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A Review of Chatbots Application on Supporting International Students' Mental Health

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Abstract:

International students face distinctive challenges, including acculturative stress, homesickness, language barriers, and heightened academic expectations. As a result, their mental health and overall well-being have become subjects of growing concern and significance in academic and support communities worldwide. The emergence of AI technologies, like ChatGPT, opens new avenues for international student mental health interventions. However, no specific Chatbot has been approved as effective for this population. This study aims to comprehensively summarize Chatbot applications in mental health counseling and analyze the challenges of applying them to international students. The study found that prominent Chatbots could demonstrate efficacy in reducing symptoms of depression and anxiety through techniques such as cognitive behavioral therapy (CBT). Chatbots are becoming integral to mental health care, providing accessible and evidence-based interventions and psychoeducation. Compared with traditional in-personal mental health counselling, a Chatbot is more functioning in providing personalized therapy sessions, essay accessibility, real-time responses, and suitable assistance, which could solve current challenges and unmet mental health counselling needs of international students. Despite their potential, ethical considerations and privacy challenges must be addressed to ensure reliable and secure use. Continued refinement is needed for international students' application to enhance multicultural sensitivity, the accuracy of cross-language interpretation, and personalization. The evolution of Chatbots holds significant promise for enhancing mental health support, particularly for international students navigating and coping with their unique challenges.

Keywords: International students; Mental health; Counseling; Chatbot; Psychoeducation.

1. Introduction

International students' mental health and well-being have become critical research areas due to the unique challenges these students face in adapting to new cultural and academic environments. The existing scholarly literature on providing mental health counseling services for the unique demographic of international students is limited. International students often experience acculturative stress, homesickness, language barriers, social isolation, and academic pressure, which can lead to significant mental health concerns [1, 2, 3]. Research estimates that 20% of international students risk mental health problems due to acculturative stress. Studies consistently find a sizable proportion of international students struggle with mental health issues, underscoring unique challenges in adapting to a new culture [3,4]. However, scarcity of mental health services are tailored to meet their unique needs. due to numerous challenges: social stigma, accessibility, complexity of management, and ethical concerns [2, 3]. This population has a pervasive and unmet need for such specialized and personalized support [3]. The advent of advanced artificial intelligence (AI) technologies, particularly natural language processing (NLP) models like ChatGPT (Chatbot based on Generative Pre-trained Transformer), has opened new avenues for providing mental health support or as a complement to traditional therapy for [4, 5, 6].

There are relatively few historical studies of the application of ChatGPT to support this underrepresented group of international students. Representative studies in this field include Fitzpatrick et al. [8], who demonstrated the efficacy of the Woebot Chatbot in reducing symptoms of anxiety and depression among young adults, and Inkster et al., who evaluated user engagement and satisfaction with the Wysa Chatbot for digital mental well-being [9]. These studies emphasize the potential of conversational agents in

mental health care, but they also emphasize the necessity of additional research to investigate their application for distinctive populations, such as international students.

2. Review of Current ChatGPT application on students' mental health wellness

2.1 Current applications of ChatGPT in mental health counselling and psychoeducation for students

The integration of Chatbots in mental health counselling has evolved significantly since the creation of ELIZA in 1966, which mimicked a Rogerian psychotherapist [10]. Modern advancements have led to a robust development of AI-powered Chatbots, including ChatGPT, tailored to address a variety of mental health issues such as depression, autism, and anxiety [4,10,11,12]. These contemporary Chatbots have garnered positive user satisfaction and preliminary efficacy, making them promising tools in the field of mental health support [10, 12].

2.1.1 Personalized Therapy Sessions and Emotional Support

Leveraging its advanced language processing capabilities, ChatGPT can simulate human-like conversations that provide emotional support and cognitive-behavioral therapy (CBT) techniques [8,13]. This functionality embodies the ability to engage users in meaningful interactions, helping them express their emotions and receive tailored responses and therapeutic suggestions [14]. These capabilities highlight ChatGPT's versatility in addressing various mental health issues by providing immediate and sustained support [14].

