



From Algorithms to Empathy: Navigating Ethics, Efficacy and User Trust

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Abstract

This comprehensive research thoroughly investigates the role of artificial intelligence enabled mental health chatbots (AIeMHC) in revolutionising therapy procedures. It specifically explores their influence on the mental healthcare sector, user acceptability, effectiveness, and ethical dilemmas. The review's research questions investigate the effects and effectiveness of chatbot interventions in mental health care, as well as the level of user acceptance of these AI-enabled applications, the ways that chatbots prove their usefulness, the factors that affect user trust, the

ethical problems that slow down progress, and the possible long-term effects of using AI in this sensitive area. The results of our research suggest that AI chatbots are transforming mental health treatments by offering accessible, efficient, and tailored therapy, thereby extending their accessibility to underserved populations. Nevertheless, the efficacy and impact of these chatbots heavily rely on their capacity to imitate human-like interactions and on strong ethical frameworks that tackle concerns related to privacy, transparency, and prejudice. The research emphasises that AI chatbots have the capacity to greatly improve mental health outcomes. However, they also give rise to important ethical problems that need careful oversight to establish trust among users. Furthermore, this research suggests that integrating user feedback into the development process is crucial for enhancing AI applications, ensuring their alignment with diverse user needs and cultural contexts. In conclusion, the study highlights the need for continuous progress in AI technology, with a specific emphasis on deploying ethical AI and creating trust-building features. This is critical to fully leveraging chatbots' therapeutic potential in mental health.

Keywords: *AI-enabled mental health chatbot; efficacy; privacy; trust; ethics; chatbot; systematic review; artificial intelligence; conversational agent.*

Introduction

Artificial Intelligence (AI) has brought about a significant change in mental health treatment in recent years. This cutting-edge technology has not only changed the way individuals access treatment, but it has also improved treatment accuracy and customisation. AI-enabled mental health chatbots (AIeMHC) therapies, digital games, and conversational agents, have become crucial tools in tackling the worldwide mental health

epidemic. These technologies hold the potential to alleviate the burden on traditional mental health services and broaden treatment accessibility for previously underserved communities.

AI has a wide range of applications in the field of mental health. These include digital psychiatry, which utilises avatar-based therapy and smart monitoring devices, as well as AI-driven teaching tools that teach coping methods for stress and emotional regulation. For instance, Pham et al. (2022) research showcases the application of AI in delivering behavioural activation treatment through chatbots, effectively offering continuous support and customised feedback. Rathnayaka et al. (2022) provides more details on the efficacy of these AI technologies in delivering remote monitoring and emotional support, showcasing their ability to greatly improve patient involvement and adherence to treatment.

Nevertheless, the implementation of AI-enabled interventions is not devoid of obstacles. Ethical factors, such as data privacy, algorithmic openness, and prejudice, heavily impact users' trust and adoption of these technologies. These issues are critical for ensuring the conscientious implementation of AI technologies in mental health treatment. As we explore the expanding capabilities of AI, it is crucial to strike a balance between innovation and ethical issues in order to fully use new technologies for enhancing mental health outcomes.

Some individuals decide not to seek treatment because they believe it is not necessary or because they face personal challenges such as social stigma and financial constraints. For those who do want treatment, there may be delays in accessing it because there aren't enough mental health professionals, especially in rural and low-income areas (Boucher et al., 2021). Obtaining treatment in India is especially difficult because of financial obstacles and the substantial social disapproval associated with mental health. These circumstances provide barriers to accessing the required medical treatment. Primary care doctors often observe that accessing outpatient mental

health therapies for patients is more difficult in comparison to other routine referrals. Study by Emma et al. (2023) asserts that AIeMHCs aim to be easily accessible, customised to meet individual needs, and uphold strict confidentiality. They provide solutions for improving mental well-being and these chatbots are cost-effective and very practical for the intended audience.

Given the high rates of illness and death seen in individuals with psychiatric disorders, as well as a lack of mental health professionals, there is an urgent need for AI to help identify those at high risk and provide interventions to prevent and treat mental illnesses. Studies by Lee et al. (2021) and Boucher et al. (2021) demonstrate the design of AI methods in mental health care to assist in therapy, prognosis, and clinical diagnosis while also addressing technical and clinical challenges. AI has the capacity to redefine mental diseases in a more objective way, identify them at an early stage, personalise therapy, and empower individuals in their own healthcare. However, it is essential to address issues with bias, privacy, transparency, and other ethical concerns.

This systematic review seeks to clarify the limitations and potential benefits of AIeMHC, as well as the factors that account for the development of trust among users. Furthermore, it will evaluate the precision of AIeMHCs in providing customised treatment to fulfil specific needs. It also seeks to address ethical dilemmas and develop a theoretical model for evaluating the acceptability of AIeMHC's assistance. This study seeks to enhance our understanding of AI therapists and their potential role in the future of mental health care provider through a comprehensive examination of current research.

Based on these objectives, following research questions were drafted:

Question 1: How do the efficacy and repercussions of using AIeMHC interventions influence the mental healthcare field?

Question 2: What does literature say about the acceptance of AIeMHC applications among users?

Question 3: How does the use of AIeMHC establish their efficacy among users?

