

The Impact of Generative Artificial Intelligence on Mental Health: Opportunities, Challenges, and Ethical Concerns

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Abstract

Mental health conditions are one of the most pressing public health issues globally, impacting people of all ages and making it difficult for people to operate in health care systems around the world. As Generative Artificial Intelligence (GenAI) evolves quickly, it offers novel solutions for mental health care, like AI-powered chatbots, virtual assistants, emotion recognition systems, and personalized digital support platforms. This paper is an analysis of recent studies on the use of generative AI in mental health care which will compare the advantages, drawbacks, and ethical considerations of generative AI. The studies reviewed suggest that AI tools can help with greater accessibility of mental health supports, offer around-the-clock support, increase self-awareness, and decrease loneliness through personalized interactions. However, there are a number of issues to contend with: emotional reliance on AI companions, misinformation, privacy and security concerns, algorithmic bias, and a lack of clinical validation. This paper highlights insights from various studies on the current impact of Generative AI on mental health care and pinpoints areas where research is currently missing. The analysis recommends that Generative AI can revolutionize mental care but can't be a direct substitute for mental health professionals. Moving forward, it is crucial to promote responsible implementation of AI, ethical guidelines, transparency, and robust regulations to maintain safe and reliable mental health care services.

Keywords: Generative Artificial Intelligence; Mental Health; AI Chatbots; Digital Healthcare; Emotion Detection; Ethical AI; Privacy; Mental Healthcare

1. Introduction

Mental health has become one of the most significant public health challenges of the twenty-first century, affecting individuals regardless of age, gender, occupation, or socioeconomic background. Mental disorders such as depression, anxiety, bipolar disorder, post-traumatic stress disorder (PTSD), and chronic stress have increased considerably over the past decade, particularly following the COVID-19 pandemic. According to the World Health Organization (WHO), hundreds of millions of people worldwide experience mental health disorders each year, while many remain untreated because of inadequate healthcare infrastructure, shortage



of trained mental health professionals, financial barriers, geographical limitations, and the persistent social stigma associated with seeking psychological care [1].

Traditional mental healthcare primarily depends on face-to-face consultations with psychiatrists, psychologists, and counsellors. Although these services remain the gold standard for diagnosis and treatment, they are often inaccessible to large segments of the population because of long waiting periods, high consultation costs, limited availability of specialists, and unequal healthcare distribution across rural and urban regions [2]. Consequently, there has been growing interest in integrating Artificial Intelligence (AI) technologies into healthcare systems to improve service accessibility, efficiency, and personalization.

Artificial Intelligence has undergone rapid evolution during the past decade, progressing from rule-based expert systems to sophisticated deep learning models capable of understanding natural language, generating human-like responses, recognizing emotions, and supporting clinical decision-making. Among these developments, **Generative Artificial Intelligence (GenAI)** has emerged as one of the most influential technological innovations. Powered by Large Language Models (LLMs), transformer architectures, and advanced Natural Language Processing (NLP), GenAI systems are capable of producing coherent conversations, answering complex questions, summarizing clinical information, and delivering personalized recommendations in real time [3], [4].

The application of Generative AI in mental healthcare has attracted considerable attention because of its ability to provide continuous emotional support through intelligent conversational agents. AI-powered chatbots such as Woebot, Wysa, and other virtual mental health assistants employ conversational AI techniques to guide users through cognitive behavioural therapy (CBT) exercises, mindfulness practices, mood tracking, stress management strategies, and emotional self-assessment. These systems are available twenty-four hours a day, enabling users to receive immediate support during periods of emotional distress without the limitations associated with conventional healthcare services [5], [6].

Recent advances in multimodal Generative AI have further expanded the capabilities of intelligent mental health systems. Modern AI applications integrate textual conversations, speech analysis, facial expression recognition, physiological sensor data, and behavioural analytics to identify emotional states more accurately. Machine learning algorithms can analyse subtle linguistic patterns, sentiment variations, vocal characteristics, and behavioural changes that may indicate depression, anxiety, suicidal ideation, or emotional instability. Such technologies have the potential to facilitate early diagnosis, continuous monitoring, personalized intervention planning, and improved patient engagement [7].

