

Application of Artificial Intelligence in Empowering Mental Health Education in Higher Education Institutions

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Keywords: Artificial Intelligence; Mental Health Education; Colleges and Universities; Mental Health Support; Psychological Well-Being

Abstract: With the increasing prominence of mental health issues among college students, the application of artificial intelligence (AI) technology in mental health education has gradually garnered attention. This paper investigates the application of AI in mental health education in higher education institutions, analyzing its specific practices in mental health monitoring, assessment, crisis early warning and intervention, as well as the optimization of mental health education curricula. The study indicates that AI can dynamically monitor and accurately assess students' psychological states through the analysis of multi-source data and construct high-precision psychological crisis early warning models using machine learning algorithms, providing personalized intervention plans for high-risk students. Moreover, AI can optimize mental health education curricula by enhancing educational outcomes through personalized, interactive, and contextualized approaches. However, the application of AI in mental health education also faces ethical risks such as emotional comprehension bias, misunderstandings due to cultural differences, and privacy and data security concerns. This paper emphasizes the need to address the ethical and legal issues of AI while fully utilizing its technology to ensure its effective, safe, and sustainable application in mental health education in higher education institutions.

1. Introduction

The escalating mental health challenges among students in higher education have emerged as a pressing concern, with a significant proportion experiencing emotional and psychological difficulties, such as stress, anxiety, and depression. According to the 2022-2023 National Report of the Healthy Minds Study (HMS), 46% of students have been diagnosed with mental disorders by healthcare professionals, including depression (30%), anxiety (36%), and other symptoms^[1]. These issues have become integral components of university operations that cannot be overlooked, adversely affecting academic performance, social well-being, and overall life satisfaction.

Concurrently, traditional approaches to mental health monitoring, assessment, and intervention exhibit inherent limitations. With advancements in technology and the advent of new tools, the

rapid development of artificial intelligence (AI) has spurred exploration of its innovative applications across diverse fields. AI's prowess in data analysis, pattern recognition, and automation endows it with substantial potential to deliver mental health services, thereby opening new avenues for strengthening support systems within higher education. AI can process large-scale student datasets to gauge mental health statuses, identify high-risk individuals, and facilitate early personalized interventions. Furthermore, the integration of AI tools into mental health education can foster a more informed and proactive approach, offering scalable and efficacious solutions^[2]. Incorporating AI into collegiate mental health curricula provides students with more personalized learning content and interactive experiences, enhancing the targeting and timeliness of mental health education. A study by Shuwen Zhai et al., which surveyed 600 university faculty, students, and staff across various functional departments, revealed a prevalent positive attitude toward AI's role in ameliorating college students' mental health. The research further indicated that the convergence of AI and mental health education can amplify synergistic effects^[3].

2. Applications of AI in Collegiate Mental Health

2.1 Mental Health Monitoring and Assessment

AI technologies can monitor the mental health status of college students by analyzing multi-source data, including academic records, behavioral metrics, social interactions, and lifestyle patterns. Such data encompass online learning duration, assignment completion rates, social media discourse, campus card transaction records, and campus mobility trajectories. Through data cleaning, feature extraction, and fusion algorithms, AI systems can transform fragmented heterogeneous data into structured datasets suitable for analysis, thereby establishing a robust informational foundation for the detection of psychological problems. Leveraging the collected data, AI enables dynamic assessments of students' mental states. For instance, it can identify populations at high risk of psychological issues using sleep patterns and social interaction data^[4]. Integrating knowledge graph technology, AI can correlate psychological problems with factors such as academic stress, family background, and unexpected events (e.g., academic failure, interpersonal conflicts). Employing natural language processing (NLP) and affective computing, AI synthesizes multimodal data (e.g., voice, text, behavioral logs, facial micro-expressions) to construct comprehensive, dynamic profiles of students' mental health, generate real-time assessment reports, and disseminate relevant information to faculty.

This advancement has also catalyzed the development of “intelligent psychological assessment,” addressing the limitations of traditional questionnaire-based evaluation methods. By utilizing AI technologies and learning paradigms to characterize and simulate relationships between psychological traits and states, intelligent mental health assessments can be conducted via diverse channels, including social media data, smart device metrics, and video game data^[5].

2.2 Psychological Crisis Early Warning and Intervention

Advancements in artificial intelligence technology enable more accurate predictions for psychological crisis early warnings, allowing institutions to quickly identify at-risk students, develop tailored intervention strategies, and effectively prevent psychological crises from occurring. AI's ability to analyze large-scale data is crucial in identifying psychological risks at the population level. By examining extensive student datasets, it can identify periods of high incidence for such risks, such as exam weeks or graduation seasons, when students are more susceptible to increased anxiety due to academic or job-related pressures. Forecasting these risks ahead of time enables universities and mental health service providers to proactively prepare interventions, implement

targeted measures, and reduce psychological issues. Furthermore, AI systems can dynamically modify intervention strategies based on real-time data to ensure their effectiveness and timeliness, thereby establishing a comprehensive, multi-tiered mental health protection framework^[6]. Using machine learning and deep learning algorithms, AI can construct high-precision models for psychological crisis assessment. Trained on multimodal data, these models can quantify students' mental states and classify risk levels (e.g., low, moderate, high). Numerous recent studies and applications have validated AI's substantial practical value in psychological crisis prevention. For example, Marcel's team developed a machine learning algorithm to identify suicidal tendencies by analyzing patients' functional MRI data, achieving an accuracy rate of 91% . Passos et al. employed machine learning algorithms combined with clinical and demographic variables to distinguish suicide attempters from non-attempters, with an accuracy range of 65%–72%^[7]. These findings underscore AI's significant potential in psychological crisis early warning and intervention. As technology advances, AI will increasingly enable precise identification and prediction of psychological risks, providing robust support for university mental health initiatives.