Question 4: What variables influence the level of trust that consumers have in an AIeMHC?

Question 5: What ethical difficulties are impeding the development of AIeMHC?

Question 6: What is the potential of using AIeMHC in the future?

Question 7: What are the associated constraints, indicating if or how we may surpass them?

Methodology

The data collection methodology for the systematic literature review on AI chatbots in mental health was carefully planned to guarantee a thorough gathering of pertinent academic publications and research articles. The procedure was initiated by conducting a focused search across numerous reputable academic databases and search engines, including Google Scholar, PubMed, Elsevier, ScienceDirect, Frontiers, OpenAthens, ResearchGate and Europe PMC. To identify relevant papers, the search was narrowed down using specific keywords such as "AI chatbots in mental health," "efficacy of AI therapy," and "challenges with mental health chatbots." To gather the most relevant and current material, the search was limited to peer-reviewed publications, clinical trials, and systematic reviews published in English between 2003 and 2024; however, it did not include foundational research. The relevant research papers were also searched from the references to find suitable studies. The initial screening of each article was based on its title and abstract to assess its relevance to the research objectives, which centre on the functionality, efficacy, and user engagement of AI chatbots in mental health settings. Later, the articles were acquired, and the entire text was thoroughly examined using a predetermined set of criteria for inclusion and exclusion. Afterwards, it was ensured that the selected studies met the

necessary criteria for scientific rigour and relevance. The goal of this methodological approach was to comprehensively analyse and consolidate existing information and limitations of AI-enhanced mental health chatbots.

Table 1: *Inclusion-exclusion criteria for article collection*

I/E	Criteria Description	Method of Verification
Inclusion Criteria	Peer-reviewed research papers and articles focusing on the online behaviour of individuals in the context of mental health.	Review of publication type and content relevance
	Studies assessing the efficacy, functionality, and therapeutic outcomes of AI chatbots in mental health settings.	Abstract and method section analysis
	Research addressing the application of chatbots specifically in health and mental health contexts.	Keyword and topic screening in full texts
	Literature analyses technological aspects of AI chatbots, such as natural language processing (NLP) and machine learning.	Examination of technical details in the text
	Books and articles discussing the challenges and shortcomings of mental health chatbots.	Content review focusing on challenges discussed
	English-language articles published within the last 21 years.	Check the publication date and language.
	Clinical studies, systematic reviews, and meta-analyses focusing on 'Chatbots', 'Artificial Intelligence', and 'AI Therapy'.	Analysis of study design and scope
	Studies consider cultural, ethical, and accessibility issues related to AI chatbots in diverse populations.	Review of ethical considerations and demographics

Exclusion Criteria	Research focuses on chatbots used for non-health-related purposes such as customer service or entertainment.	Topic and context screening in the abstract and introduction
	Papers that do not primarily focus on chatbots, even if related to artificial intelligence or mental health.	Topic relevance check in the abstract and discussion
	Articles where the focus on chatbots is not clearly stated or only tangentially mentioned.	Detailed content analysis for direct relevance
	Non-English articles, unless they are seminal works and have been translated.	Language verification and translation availability check
	Opinion pieces, and non-peer-reviewed articles.	Examination of article type and peer-review status
	Studies published more than 21 years ago may not reflect current technologies or practices.	Verification of the publication date

Systematic Review of Literature

AI has made significant advancements in mental health treatment in recent decades, enhancing its value, productivity, and accessibility. However, the level of user trust in the technology has a significant impact on the effectiveness and acceptance of AIeMHC. To effectively implement and utilise AIeMHC, it is crucial to have a deep understanding of the various aspects of trust involved. This literature review explores the factors that influence users' trust in AIeMHC.

Question 1: How do the efficacy and repercussions of using AIeMHC interventions influence the mental healthcare field?

Effectiveness of Virtual and In-Person Therapies

Several studies have examined the efficacy of virtual and in-person therapy approaches. Cho et al. (2023) conducted research that demonstrated the potential for virtual counselling to be as effective as conventional face-to-face sessions. The study included 60 participants and found similar reductions in psychological symptoms and increased involvement in virtual settings. Similarly, Novella (2022) found no significant difference in the efficacy of online video counselling compared to in-person treatment for alleviating anxiety in a sample of 49 college students. In a comprehensive evaluation of 54 studies, Zandieh (2024) expanded on this comparison by examining cognitive behaviour therapy (CBT). The study found that remote CBT was as beneficial as in-person sessions for treating different mental health conditions. These findings indicate that virtual therapy procedures may provide feasible alternatives to conventional settings, potentially increasing treatment availability. In a study conducted by Lucas et al. (2014) to explore the role of virtual individuals, like chatbots, in therapy. The researchers discovered that these AIeMHCs can facilitate individuals in expressing personal feelings and information more openly. Consequently, this creates a secure setting for individuals to disclose sensitive matters.

Therapist Experience and Support in Online Therapy

Researchers have also investigated the transition to virtual therapy from the perspective of therapists. It was observed by Doorn et al. (2023) that therapists had reduced engagement during teletherapy sessions, according to input from 826 therapists. However, this decrease in engagement did not have a significant effect on the therapeutic relationship. In his study, Hedman (2023) emphasised the significance of therapist assistance in internet-based CBT for mental and somatic illnesses. He confirmed that this form of treatment is equally successful as traditional face-to-face

therapy. These findings emphasise the critical role of therapist engagement in online therapy effectiveness.