2.1.2 Educational Tools and Self-Help Platforms

In addition to direct counseling, ChatGPT has been used to develop self-help psychotherapy platforms. These platforms enable users to seek psychological counseling and support through continuous engagement with ChatGPT [14,15]. Users can discuss their emotions and problems while receiving appropriate responses, which aids in stress relief and mental health improvement. Furthermore, ChatGPT can be an educational tool, disseminating relevant psychological knowledge and skills. By conversing with ChatGPT, users enhance their mental health awareness and self-management abilities, preventing potential mental health problems. [14,15]

2.1.3 Therapy Support and Information Management

ChatGPT's abilities extend beyond real-time conversation support to serve as a valuable tool during therapy sessions. It can support diagnostics and screening, symptom management and behavior intervention, and content delivery [13,16]. Meanwhile, between therapies, it functions as a patient companion, collecting information on patient conditions and organizing it for therapists to streamline the treatment process [13,16]. ChatGPT can gather and report relevant information by processing and generating text, ensuring that therapists are well-informed about their patients' progress before the next session [1,2,9]. This capability of drawing insights from ongoing conversations reinforces ChatGPT's role as a therapist assistant.

2.1.4 Lifelong Learning and Counseling Competency Development

Research involving mental health and counseling students has shown that ChatGPT is perceived as a beneficial tool for learning and supporting counseling competencies [13,15]. It aids students in understanding and practicing primary professional skills, personal boundaries, and appropriate counseling dispositions and behaviors [10, 15]. This educational aspect of ChatGPT not only facilitates learning and enhances the overall quality of future mental health professionals.

2.1.5 Immediate and Ubiquitous Support

A significant characteristic of ChatGPT is its capacity to deliver psychological counseling services unbound by temporal and spatial limitations. Users can obtain prompt support and guidance at their convenience, rendering it an essential resource for individuals needing timely mental health intervention [4,5,6,7,14]. This functionality ensures that support is available at any moment, particularly in situations where traditional therapy might not be accessible [4,5,6,7,14].

2.1.6 Health Recommendations and Lifestyle Advice

ChatGPT also offers lifestyle advice alongside its counseling services, emphasizing healthy living principles and therapeutic interactions [13,15,16]. This dual approach can help users understand the significance of lifestyle changes in conjunction with counselling, promoting a holistic approach to mental well-being [13,15,16].

2.1.7 Conversational Search and Recommendation Systems

ChatGPT can be used as a conversational search aid or interface for recommendation systems. By engaging users in concise dialogues, they can be guided towards relevant mental health information or therapy resources. [5,6,9,10,16]. This aspect is particularly useful for users seeking specific information or resources related to mental health, thus making ChatGPT a multipurpose tool in navi-

gational and educational contexts [16,17].

2.1.8 Ethical Considerations and Challenges

While the potential of ChatGPT in mental health counseling is substantial, it is crucial to address ethical, accurate, and legal challenges [1,10, 14,16,17]. Ensuring the safe and effective use of AI-based applications involves developing appropriate strategies to mitigate risks related to reliability and privacy [1,10, 14,16,17]. The sensitivity of mental health data necessitates stringent protocols to protect clients privacy and ensure the information's accuracy provided by ChatGPT [1,10, 14,16,17].

2.2 Other Chatbots' Application on Mental Health Support

The utilization of Chatbots in mental health support has grown substantially, with numerous AI-driven platforms emerging to aid various psychological conditions. These Chatbots are implemented in diverse forms, leveraging different technologies and designs to meet specific user needs.

2.2.1 Historic and Modern Chatbots

ELIZA, the inaugural and widely recognized Chatbot, was created in 1966 with the purpose of emulating a Rogerian psychiatrist [10]. This early model was rule-based and relied on pre-scripted responses for interaction [10]. However, contemporary Chatbots are significantly more complex, utilizing cutting-edge technology like machine learning and natural language processing (NLP) to deliver more complex and tailored conversations[14].

2.2.2 Popular Therapeutic Chatbots

The landscape of Chatbot applications in mental health counseling is diverse, with each offering unique functionalities, platforms, and therapeutic approaches. Woebot and Wysa excel in CBT and multiple therapy methods, respectively, improving mental health significantly [10]. The customizability and versatile application platforms of conversational AI agents, such as Tess, cater to a wide range of therapeutic needs within the digital mental health landscape. Conversely, specialized Chatbots like Shim, Anna, and the Ministry's App demonstrate a more targeted focus on niche areas of mental wellness [10]. Notably, the large language model ChatGPT stands out for its expansive capabilities and cross-platform adaptability, facilitating comprehensive, user-tailored mental health support across numerous digital environments. The varied evidence of efficacy and user engagement feedback underscores the evolving role of Chatbots in mental health, emphasizing their potential to complement traditional therapy and expand access to mental health resources [14, 16, 17].

The table, as shown in Table 1, summarizes their respective functionalities, platforms, evidence bases, user engagement metrics, and key features in mental health counselling and provides a clear, comparative overview of the various mental health Chatbots.

