

In this context, artificial intelligence (AI) has emerged as an innovative tool for addressing mental health challenges. AI-driven solutions, such as chatbots and digital platforms, offer scalable and accessible mental health support, making them particularly valuable during crises when traditional services are constrained.

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Drawing on a review of previous studies, this paper explores the role of AI in supporting the mental health of university students during crises, focusing on the central question: Can AI-based technologies contribute to improving the mental health of students during crises?

2. Previous Studies:

-Abuhmaidan and Al-Majali (2020): This study focused on how the COVID-19 pandemic affected the mental health of students at Al Ain University, considering demographic factors like gender, age, marital status, college, and academic level. The study included 258 students from the science and humanities departments, using the modified Mental Health Scale (R S CL-90 Symptoms Check List). The findings showed that while the overall mental health of students was good, female students and second-year students reported worse mental health compared to others. The study emphasizes the need to address mental health issues, especially during the pandemic.

- Rezaour, Elmashaeuser (2022): This study examined the emotional health of university students during the COVID-19 pandemic and the rise of online learning. The research collected data from a global consortium of universities, analyzed using various machine learning and statistical models. The results indicated that students' mental health was most affected by academic-related aspects, financial security, and satisfaction with the response of the government and universities to the pandemic.

- Conteh I et al (2022): This systematic review examined mental health issues among Chinese college students at different stages of the COVID-19 pandemic. It included 30 publications with over 1.4 million students. The findings revealed high prevalence rates of PTSD, anxiety, depression, and stress during the initial stages of the pandemic, with significant risk factors such as being female, being a medical student, isolation, and issues with online learning. The normalization phase also showed high prevalence rates of insomnia, anxiety, and depression, with self-quarantine and face mask requirements being key risk factors.

- Mahdavinoor et al (2022): This study focused on the prevalence of stress, anxiety, and depression among medical science students in Mazandaran Province, Iran. The study involved 352 students and used the DASS-21 scale for data collection. The findings showed that 33.6% of students had moderate to severe depressive symptoms, 28.4% had anxiety symptoms, and 27.3% experienced stress. The study found correlations between smoking, physical activity, and mental health, highlighting the need for mental health policies for students.

- Nahar Z et al (2022): This study aimed to identify mental health issues and contributing factors among Bangladeshi female university students. It involved an online survey with 451 participants, revealing high prevalence rates of anxiety (55.88%), depression (69.18%), and loneliness (45.23%). The study found that marital status, socioeconomic conditions, and family structure influenced mental health, and emphasized the negative impact of the COVID-19 pandemic on students' emotional health and academic performance.

-Pandya et al. (2022): This scoping review examined how COVID-19 affected the mental health and lifestyle of college students and researchers, particularly in low- and middle-income countries like India. The review highlighted the significant impact of the pandemic on student mental health and identified strategies employed by academic institutions to assist students. The study emphasized the importance of incorporating mental health promotion into standard services and identified key lessons for future interventions.

- Priya and Kakoli (2023): This study investigated the psychological effects of the COVID-19 pandemic on Indian college students, focusing on stress, anxiety, and depression. Data from online surveys showed that these issues were exacerbated by increased screen time, decreased social interaction, and financial worries. The study called for increased mental health support and follow-up research on the long-term effects of isolation, while acknowledging limitations such as the lack of representativeness of the survey.

- Julianto V et al (2023): This study evaluated the mental health status of Indonesian vocational high school students during the pandemic using the DASS-42 instrument and Rasch analysis. Over 60% of students reported mental health issues, primarily due to social restrictions and the shift to online learning. The study found that students from middle-class families, those living in rural areas, female students, and firstborn children were more likely to experience mental health issues.

- Chen (2023): This study examined the impact of the COVID-19 pandemic on college students' mental health, focusing on stress and anxiety. It suggested alternative computational methods to traditional regression analysis to study the impact of various predictors on mental health, using data from an online survey. The study found that prior medical conditions, exercise, and staying in touch with friends and family positively influenced mental health outcomes.

- Priya and Kakoli (2023): This study examined the psychological effects of COVID-19 on Indian college students, highlighting the exacerbation of mental

health problems like stress, anxiety, and depression due to increased screen time, lack of social interaction, and financial concerns. The study calls for better mental health support services and further investigation into the long-term effects of isolation. The limitations of the study include the unrepresentative sample and reliance on self-reported data.

The studies highlight the widespread impact of the COVID-19 pandemic on college students' mental health, revealing high levels of stress, anxiety, and depression. Key factors such as isolation, online learning, and financial concerns were common across regions. These findings emphasize the urgent need for targeted mental health support and long-term interventions for students.