Effectiveness and Clinical Outcomes

A thorough study unveils the efficacy and clinical results of an AIeMHC therapies in mental healthcare. A meta-analysis was conducted by Zhong et al. (2024) using 18 randomised trials and a total of 3477 participants in their study. The findings of the study showed that an AIeMHCs had a substantial positive impact on reducing symptoms of depression and anxiety in the short term. However, the three-month follow-up did not sustain the benefits, underscoring the necessity for ongoing evaluation and enhancement of these technologies. Although, the findings of Rollwage et al. (2023) emphasise the distinct and advantageous impact that well-crafted AI solutions may have on enhancing the efforts of human clinicians. These solutions aid with many aspects of clinical practice, allowing clinicians to have more available time. Furthermore, Karkosz et al. (2024) found that both groups had comparable levels of anxiety and depression symptoms at enrollment and at the beginning of the study. The intervention resulted in a reduction in both groups' symptoms of depression and anxiety, which remained stable after 1 month. The intervention had no significant impact on loneliness, but exploratory research indicated that those who used 'Fido', an AIeMHC, had reduced feelings of loneliness. However, it is to be noted that the study focused on subclinical young adult anxiety and depression. However, Bendig et al. (2019) recommend conducting controlled studies to ensure the safety, effectiveness, and validity of using an AIeMHC for therapy in clinical settings.

Comparative Studies and Broader Implications

Comparative studies and their broader implications provide a deeper understanding of chatbot-based therapy and its broader implications. The effectiveness of AIeMHC treatment and

bibliotherapy was compared by Liu et al. (2022) in treating depression among college students. They noted significant reductions in both depression and anxiety. Nevertheless, the group who received chatbot treatment reported a much stronger therapeutic connection. The effectiveness of a Polish therapy chatbot named Fido was evaluated by Karkosz et al. (2024) and saw a decrease in symptoms after the interaction. Initially, there were no notable disparities in symptom reduction between the chatbot intervention and control groups. However, following the intervention, both groups experienced a decrease in symptoms, and increased chatbot use was associated with a decrease in feelings of loneliness. Furthermore, Gual-Montolio et al. (2022) investigated the use of AI methods to enhance real-time psychological therapy. They discovered that these strategies led to positive outcomes by lowering clinical symptoms. Furthermore, Pham et al. (2022) investigated the wider use of AI in psychiatry, specifically focusing on the benefits and deployment of chatbots in the context of the COVID-19 pandemic.

User Preferences and Technological Adoption

The examination includes user preferences and the process of adopting technology. While examining the preferences of educated individuals about AI-based psychotherapy Aktan et al. (2022) discovered an inclination for human therapists, despite the presence of an AIeMHC. Furthermore, Lee et al. (2024) and Vossen et al. (2024) studied what clients liked and didn't like about AIeMHC. They looked at things like rapport, trust, and how well personalised psychotherapy chatbots worked. These studies demonstrate that tailored strategies may significantly impact the efficacy of treatment.

Long-Term Impact and Technological Advancements

The research provides various perspectives on the lasting effects and technical progress in mental healthcare. The potential of digital solutions was examined by Nosrati et al. (2020), such

as AIeMHC, to improve the accessibility and delivery of mental health treatment. They also discussed the implications for mental health care and improvements in AI technology. However, in their study, He et al. (2022) discovered that the long-term impact of converging agent interactions (CAIs) on mental health outcomes was not statistically significant, with effect sizes ranging from -0.04 to 0.39. Personalisation and empathetic response were two critical factors that significantly contributed to effectiveness. The longer duration of interaction with conversational agents was associated with larger pooled effect sizes. There is a paucity of research on the long-term impact of AIeMHC on their efficacy and therapeutic use.

AI Advancements and Ethical Considerations

The progress of AI in the field of mental healthcare has received considerable attention as researchers investigate its expanding capabilities and the ethical concerns it may pose. It is emphasised by Alowais et al. (2023) that AI has the capacity to enhance illness diagnosis, treatment selection, and clinical evaluation by means of effective data analysis. Similarly, Kurniawan et al. (2024) conducted a study to examine the level of adoption of AIeMHC in chronic disease management. The study highlighted the user-friendliness and helpful characteristics of these chatbots. AI models' social intelligence was evaluated by Sufyan et al. (2024) and discovered that sophisticated language models are becoming more proficient in comprehending and reacting to human emotions. In their study, Khawaja and Bélisle-Pipon (2023) examined the ethical and technological difficulties associated with incorporating AI enabled chatbots into mental health services. They emphasised the need for effectively managing user expectations to prevent any possible adverse effects.

Question 2: What does literature say about the acceptance of AIeMHC applications among users?