Table 1. Current Chatbots in Mental Health Counseling

Chatbot	Functionality	Platform(s)	Evidence of Efficacy	User Engagement & Feedback	Pros & Cons	Core Functions and Therapeutic Approaches
Woebot	Provides Cognitive Behavioral Therapy (CBT) by means of concise, daily dialogues and monitoring of mood.	Facebook Messenger, Mobile App	Evidence: Reduced depression (PHQ-9) and anxiety (GAD-7) in randomized controlled trials.	User Engagement: Significant mood improvements in users.	Pros: Accessible, affordable, anonymous, immediate feedback, evidence-based CBT. Cons: Lacks human touch, limited scope for complex cases, standardized responses.	Core Functions: Specializes in CBT for depression and anxiety. Therapeutic Approaches: Focuses intensely on CBT with mood tracking and daily conversations.

Chatbot	Functionality	Platform(s)	Evidence of Efficacy	User Engagement & Feedback	Pros & Cons	Core Functions and Therapeutic Approaches
Wysa	Combines CBT, behavioral reinforcement, and mindfulness techniques.	Mobile App	Evidence: High-engagement users reported improvements in PHQ-9 scores.	User Feedback: A majority of users, specifically 68%, reported that the app was beneficial and provided motivation.	Pros: Personalized, multiple therapeutic techniques, high user engagement, 24/7 support. Cons: Lacks human interaction, not suitable for severe cases, moderate helpfulness feedback.	Core Functions: Utilizes multiple therapy approaches. Therapeutic Approaches: Includes CBT, behavioral reinforcement, mindfulness.
Tess (X2AI)	AI-driven Chatbot providing on-demand mental health support via text message, using CBT and psychoeducation.	Text Message, Various Platforms	Evidence: Effective in alleviating symptoms of anxiety and depression in a variety of populations.	User Feedback: Positive preliminary results, integrates with counseling services.	Pros: Customizable, multi-lingual, 24/7 support, integratable, evidence-based therapies. Cons: High reliance on technology, potential privacy concerns, limited human empathy.	Core Functions: Customizable for various therapies and demographics. Therapeutic Approaches: Uses CBT and psychoeducation, 24/7 support.
Replika	AI companion offering emotional support through personalized conversations.	Mobile App	Evidence: Studies indicate reduced loneliness and improved emotional well-being.	User Feedback: Highly personalized interactions, non-judgmental.	Pros: Personalized, multi-lingual, anonymous, adaptive learning from users. Cons: Lacks focus on specific therapeutic techniques, emotional support may feel less structured.	Core Functions: Provides emotional support. Therapeutic Approaches: Tailored from user interactions, focusing on companionship.

Chatbot	Functionality	Platform(s)	Evidence of Efficacy	User Engagement & Feedback	Pros & Cons	Core Functions and Therapeutic Approaches
ARIA (AI-RCS)	Provides mental health support through interactive, human-like conversations.	Various Platforms	Evidence: Supported by research for effectiveness in anxiety and depressive symptoms.	User Engagement: Engages users through empathetic interactions, multi-lingual support.	Pros: Human-like interactions, multi-lingual, supportive environment, evidence-based. Cons: Technology-dependent, potential for misguidance, privacy concerns.	Core Functions: Provides human-like, empathetic support. Therapeutic Approaches: Interactive, human-like conversations for mental health support.
Anna	Coaches users through gratitude activities to elicit positive emotions and meaning.	Not specified	Evidence: Not specified in detail.	User Feedback: Guides users in expressing positive emotions and meaning.	Pros: Promotes gratitude, positive emotions, structured activities. Cons: Limited evidence, specialized use case, less broad application.	Core Functions: Promotes positive emotions through gratitude. Therapeutic Approaches: Structured gratitude activities.
ChatGPT	Personalized therapy sessions, emotional support, cognitive-behavioral therapy (CBT) techniques, self-help psychotherapy, mental health education.	Various platforms including Web, Mobile Apps	Evidence: Comprehensive review of digital mental health interventions including ChatGPT.	User Feedback: User satisfaction with tailored responses based on tone and length; use in educational settings.	Pros: Highly versatile, personalized, evidence-based, widely applicable. Cons: Ethical and accuracy challenges, potential for biased responses, high technology dependency.	Core Functions: Offers comprehensive mental health support. Therapeutic Approaches: Personalized therapy sessions, CBT, emotional support, education.