The Use of Artificial Intelligence to Support Students' Mental Health :

- Hussna et al. (2021): This study focused on predicting the impact of the COVID-19 pandemic, lockdowns, and isolation on student mental health. By using data from a student mental health survey available on Kaggle, the researchers applied multiple classifiers to predict mental health disorders. The study presented five different models and used Explainable AI (XAI) techniques such as LIME and SHAP to enhance the accuracy of predictions. The findings highlight the value of cutting-edge AI methods in understanding and addressing student mental health challenges during difficult times.

- Krishnan (2023): This study focused on how the COVID-19 pandemic affected the mental health of students in professional programs. The research highlighted the importance of early identification of mental health issues to provide timely interventions. It used predictive analytics and machine learning techniques to classify students based on the severity of their mental health conditions, with a focus on comparing engineering and medical students. The study found that medical students experienced higher levels of anxiety and depression compared to their engineering peers, and the analysis helped identify key predictors of mental health issues in these students.

- Shvetcov et al. (2023): This study aimed to examine the characteristics of user subgroups that accessed mental health apps during three distinct periods of the COVID-19 pandemic: during the lockdown, immediately after the lockdown, and three months later. Using a two-stage machine learning methodology combining supervised and unsupervised approaches, the study identified three distinct subgroups of students. Two of these subgroups, characterized by either better or worse mental well-being, showed consistent traits throughout the pandemic. The third subgroup, defined by situational well-being, displayed significant changes

over time, highlighting the impact of stress and traumatic experiences. These findings underscore the importance of incorporating interventions that address burnout, traumatic stress, and user motivations in mental health apps.

- Fulmer et al. (2023): This study explored how an AI chatbot, "Tess," could assist counseling students with their mental health during the COVID-19 pandemic. Participants had access to the chatbot for two weeks, and qualitative data were gathered regarding their interactions. The findings were mixed, with some counseling students expressing doubts about the chatbot's usefulness in providing mental health support. Despite these reservations, the study highlighted the potential therapeutic applications of AI chatbots and their role in counseling practice, supervision, and education during times of crisis.

- Chen (2023): The purpose of this study was to address the growing concerns about college students' mental health exacerbated by the COVID-19 pandemic. It suggested alternative computational techniques for analyzing survey data, moving beyond the limitations of regression analysis. The study built a framework that capitalized on feature permutations and drew inspiration from current advancements in machine learning. Using data collected from an online survey at a university in the UK, the study found that students' mental health was significantly impacted by their previous medical history and experiences of adversity. Additionally, regular exercise and maintaining contact with family and friends were positively associated with better mental health outcomes for students.

These studies collectively emphasize the potential of artificial intelligence in supporting student mental health, particularly during the COVID-19 pandemic, while also highlighting challenges such as skepticism about AI tools' effectiveness and the need for more personalized interventions based on students' diverse experiences and needs.

3. Definitions:

3.1 Mental Health:

- **World Health Organization Definition:** Mental health refers to a state of psychological well-being that enables individuals to overcome life challenges, achieve their full potential, learn and work efficiently, and contribute positively to their communities. It is a vital component of overall health and wellness.

- **Centers for Disease Control and Prevention Definition:** Mental health encompasses emotional, psychological, and social well-being, influencing thoughts, feelings, and behaviors. It impacts how we manage stress, form

relationships, and make decisions, and is crucial throughout all life stages, from childhood to adulthood.

- **American Psychological Association Definition:** Indicators of mental health include emotional well-being, effective behavioral adjustment, minimal anxiety and disabling symptoms, and the ability to build healthy relationships while managing daily life stresses.

3.2 Artificial Intelligence:

- **International Organization for Standardization Definition:** Artificial Intelligence (AI) is a field of science and engineering focused on creating systems that generate outputs—such as content, predictions, recommendations, or decisions—based on a set of human-defined objectives.

- **Cambridge Dictionary Definition:** AI refers to the study or application of computer systems or devices that exhibit characteristics of the human brain, such as the ability to recognize or produce images, understand and generate language in a human-like manner, solve problems, and learn from the data provided to them.

4 . AI chatbots to provide self-help depression:

4.1 Chatbots :

Chatbots are systems based on artificial intelligence that can interact with users through text, speech, or images. In the context of mental health support, these chatbots are used to provide psychological and social support to individuals, particularly those who may be reluctant to seek traditional help due to stigma or limited access to healthcare services. Chatbots offer users the ability to interact in privacy and safety, which enhances their willingness to express emotions and mental health concerns. They provide support strategies such as expressive writing, psychological advice, and immediate guidance during critical moments. (Haque,Rubya , 2022).