AI and Telehealth Advancements

The introduction of AI has transformed mental health care by enabling professionals to use advanced technologies to diagnose and treat patients with efficiency (Zhang et al., 2023). The surge in mental health applications during the pandemic has emphasised the crucial function of technology in delivering psychotherapy, counselling, and diagnostics (Wosik et al., 2020). Moreover, the telehealth industry has seen substantial expansion after the pandemic, resulting in the development of tailored and personalised treatments that cater to the convenience and expectations of customers. This has greatly increased the availability of healthcare services (Wosik et al., 2020; Jaworski et al., 2021).

User engagement and Clinical Applications

The use of mental health applications has shown significant advantages in the management of mental health conditions; however, their efficacy relies heavily on the severity of the illness and the person's unique requirements (Torous et al., 2018). A study by Jaworski et al. (2021) and Zhang et al. (2023) shows that healthcare professionals are very important in recognising the possible effects of AI and learning how to create personalised treatments that combine traditional and modern therapeutic approaches.

Ethical Factors

It is essential to ensure patient privacy, and regulating the impartiality of AI-driven interactions is of utmost importance. Research by Ho et al. (2018) and Gratzner and Goldbloom (2020) demonstrated that chatbots can effectively create a non-biased environment for patients,

enhancing their privacy, self-assurance, and emotional well-being, particularly for those who have experienced trauma.

Challenges and Limitations in AI Deployment

Although AI deployment in mental healthcare offers advantages, it also presents significant obstacles. Internet-based CBT presents challenges such as the absence of direct supervision and the need for customised treatments, despite its advantages in terms of accessibility and clinical effectiveness (Gratzer & Khalid-Khan, 2015). Furthermore, there is a general concern that mental healthcare facilities are not fully utilising AI for disease early detection and developmental epidemiology (Costello, 2016; Schmaal et al., 2014). Despite the enthusiasm for integrating AI into mental healthcare, a Swiss study found that the curricula of existing educational institutions severely lack AI training, providing only 0.52% of the required expertise (Blease et al., 2021).

Generational Perspectives on AI

Recent research has shown substantial variations in how various generations perceive AI. According to Alanzi et al. (2023), Generation Z and Y have a greater inclination towards AI and hold more favourable views towards its use in healthcare. Generational differences may be responsible for the shift in the acceptability and perceived usefulness of AI in healthcare.

Top-Rated and Extensively Reviewed Mental Health Applications

Mental health applications and chatbots are a novel approach to comprehending and investigating mental health and well-being; however, they still have much progress to make. AIeMHCs and mental health applications often provide assistance and guidance, specifically designed to address mild symptoms, and may supplement professional services (Metcalf, 2024). Recent advancements suggest that individuals can still use applications without seeking

professional assistance and multiple websites provide applications and chatbot based services. According to Metcalf (2024) several mental health applications and chatbots, catering to both individuals and organisations, use 'Marlee', an AI coach. It provides guidance to clients in order to help them reach their objectives, taking into account their motivation. The approach emphasises the development of resilience, the acquisition of new skills, self-discovery, and the use of innovative technology for journaling.

Woebot Health is a different application that uses CBT to assist individuals in comprehending mental health and enhancing their well-being. The approach emphasises the importance of regular therapy for depression and anxiety. The company's consumer base is large, especially those interested in CBT (Brown, 2021). An anecdotal report indicated that Woebot Health has shown potential in using modules that include CBT concepts, such as cognitive restructuring. While the visual elements of the platform are captivating, there is room for improvement to make them more personalised and attuned to the requirements and expectations of clients. The therapies provided by Woebot Health (Durden et al., 2023; Fitzpatrick et al., 2017) have led to enhancements in adult resilience, as well as reductions in reported stress and burnout. The forum for league membership has similarities with Woebot Health.

Wysa employs CBT to aid individuals in comprehending their mental well-being. Wysa establishes a non-judgmental environment by reframing ideas and assertions to facilitate client communication (Wysa, 2023). The EMHIC (2023) revealed that 46% of individuals experience feelings of shame when discussing their mental health challenges. This is mostly due to a lack of understanding and reliable resources available to them. It has successfully addressed industrial injuries and chronic pain in American organisations (Iglesias et al., 2023; Gupta, 2022). According to clinical evidence, Youper, a well-known player in the field of digital treatments, uses CBT and

positive psychology techniques to effectively address depression and anxiety (Youper, 2023; Metcalf, 2024). Longitudinal studies have shown the efficacy of Youper in treating depression and anxiety in both adults and students, with minimal variations in symptoms (Mehta et al., 2021; Yarrington, 2021). Several mental health applications integrate AI with mental health care experts or therapists to enhance the user experience (Metcalf, 2024). Talkspace, Ginger (now Headspace), and 7 Cups have implemented community- and group-oriented approaches and networks for their interventions (Talkspace, 2018; Headspace for Organisations | Formerly Headspace Health, n.d.; 7 Cups, 2019).

Question 3: How does the use of AIeMHC establish their efficacy among users?