AI also delivers personalized intervention tools for university mental health work, formulating tailored intervention plans based on individual differences and risk stratification. For students with stable mental health, it can provide preventive mindfulness training courses; for low-risk students, it offers psychological adjustment resources such as meditation audio and emotional management programs; for moderate-to-high-risk students, it recommends appropriate counseling services or therapeutic courses and monitors intervention outcomes. Upon detecting high-risk signals (e.g., suicidal ideation), AI can automatically escalate to human services. Leveraging natural language processing and affective computing technologies, artificial intelligence is capable of integrating multimodal data to construct a comprehensive and dynamic mental health profile of college students^[8]. This provides a robust basis for psychotherapists and assists educators in devising more precise and effective intervention plans. This personalized approach enhances intervention targeting and efficacy, with plans adjusted based on student feedback to ensure sustained support. For instance, Princeton University's EmoAgent—an AI framework for assessing and mitigating mental health risks in human-computer interaction—can simulate and evaluate users' mental states, delivering real-time interventions to reduce risks and harm. AI-driven chatbots (e.g., Woebot, Wysa, Youer) provide mental health support via cognitive behavioral therapy (CBT) techniques, offering personalized feedback and guidance based on user input. These chatbots have demonstrated efficacy in alleviating anxiety, depression, and stress levels. They can also analyze data from built-in smartphone sensors or wearable devices to detect changes in behavioral patterns and provide recommendations for health prevention.

2.3 Mental Health Education Curricula

AI has the potential to enhance mental health education curricula by transforming mental health knowledge into targeted, perceivable, and actionable competencies. This is achieved through personalized, interactive, and contextualized approaches across the "pre-class, in-class, post-class" continuum, ultimately achieving the educational goal of "prevention first, proactive empowerment." Before class, AI can analyze students' diverse psychological needs through pre-course questionnaires and daily online interaction data, enabling the delivery of differentiated content to achieve "personalized education for diverse individuals." For instance, students with "social anxiety tendencies" can receive micro-courses on "initiating conversations" and visual guides to non-violent communication; those experiencing "academic stress" can gain access to time management tools (e.g., the Pomodoro Technique) and cognitive adjustment guides on "setting realistic expectations"; and first-year students struggling with adaptation can be provided with short videos on "three steps

to building university social networks" and "psychological adjustment for independent living." During class, AI integrates VR/AR technologies to create immersive scenarios, facilitating experiential learning. After class, AI serves as a "24/7 teaching assistant," offering real-time interaction and personalized feedback, promptly addressing students' queries, linking course content with extracurricular support resources, intelligently matching internal and external resource information, and providing personalized extensions based on student needs. A study by Yang Zongkai explored the integration of ChatGPT into teaching, shifting the pedagogical model from "teacher-student" to "teacher-machine-student." This framework utilizes AI to enhance curriculum knowledge guidance, resource development, and teaching data analysis capabilities, assisting educators with administrative tasks and enabling them to concentrate on educational core objectives^[9]. Moreover, mental health curricula function not only as platforms for knowledge transmission but also as crucial settings for early crisis detection. During course interactions, such as student speeches, assignments, and responses in simulated scenarios, AI can detect risk signals, including frequent references to "life being meaningless" or "feeling unvalued," and trigger intervention mechanisms promptly.

3. Ethical Considerations and Risks

The non-determinism inherent in AI autonomy has introduced key challenges in algorithmic ethics, namely non-interpretability and unpredictability. In terms of emotional comprehension, although current AI systems can recognize basic emotions such as happiness, sadness, and anger, their interpretations of cultural contexts and implicit psychological states are significantly biased. The absence of humanized interaction in psychological counseling may exacerbate students' resistance to institutional mental health services. Cultural differences in emotional expression and norms often lead AI language models to misinterpret sarcasm, metaphors, and other complex linguistic constructs, resulting in inaccurate intervention recommendations.

The application of AI technology also requires caution in terms of privacy protection and data security. As the American educator Neil Postman stated, "Every technology is both a burden and a blessing, not an either-or result, but a product of coexisting advantages and disadvantages". Mental health data are highly sensitive information. Once data security vulnerabilities or data breaches occur, they can cause serious damage to students' personal privacy and reputation, and may even lead to social discrimination or secondary psychological harm.

Moreover, compared to previous AI technologies, generative AI (such as ChatGPT) presents a broader spectrum of potential risks to human society, making prevention more urgent. When AI dispenses unscientific advice that leads users to take extreme actions, the attribution of responsibility is ambiguous. Within the current legal framework, it remains unclear who should assume primary responsibility in such scenarios: the developers, the operators, or the users. This legal ambiguity not only amplifies the risks associated with AI applications but also fosters concerns among users when utilizing AI mental health services^[10].

4. Conclusions

This study has thoroughly investigated the application of artificial intelligence (AI) technology in mental health education in higher education institutions, revealing its significant potential in areas such as mental health monitoring and assessment, early warning and intervention of psychological crises, and optimization of mental health education courses. However, the application of AI in the field of mental health also faces ethical and risk challenges. The inexplicability of AI systems and biases in interpreting cultural contexts may lead to inaccurate intervention recommendations. Meanwhile, the high sensitivity of mental health data demands strict privacy

protection and data security safeguards. In summary, AI technology provides innovative solutions for mental health education in higher education institutions but also requires a balance between technological application and ethical risks. Future research should further optimize AI algorithms to enhance their capabilities in emotional understanding and cultural adaptability, while strengthening privacy protection and legal framework construction, in order to fully leverage the positive role of AI in mental health education.

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