Despite these promising developments, the implementation of Generative AI in mental healthcare raises several critical concerns. Mental health data are among the most sensitive forms of personal information, making privacy protection, cybersecurity, and regulatory compliance essential considerations. Furthermore, Generative AI models may generate inaccurate or hallucinated responses, exhibit demographic bias resulting from biased training datasets, or provide recommendations that lack clinical validation. Excessive dependence on AI companions may also reduce human interaction and potentially create emotional attachment between users and intelligent systems. These challenges emphasize that AI should complement rather than replace qualified mental health professionals [8], [9].

Ethical considerations have therefore become central to the deployment of AI-driven mental healthcare. Researchers and policymakers increasingly advocate for explainable AI, transparent decision-making, fairness-aware machine learning, informed consent, continuous human supervision, and compliance with healthcare regulations to ensure patient safety. Developing trustworthy AI systems requires collaboration

among clinicians, AI developers, psychologists, legal experts, and regulatory authorities to establish standardized evaluation frameworks and ethical governance mechanisms [10].

Although numerous studies have investigated specific applications of AI chatbots, emotion recognition systems, and conversational agents, comparatively fewer review studies provide a comprehensive analysis of the opportunities, technical limitations, ethical implications, and future research directions of Generative AI within mental healthcare. Existing literature often focuses on isolated applications while overlooking broader issues such as responsible AI deployment, interdisciplinary collaboration, long-term clinical validation, and emerging regulatory frameworks.

Research Objectives

This review aims to:

1. Examine recent developments in Generative AI applications for mental healthcare.
2. Analyse the effectiveness of AI-powered conversational agents, virtual therapists, and emotion recognition systems.
3. Compare findings reported in recent research studies.
4. Identify the ethical, technical, clinical, and societal challenges associated with Generative AI.
5. Highlight current research gaps and propose future research directions for responsible AI-enabled mental healthcare.

Major Contributions of this Review

The major contributions of this paper are as follows:

- A comprehensive review of recent Generative AI applications in mental healthcare.
- Comparative analysis of existing literature published between 2022 and 2025.
- Critical discussion of ethical, privacy, fairness, and transparency issues.
- Identification of research gaps and future opportunities.
- Recommendations for the responsible integration of Generative AI into mental healthcare systems.

2. Literature Review

The application of Artificial Intelligence (AI) in healthcare has evolved significantly over the past decade, with Generative Artificial Intelligence (GenAI) emerging as one of the most promising technologies for supporting mental health diagnosis, counselling, patient engagement, and personalized therapeutic interventions. Recent developments in Large Language Models (LLMs), Natural Language Processing (NLP), deep learning, and multimodal AI have enabled intelligent systems capable of understanding human emotions, generating context-aware responses, and assisting healthcare professionals in clinical decision-making. This section critically reviews recent studies related to Generative AI in mental healthcare, highlighting major applications, technological advancements, ethical concerns, and existing research gaps.

a. Generative AI in Mental Healthcare

Generative AI refers to AI models capable of producing human-like text, speech, images, and other forms of content using deep learning architectures. In mental healthcare, these models facilitate conversational support, emotional assessment, symptom monitoring, and digital therapeutic interventions. Unlike

traditional rule-based systems, LLMs such as GPT-based architectures can understand complex linguistic patterns, maintain contextual conversations, and generate personalized recommendations.

Recent studies suggest that GenAI has the potential to improve accessibility to mental healthcare, particularly for individuals residing in remote regions or areas experiencing shortages of qualified mental health professionals. AI-powered systems provide immediate assistance, reducing waiting times and enabling continuous emotional support [1], [2].