Theoretical Models of AI Acceptance

Researchers have established numerous models to comprehend how individuals perceive and integrate AI into their daily lives. Derived from the Theory of Reasoned Action, the Technology Acceptance Model (TAM) underscores the crucial role of perceived utility and ease of use in determining technology adoption (Davis et al., 1989; Kelly et al., 2023). Afterwards, Choung et al. (2022) and Kelly et al. (2023) updated the model to incorporate trust and authenticity, emphasising their crucial role in consumers' adoption of AI technology. The Unified Theory of Acceptance and Use of Technology (UTAUT) is an important paradigm that incorporates ideas such as performance expectancy, effort expectancy, and enabling circumstances. Various studies have confirmed that these factors collectively influence user behaviour and expectations towards technology, explaining the variance in behaviour across most cultures (Venkatesh et al., 2012; Thomas et al., 2013; Kelly et al., 2023). AIDUA, which is based on TAM, examines the factors that encourage individuals to adopt AI by including result stages, primary and secondary appraisal stages, and so on (Sohn & Kwon, 2020; Gursoy et al., 2019).

The Effectiveness of AI-Driven Interventions in Mental Health Care

Research has mostly focused on evaluating AI's potential to increase diagnosis, improve treatment results, and provide easily accessible mental health assistance. Research encompasses a variety of topics, including AI chatbots providing CBT (Boucher et al., 2021) and meta-analyses of internet-based mental health therapies (Ebert et al., 2019). The results highlight the promise of AI for efficiently controlling mental disease symptoms and improving therapy quality. For example, Gual-Montolio et al. (2022) and Gallo et al. (2024) have shown the efficacy of AI in real-time environments and healthcare facilities, respectively. According to Abd-Alrazaq et al. (2020) and Talati (2023) conducted research on the use of chatbots and AI in the diagnosis and treatment of mental health disorders. In addition, Zhou et al. (2021) documented encouraging outcomes in the treatment of depression, anxiety, and stress, as well as the enhancement of quality of life, using online mental health treatments. This further highlights the effectiveness of AI-driven methods. These studies highlighted the varied outcomes and stressed the need for further study in this area.

Additionally, Tutun (2022) developed a decision support system harnessing AI for diagnosing mental disorders. In their study, Balcombe and De Leo (2021) examined the capacity of digital technology to fulfil mental health needs in the context of the COVID-19 pandemic. As per Manek et al. (2024), they too examined the potential of AI models, particularly chatbots, to detect mental illnesses via smartphone mental health applications. In their study, Garg and Patil (2021) conducted a comprehensive examination of techniques for monitoring and providing treatment for mental health using AI. A study by Sun et al. (2023) included an AI methodology in the classification of mental diseases, detection of biomarkers, real-time monitoring, and therapy.

Specific AI mental health investigations have yielded profound insights into the intricacies of using AI in the field of mental health. It was discovered by Romanovskyi et al. (2021) that

engaging with chatbots may effectively alleviate symptoms of anxiety and sadness, promoting a sense of calmness and boosting self-confidence. Furthermore, Shinozaki et al. (2013) and Ly et al. (2017) examined the ability of chatbots to establish trust and their efficacy in enhancing well-being and stress management. Researchers acknowledged the chatbots' capacity to extract nuanced information from users' experiences and provide customised cognitive behavioural treatment as highly advantageous (Tielman et al., 2017; Fitzpatrick et al., 2017). Research has also emphasised the use of chatbots in promoting compliance with medication and lifestyle modifications among clinical groups, including patients diagnosed with schizophrenia (Bickmore et al., 2010; Bickmore, Puskas, et al., 2010). A significant number of individuals preferred the chatbot over a therapist because of its psychoeducational content and user-friendly nature. In their study, Philip et al. (2017) discovered that chatbots could deliver CBT to reduce self-reported levels of anxiety and despair. Similarly, Liu et al. (2022) discovered that the chatbot's self-help depression intervention effectively decreased symptoms of depression and anxiety (worry and apprehension) and enhanced the therapeutic bond with participants to a greater extent than basic bibliotherapy.

The Metrics Used to Determine the Effectiveness of Artificial Intelligence in Psychology.

The studies conducted by Boucher et al. (2021) and Gual-Montolio et al. (2022) aimed to evaluate the effectiveness of AI-based therapies in improving clinical symptoms and satisfaction levels, as well as their influence on individuals' overall well-being. In addition, Ebert et al. (2019) used meta-analysis methods to assess the efficacy of therapist-guided internet-based therapies for mental health. Their study offered valuable insights into the effectiveness of these interventions for different mental health disorders. Similarly, Zhou et al. (2021) performed assessments to determine the efficacy of online mental health therapies, specifically targeting young individuals.

The evaluations included depression, anxiety, stress, sleeplessness management, and quality of life enhancement. Furthermore, Abd-Alrazaq et al. (2020) conducted research on the safety and subjective well-being effects of chatbots, offering insights into their potential benefits and drawbacks in mental health settings. In addition, Gallo et al. (2024) conducted research to demonstrate the tangible outcomes of an intervention utilising an AI degradation model. The study specifically focused on reducing the incidence of escalated care among admitted patients. Furthermore, Tutun (2022) investigated the precision and level of involvement of AI-driven decision support systems in the diagnosis of mental diseases, highlighting their ability to improve diagnostic procedures.