Chatbot	Functionality	Platform(s)	Evidence of Efficacy	User Engagement & Feedback	Pros & Cons	Core Functions and Therapeutic Approaches
DEPRA	Eliminates the reliance on multiple-choice responses, allowing users to express their thoughts openly; assesses symptoms like mood, guilt, suicidal tendencies, insomnia, anxiety, and physical symptoms to diagnose depression levels.	Various Platforms	Evidence: Not specified in detail.	User Feedback: Allows spontaneous expression without hesitation.	Pros: Open-ended responses, comprehensive symptom assessment, evidence-based diagnosis. Cons: Limited evidence, specialized focus, technology-dependent.	Core Functions: Diagnoses depression through open responses. Therapeutic Approaches: Comprehensive symptom assessment.
XiaoNan	Uses a pipeline-based Chatbot powered by RASA to deliver CBT-based interventions for depression; reviewed by professional therapists.	WeChat (available on Windows, macOS, Android, iOS)	Evidence: Focused trial on depression, therapist-reviewed content.	User Feedback: Available on multiple platforms, uses professional therapist-reviewed CBT.	Pros: Accessible via multiple platforms, professional therapist-reviewed, comprehensive CBT-based support. Chinese language available Cons: Initial trials focused primarily on depression, potential for expansion needed, technology-dependent.	Core Functions: Delivers CBT for depression. Therapeutic Approaches: Pipeline-based Chatbot using RASA, professional therapist-reviewed CBT.

2.3 Summary of Chatbots Providing Effective Treatment for Depression and Anxiety

The extant literature highlights depression, anxiety, and stress as the predominant mental health challenges experienced by the international student population [1,2]. Integrating AI-based Chatbots and robots into healthcare has significantly expanded the scope of conditions they can address [17,18]. A self-supported depression intervention delivered by a chatbot showed superior performance compared to basic bibliotherapy in lowering depression and anxiety, as well as enhancing the therapeutic connection with participants [19].

One of the primary uses of mental health Chatbots is in treating depression and anxiety. Chatbots like Woebot, Wysa, Xiaonan, DEPRA, and Tess have demonstrated effectiveness in these areas:

Despite these positive outcomes, Chatbots must be used cautiously for severe cases, as indicated by studies comparing ChatGPT's recommendations for depressive episodes to those of doctors [10].While ChatGPT often recommends psychological treatment and a combination of pharmaceutical strategies for moderate to severe cases, its assessments differ significantly from those of experienced healthcare providers [10].

3. Conclusion

As explored in this review, the application of AI-driven Chatbots, particularly ChatGPT, holds considerable promise in supporting the mental health of international students, who often face unique challenges such as acculturative stress, homesickness, language barriers, and academic pressure. The analysis of various prominent Chatbots demonstrates their potential effectiveness in alleviating symptoms of depression and anxiety through techniques like cognitive behavioral therapy (CBT), behavioral reinforcement, and mindfulness. Chatbots such as Woebot, Wysa, and Tess have shown positive results, indicating a growing integration of these tools in mental health care, providing personalized therapy sessions, enhancing accessibility, and delivering real-time responses.

However, the current state of research shows several gaps and challenges that hinder the optimal implementation of Chatbots for international students. These include significant concerns regarding data privacy and security, ethical considerations, the need for high-quality and unbiased data, and the challenge of accurately understanding and addressing complex human emotions. The slow pace of interdisciplinary collaboration further exacerbates these issues, as effective solutions require the combined expertise of patients, designers, data scientists, physicians, researchers, developers, and healthcare providers.

Moreover, the existing literature and applications reveal that while Chatbots can provide immediate support, their ability to replace or effectively complement traditional in-person therapy for severe mental health cases is still questionable. Chatbots must be carefully employed alongside traditional methods, particularly for severe cases, as their recommendations can vary significantly from those provided by experienced healthcare professionals. Additionally, there are technical limitations, such as the lack of conversational fluidity and logical coherence in generated text, which can impact user engagement and therapy outcomes.

To address these gaps, future research needs to focus on enhancing data security measures and developing unbiased datasets that accurately reflect the diverse experiences of international students. Increasing interdisciplinary collaboration is crucial for overcoming economic, cultural, and linguistic barriers. Furthermore, improving the sophistication of AI models will be essential for better understanding and responding to human emotions. There is also a need for long-term studies to evaluate the sustained effectiveness of chatbot interventions over extended periods and across diverse demographic groups.

My research aims to build on existing studies by addressing these gaps and challenges. It will focus on developing enhanced AI models with improved cross-cultural sensitivity and advanced natural language processing capabilities to offer more personalized and accurate mental health support. Additionally, the research will emphasize ethical considerations, ensuring that AI-driven interventions adhere to stringent data privacy and security protocols. By fostering interdisciplinary collaboration and including diverse populations in the development process, this research intends to create more inclusive and effective mental health support solutions for international students, ultimately contributing to their well-being and academic success.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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