4.2 Recognition and Response Generation:

Text is categorized by recognition models according to predetermined intentions and feelings. A template known as a "domain," which comprises certain sets of "entities," "slots," "rules," and "stories" based on machine learning models from RASA, is used by the dialog management module to choose the output message. XiaoNan, the chatbot, is intended to assist people who are depressed. In order to assist users comprehend the relationships between their emotions, thoughts, and behaviors, it evaluates their degree of depression and applies cognitive behavioral therapy (CBT) procedures. Additionally, users can use XiaoNan to track their everyday emotions or have informal conversations with the chatbot, which will respond with empathy (Hao Liu et al., 2022).

4.3 Mental health apps:

29% of 15,000 mHealth apps surveyed were devoted to diagnosing, treating, or supporting mental health issues. Furthermore, public health institutions like the National Institute of Mental Health (NIMH) in the United States and the National Health Service (NHS) in the United Kingdom have recognized mental health applications as scalable and affordable ways to close the gap in mental health care. The usefulness of these apps is still up for dispute, even though cell phones are widely available and in a good position to help address the lack of mental health professionals. Determining which mental health apps have proven useful and what factors influence their performance is crucial, as mental health apps are increasingly being prescribed to patients to help manage their mental health disorders and supplement psychiatric treatment.(Pooga 2018).

4.4 -Sentiment Analysis:

Sentiment analysis, sometimes referred to as opinion mining, has been more popular during the COVID-19 pandemic as students use online forums more frequently to share their thoughts about their educational experiences. Thanks to this technology, student input can be categorized as neutral, negative, or favorable. By examining these comments, academic institutions can spot patterns and successfully resolve student issues, which will enhance the standard of instruction and assistance provided during distant learning. (Alsuhaibani and others, 2024).

4. Discussion :

The COVID-19 pandemic had an unprecedented impact on the mental health of university students worldwide, creating significant challenges due to the rapid shifts in university life. The sudden transition to remote learning, the social isolation imposed by lockdown measures, and the uncertainty about the future were some of the key factors that contributed to the exacerbation of the mental health challenges faced by students. Through studies addressing this topic, a number of psychological symptoms were notably identified, such as anxiety, depression, and post-traumatic stress disorder, highlighting the profound impact of the pandemic on the mental health of this group.

The findings of this study reveal that many students, particularly in the context of lockdown measures and the sudden shift to digital education, reported severe psychological symptoms ranging from anxiety to depression. The results showed that some groups were more affected than others, such as female students or those enrolled in medical programs. Additionally, it was found that there is a correlation between socioeconomic status and the severity of psychological symptoms, with

studies indicating that students from lower socioeconomic backgrounds were more likely to suffer compared to their peers from higher socioeconomic classes. Regarding the role of artificial intelligence in supporting students' mental health, the results indicated promising potential for using this technology to provide immediate and continuous psychological support. Among the tools identified were AI-powered chat bots and mental health applications, which demonstrated the ability to fill some gaps in traditional psychological care by enabling students to access help easily and safely. However, the results also suggest that the effectiveness of these tools is still being evaluated, as there are challenges related to student acceptance of this technology, as well as trust in the AI's ability to provide personalized mental health support

5. Recommendation:

- Universities and educational institutions should provide tailored psychological support programs that address the diverse mental health conditions students face, especially during crises like the COVID-19 pandemic. These programs should be accessible remotely and offer multiple means of interaction, such as online counseling.
- It is crucial to customize psychological support based on individual student characteristics such as academic specialization, gender, and socioeconomic status. Personalization can enhance the effectiveness and relevance of psychological interventions to better meet students' needs.
- Awareness among students and faculty members about the importance of mental health should be heightened, emphasizing its role as an essential component of student well-being. Additionally, university professionals should be trained to provide psychological support using artificial intelligence and modern technological tools.
- Continuous studies and research are necessary to evaluate the effectiveness of AI tools in delivering psychological support to students. Through ongoing research, these tools can be refined to become more effective and reliable in addressing the increasing mental health challenges among students.
- Universities must continue providing psychological support to students not only during major crises like the COVID-19 pandemic but also under normal circumstances. Moving toward sustainable mental health strategies will contribute to long-term student well-being.

6. CONCLUSIONS:

This study underscores the significant impact of the COVID-19 pandemic on students' mental health, highlighting challenges such as social isolation, anxiety, and disruptions to learning. It also emphasizes the potential role of artificial intelligence (AI) in addressing these issues by providing crucial support for students' well-being. AI-powered tools, such as chatbots and mental health apps, have shown effectiveness in offering accessible support during times of crisis. To enhance student mental health support, universities should integrate AI-based tools alongside traditional counseling services, making assistance more widely available. It is also vital to train mental health professionals in the effective use of these technologies, ensuring they complement human care without replacing it. Furthermore, continuous research into the effectiveness of AI-driven solutions is necessary, alongside addressing ethical concerns, particularly around privacy. In conclusion, by adopting AI-based strategies, educational institutions can better address the mental health needs of students, offering timely and effective support while preserving the essential role of human interaction.

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