In addition, Talati (2023) examined the impact of AI on enhancing diagnostic procedures and ongoing monitoring, highlighting its significance in providing individualised mental healthcare. In their study, Balcombe and De Leo (2021) assessed the efficacy of digital technology in meeting mental health requirements during the COVID-19 crisis, offering valuable insights into its usefulness in the face of unparalleled difficulties. Furthermore, Manek et al. (2024) conducted research that explored the use of AI models and smartphone mental health applications (SMHApps) for early detection and treatment of mental diseases, highlighting the promising role of technology in this field. In addition, Garg and Patil (2021) conducted a study of AI solutions for the monitoring and treatment of mental health disorders. Their analysis comprehensively explores the diverse applications of these solutions in clinical practice. Finally, Sun et al. (2023) studied how AI can enhance mental health care by classifying psychiatric disorders, identifying biomarkers, and providing real-time monitoring. They highlighted the several ways in which AI helps this industry.

Extrinsic assessment metrics are useful for analysing the performance of language models when considering user viewpoints and real-world circumstances (Resnik et al., 2010). These indicators are critical for assessing a model's performance in meeting end-user demands and expectations, as well as analysing the extent to which LLMs are in line with human users' expectations and requirements (Chang et al., 2024). The use of subjective techniques for gathering extrinsic measurements requires continuous human participation and discernment throughout the assessment procedure (Wang et al., 2023; Resnik et al., 2006; Liu et al., 2023). The literature divides extrinsic measurements into two primary categories: general-purpose metrics and health-specific indicators. These metrics are crucial in assessing the quality, consistency, relevance, and overall effectiveness of language models in various real-world domains, tasks, settings, and user requirements. The general-purpose metrics include trustworthiness, utility, accuracy, groundedness, safety, bias, helpfulness, calibration, toxicity, and robustness.

Health-specific evaluation metrics (like timeliness, healthy behaviours, and emotional support) carefully created to examine how healthcare-focused LLMs and chatbots handle and generate health-related information. These metrics focus on factors like accuracy, effectiveness, and relevance (Abbasian et al., 2024). Several measures were used by Househ et al. (2020) used to evaluate the quality of replies generated by chatbots. These criteria included appropriateness, comprehensibility, realism, response speed, empathy, repetitiveness, voice clarity, and linguistic accuracy. Using metrics related to response comprehension, they analysed the chatbot's understanding of user replies. These metrics included user-assessed understanding, word error rate, concept error rate, and attention estimator mistakes. The aesthetic metrics evaluated the visual attractiveness of chatbots based on the following criteria: the look of the virtual agent, the backdrop colour and content, the font type and size, the colour, shape, and icon of buttons, and the contrast

of the background colour. In their study, Jadeja and Varia (2017) outlined four key aspects for assessing chatbots: information retrieval (IR), user experience (UX), language analysis, and AI capabilities (human-likeness). A qualitative measurement was developed by Rathnayaka et al. (2022) as a measure for assessing the enhancement of mood. Two data points from the emotion checks, the first "pre-usage" feeling check and the final "post-usage" feeling check, form the basis of the measure. Furthermore, Mehta et al. (2021) conducted a comprehensive study to assess the impact of customised discussions by examining the spectrum of emotions expressed by users. Ultimately, they sent a survey of high-quality feedback to all customers to assess their impressions of their use. They asked participants to rate the application on a 5-star scale to gauge their satisfaction with a specific mental health chatbot. They assessed the level of retention and engagement by calculating the proportion of individuals who actively engaged with the application. In their study, He et al. (2022) used the Working Alliance Questionnaire (WAQ) to gauge the extent of the working alliance, the Usability Metric for User Experience-LITE to assess usability, and the Acceptability Scale (AS) to quantify acceptability.

Question 4: What variables influence the level of trust that consumers have in an AIeMHC?

The acceptance and utilisation of AI heavily depend on trust (Anderson & Rainie, 2023). According to Mayer et al. (1995), trust is the firm conviction that the AI system will function as intended and protect the user's interests. Two distinct groups of factors influence trust in these apps: technological perspective and individual characteristics.

Technological Perspective

Users' judgements of the accuracy and dependability of AI algorithms significantly influence their level of confidence in mental health apps. Several studies indicate that some reviewers have a greater inclination to place their faith in computer systems as opposed to other

individuals, such as human mental health care providers. This preference arises from the belief that automation is believed to possess superior qualities in terms of its visual appeal, dependability, precision, consistency, and capacity to deliver targeted feedback (Montague et al., 2010). Reviewers also noted that features such as thought monitoring, mood trackers, and journaling allowed them to observe and document their thoughts and emotions. The ability to actively engage with their mental health through these applications instilled confidence in them (Angermeyer & Matschinger, 2003). Conversational chatbots with extensive capabilities might enhance the accessibility of mental health treatments for a wide range of individuals. They demonstrate remarkable endurance in their ability to work continuously without compensation or breaks, yet they require human oversight and upkeep. Individuals have the ability to modify or deactivate chatbots in the event of a malfunction. These characteristics have piqued the interest of businesses, organisations, and individuals in using chatbots to improve mental health services amidst rising demand and limited availability. The COVID-19 pandemic has exacerbated the challenges (Wainberg et al., 2017; Sadavoy et al., 2004). Studies indicate that individuals have a tendency to favour engaging with chatbots rather than interacting with actual individuals in situations that are humiliating or have a negative connotation (Nadarzynski et al., 2019). Individuals may have a greater sense of security while communicating with a chatbot as opposed to a human being, particularly when it comes to disclosing personal or sensitive information. In addition, individuals who feel lonely may see the ability of chatbots to form emotional connections as an advantage. Furthermore, younger adolescents find it more convenient to maintain their anonymity when engaging in online discussions (Livingstone et al., 2004).