However, researchers consistently emphasize that these systems should be viewed as supportive technologies rather than replacements for trained psychologists or psychiatrists because they lack genuine empathy, contextual reasoning, and clinical accountability [3].

b. AI-Powered Conversational Agents and Chatbots

Conversational AI represents one of the most widely adopted applications of Generative AI in mental healthcare. AI chatbots simulate therapeutic conversations using NLP and machine learning algorithms, providing users with guidance based on Cognitive Behavioural Therapy (CBT), mindfulness exercises, stress reduction techniques, and emotional self-management.

Applications such as **Woebot**, **Wysa**, and similar virtual assistants have demonstrated promising outcomes in reducing mild symptoms of anxiety, depression, and loneliness through structured conversations [4], [5]. These systems enable users to monitor emotional wellbeing, perform daily mood assessments, and receive personalized coping strategies.

Several researchers report that conversational agents increase healthcare accessibility by offering 24-hour support while maintaining anonymity, which encourages individuals reluctant to seek traditional psychological counselling because of social stigma [6].

Nevertheless, chatbot performance depends heavily on training data quality, linguistic diversity, and continuous clinical validation. AI-generated responses may occasionally provide incomplete or misleading guidance, emphasizing the importance of human supervision.

c. Large Language Models for Psychological Counselling

Large Language Models (LLMs) have significantly enhanced conversational AI capabilities by enabling systems to generate coherent, context-aware responses during extended interactions.

Recent research demonstrates that LLMs can assist users by:

- answering mental health questions,
- explaining psychological conditions,
- encouraging emotional expression,
- recommending coping strategies,
- providing motivational support,
- assisting clinicians in documentation.

Unlike conventional chatbot systems, transformer-based language models maintain conversational context across multiple interactions, allowing more personalized discussions.

Despite these advantages, researchers caution that LLMs occasionally generate hallucinated information, fabricated clinical advice, or inaccurate recommendations that could negatively affect vulnerable users [7]. Consequently, AI-generated outputs require verification before being incorporated into clinical practice.

d. Emotion Recognition and Sentiment Analysis

Emotion recognition has become a fundamental component of intelligent mental healthcare systems.

Modern AI systems analyse multiple sources of information including:

- textual conversations,
- speech signals,
- facial expressions,
- physiological measurements,
- behavioural patterns.

Deep learning models trained using multimodal datasets can identify emotional states such as happiness, sadness, anger, stress, anxiety, fear, and depression with relatively high accuracy [8].

Several studies indicate that combining NLP with sentiment analysis improves depression detection and enables early intervention before symptoms become severe.

Researchers have also investigated wearable devices integrated with AI algorithms for continuous monitoring of stress levels using heart rate variability, sleep quality, physical activity, and voice characteristics.

Although these technologies demonstrate encouraging performance, accuracy often decreases when systems encounter culturally diverse populations or previously unseen linguistic expressions.

e. Personalized Mental Health Support

One of the major advantages of Generative AI lies in its ability to deliver personalized healthcare.

Machine learning algorithms continuously analyse user interactions to identify behavioural trends and recommend individualized interventions.

Personalization may include:

- adaptive counselling,
- customized meditation exercises,
- individualized CBT sessions,
- personalized wellness recommendations,
- daily emotional monitoring,
- stress management strategies.

Researchers report that personalized AI interventions improve patient engagement because recommendations better reflect individual behavioural characteristics rather than generic therapeutic advice [9].

However, excessive personalization requires extensive personal data collection, creating additional concerns regarding privacy protection and informed consent.

f. Ethical Challenges of Generative AI

Ethical concerns remain one of the most frequently discussed topics within current literature.

Researchers consistently identify several major ethical issues:

Privacy

Mental health information represents one of the most sensitive categories of personal data.

Unauthorized disclosure may result in discrimination, employment challenges, insurance complications, or social stigma.

Healthcare AI systems therefore require:

- encryption,
- secure cloud storage,
- access control,
- anonymization,
- regulatory compliance.

Algorithmic Bias

AI systems learn from historical datasets.

If training data disproportionately represent particular demographic groups, AI recommendations may become biased toward specific genders, ethnicities, cultures, or socioeconomic populations.