Individual Characteristics

AI applications are diversifying, utilising a variety of methodologies and sophisticated algorithms to enhance their functionality (Alotaibi & Sas, 2023). Users are more likely to have confidence in applications that they see as beneficial and user-friendly. Therefore, perceived utility and ease of use are crucial aspects of establishing trust (Venkatesh et al., 2003). Socio-cultural considerations have a significant role in influencing the adoption and features of AI, particularly in the field of healthcare. Cultural beliefs have a significant influence on shaping the diverse and ever-changing conceptions of AI (Blessing et al., 2024). The primary organisational elements influencing AI adoption include managerial skills, decision-making support, cost, and the suitability of AI for the company. These aspects are considered significant milestones in understanding the adoption of AI inside organisations (Tjebane et al., 2022).

Question 5: What ethical difficulties are impeding the development of AIeMHC?

AIeMHC gives rise to ethical concerns such as discrimination, stereotyping, and exclusion. They also raise data-related issues like privacy, data governance, and stigma (Hamdoun et al., 2023; Larsen et al., 2016; Vilaza et al., 2021). Furthermore, there are technical issues to consider, such as error tolerance, excessive confidence in chatbot recommendations, erosion of trust in healthcare professionals, and reliance on technological solutions. Privacy infringements often concern users (Miner et al., 2020). Providers of affordable or no-cost digital psychotherapy services may reveal or trade user data for marketing or other unforeseen objectives. Employer wellness programmes' digital psychotherapy applications may expose participants to privacy breaches and workplace discrimination (Ajunwa, 2023).

Explicability in the field of AI refers to the act of making the processes and outcomes clear and comprehensible. Privacy regulations and data-sharing agreements often use this fundamental

concept. Exclusively digital psychotherapy apps may require consumers to divulge personal information without a complete comprehension of who would be able to access it and the measures in place to safeguard their identity (Martinez-Martin & Kreitmair, 2018). The language and extent of such documentation sometimes make legal requirements difficult to comprehend, particularly for younger users (Luger et al., 2023).

There is an additional ethical concern that arises in this particular situation. Chatbots often overlook personal crime findings, posing significant challenges (Ho et al., 2018). It was demonstrated by Ischen et al. (2020) that individuals have the capacity to create fictitious relationships with AI systems. This may lead individuals to disclose information that would have ethical or legal implications if shared with actual humans. Legal repercussions may result from neglecting to inform the authorities, and the principles of benevolence and fairness require reporting unlawful actions when they pose immediate harm to others. Reporting has the potential to pose risks. Either automation or human engagement can accomplish reporting. We should implement an established procedure to systematically examine all user-generated content for potentially objectionable information, using techniques like keyword analysis or sophisticated NLP to identify problematic words or phrases. A human content moderator with the necessary expertise should receive the information if it is of immediate importance or exceeds the chatbot's capabilities. The moderator will then choose whether to take further action based on ethical concerns. Chatbot users should be aware of the legal ramifications and obligations associated with their use (Coghlan et al., 2023).

Overcoming these ethical dilemmas Supervision by humans

It is crucial to maintain constant vigilance in the field of AI, as there is a strong argument that entrusting decision-making power exclusively to "machines" is not appropriate (Fry, 2018).

Chatbots for mental health that provide automated services without human supervision are considered to be unreliable for developing therapeutic connections (D'Alfonso et al., 2017; Fitzpatrick et al., 2017). Specialists in the area recommend that algorithms should operate as "decision support systems," offering clear explanations to clarify the steps used in making each choice (Nunes & Jannach, 2017). Therapeutic chatbots should further encourage consumers to seek help from their social connections or mental health professionals, either in person or via online platforms. This element is particularly significant, especially given the early stage of empirical research on mental health chatbots. It is unclear if the outcomes achieved from these treatments would be equivalent to those acquired from traditional in-person face-to-face therapies (Kretzschmar et al., 2019).

Confidentiality

It is critical for therapeutic chatbot developers to prioritise user data protection to the highest possible degree. When sharing information with a specific authority, it's critical to exclude any personally identifiable information like names, email addresses, and phone numbers. The confidentiality of this information must be maintained at all times (Kretzschmar et al., 2019).

Assessment of potential dangers and their likelihood of occurrence

Understanding the appropriate ethical use of mental health chatbots is crucial for the relevant parties involved to clearly define the problem they want to solve and the goal they aspire to accomplish. This will ensure the justification of the specific chatbot's construction (Waycott et al., 2016). Occasionally, the disadvantages may be greater than the advantages, making it unreasonable to partially replace human therapists with chatbots that lack empathy or the ability to provide comprehensive mental healthcare. This could discourage individuals from seeking human intervention, which may be more advantageous for them (D'Alfonso et al., 2020).

Question 6: What is the potential of using AIeMHC in the future?

Multiple studies (Huang et al., 2015; D'Alfonso et al., 2017; Bird et al., 2018) indicate that chatbots have potential applications in psychotherapy for the prevention, treatment, and post-treatment/relapse prevention of mental diseases and psychological issues. One potential use might be their proactive utilisation, particularly in the field of suicide prevention (Martínez-Miranda, 2017).

Research by De Choudhury et al. (2016) has shown that it is possible to detect suicidal thoughts and behaviours in social media users using automated techniques. As a result, chatbots have the ability to automatically inform consumers about local psychological or psychiatric services. These chatbots have the potential to provide individuals with the means to actively participate in the management of psychiatric disorders on their own.

Chatbots have the potential to sustain the positive outcomes of post-traditional psychotherapy sessions, assist in explaining therapeutic ideas in daily situations, and reduce the likelihood of relapse (D'Alfonso et al., 2017). There is a growing interest in using chatbots in clinical psychology and psychotherapy. The growing number of research studies, as well as the availability of online services from healthcare providers, such as chat-supported health applications, bolster this trend (Dale, 2016; Brandtzaeg & Følstad, 2017).

Individuals with acrophobia as per Freeman et al. (2018), persecutory delusions as per Freeman et al. (2019), and cognitive and social skills related to the schizophrenia spectrum as per Bisso et al. (2020) can benefit from in-depth virtual therapy using virtual reality (VR) without incurring significant costs. A comprehensive review by Bisso et al. (2020) has cited several studies that demonstrate the efficacy and versatility of virtual reality (VR) in the treatment of disorders such as posttraumatic stress disorder, anxiety disorder, and particular phobias (Bisso et al., 2020).

Additional study is required to ascertain the suitability of this method for addressing various mental health conditions (Balcombe & De Leo, 2021).

An additional prerequisite is to create culturally sensitive chatbots and assess software that imitates human communication using AI on text messaging or voice chat platforms, namely using natural language processing (Singh, 2019). A scoping study reported on the preliminary evaluation of chatbots' practicality and approval. Furthermore, a randomised controlled experiment has shown the efficacy of chatbots, specifically in improving overall mental health, alleviating stress, and controlling depression (Bendig et al., 2019).

Question 7: What are the associated constraints, indicating if or how we may surpass them?

The user comments in the reviews of the suggested applications were mostly subjective and influenced by each user's own experience with the apps. The self-reported data might provide insights into the level of public confidence in AI applications in mental health care (MHC). Several factors, such as sociodemographic traits or health-related behaviours, may influence this trust (Brown-Johnson et al., 2018). A bias in the user reviews could significantly impact the outcomes of our study. Furthermore, the prevailing societal conditions are likely to impact the user experience and satisfaction with AI applications in the field of mental health care. Consequently, the trust of the public in these applications may vary according to changing social conditions, such as the ongoing resurgence of the COVID-19 epidemic.

Conclusion

Overall, the increasing incorporation of AI into mental health therapies shows great potential for improving therapeutic results in several areas. This article has conducted a comprehensive analysis of a large body of literature that shows how AIeMHC, virtual therapists,

and algorithm-based diagnostics, can greatly enhance the accessibility and effectiveness of mental health services. These tools can overcome obstacles commonly associated with traditional in-person therapy sessions, such as social stigma, geographical constraints, and economic constraints. This comprehensive analysis highlights the capacity of AIeMHC and digital therapies to significantly alleviate symptoms of prevalent mental diseases, including depression and anxiety, especially among marginalised communities. However, the implementation and achievement of such technologies are not without obstacles. Challenges such as ethical dilemmas, concerns about confidentiality and protection, and the disparity in access to technology provide substantial obstacles to the mainstream use of AI in mental health treatment. The reviewed research provides evidence that AI treatments may successfully alleviate symptoms of anxiety, depression, and other mental health problems by offering real-time, personalised assistance and feedback. Nevertheless, the use of AI in mental health treatment also presents other ethical, practical, and technological obstacles. Factors such as the protection of data privacy, the possibility of incorrect diagnosis, and the absence of human supervision in AI interactions need thorough examination. Furthermore, the efficiency of AI tools greatly depends on the precision and impartiality of the underlying algorithms, which need to be constantly evaluated and revised in response to new data and changing ethical norms. Moreover, this research emphasises a crucial deficiency in the acceptance and confidence of users in AI systems. In order to tackle these difficulties, it is essential for future research to concentrate not just on technology progress but also on improving user involvement and confidence via clear procedures and strong security measures. Furthermore, it is crucial to foster multidisciplinary cooperation among AI experts, mental health practitioners, ethicists, and politicians in order to establish a regulatory structure that promotes the secure, efficient, and fair use of AI in the field of mental healthcare. Ultimately, the effective incorporation of AI into mental

health treatments requires continuous training and education for both care providers and patients. Providing healthcare personnel with education on the capabilities and constraints of AI will enhance their ability to effectively incorporate these technologies into clinical practice. Concurrently, it will be critical to educate patients on the optimal usage and advantages of AI-enabled mental health services in order to fully exploit their potential. AI has the potential to greatly revolutionise mental health services. However, in order to make the most of its advantages and minimise dangers, it is necessary to carefully address ethical concerns, continuously improve the technology, and actively include all stakeholders.

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