Several studies recommend fairness-aware machine learning techniques and continuous auditing to reduce discriminatory outcomes [10].

Transparency

Many deep learning models function as "black boxes," making it difficult for clinicians to understand why specific recommendations are generated.

Researchers increasingly advocate Explainable Artificial Intelligence (XAI) methods to improve trustworthiness and clinical acceptance.

Accountability

Determining responsibility becomes challenging when AI systems generate harmful recommendations.

Researchers suggest that healthcare professionals should retain ultimate responsibility for diagnosis and treatment decisions, while AI should function solely as a decision-support tool.

g. Privacy and Data Security

Healthcare applications routinely process confidential patient information.

Recent studies emphasize compliance with international regulations such as:

- GDPR
- HIPAA
- national healthcare privacy frameworks

Secure federated learning, differential privacy, blockchain technologies, and encrypted cloud computing have been proposed as methods for protecting patient confidentiality while maintaining AI performance.

Researchers also emphasize transparent consent mechanisms that clearly explain how patient information will be collected, processed, and stored.

h. Explainable Artificial Intelligence (XAI)

Clinical adoption requires healthcare professionals to understand AI decision-making.

Explainable AI techniques including:

- SHAP,
- LIME,
- attention visualization,
- saliency maps,

allow clinicians to interpret AI predictions.

Several studies conclude that explainability improves physician confidence and facilitates regulatory approval. Nevertheless, balancing model complexity and interpretability remains an ongoing research challenge.

i. Current Research Gaps

Although recent literature demonstrates considerable progress, several limitations remain.

Researchers frequently identify:

- limited long-term clinical evaluation,
- lack of standardized benchmarking,
- insufficient multicultural datasets,
- inadequate multilingual support,
- limited explainability,
- ethical governance challenges,
- absence of universally accepted regulatory frameworks,
- limited collaboration between AI developers and mental health professionals.

Future research should prioritize longitudinal clinical trials, interdisciplinary collaboration, trustworthy AI development, culturally adaptive language models, and comprehensive regulatory standards.

3. Methodology

This study employs a **systematic literature review (SLR)** methodology to critically examine the role of **Generative Artificial Intelligence (GenAI)** in mental healthcare. The review follows a structured and reproducible process for identifying, selecting, evaluating, and synthesizing published research related to AI-driven mental health applications, including conversational agents, Large Language Models (LLMs), emotion recognition systems, and personalized digital therapeutic platforms.

Unlike experimental studies involving primary data collection, this research analyses secondary data obtained from peer-reviewed journal articles and conference proceedings. The methodology was designed to ensure transparency, reproducibility, and comprehensive coverage of the existing literature.

3.1. Research Design

The research follows a qualitative systematic review design consisting of five major phases:

1. Research question formulation
2. Literature search
3. Study screening and selection
4. Data extraction
5. Comparative and thematic analysis

The review focuses on identifying current applications, opportunities, ethical challenges, and research gaps associated with Generative AI in mental healthcare.

3.2. Data Sources

Relevant studies were retrieved from internationally recognized scientific databases, including:

- IEEE Xplore Digital Library
- ScienceDirect
- SpringerLink
- ACM Digital Library
- PubMed
- Google Scholar

The search was limited to peer-reviewed publications published between **2022 and 2025**.

3.3. Search Strategy

The following search keywords and Boolean operators were used:

- "Generative Artificial Intelligence" AND "Mental Health"
- "Large Language Models" AND "Mental Healthcare"
- "AI Chatbot" AND "Depression"
- "Emotion Recognition" AND "Mental Health"
- "Digital Mental Health" AND "Generative AI"
- "AI Ethics" AND "Healthcare"

Duplicate articles were removed before screening.

3.4. Inclusion and Exclusion Criteria

Inclusion Criteria

- Peer-reviewed journal articles and conference papers

- Published between 2022 and 2025
- Written in English
- Focused on Generative AI applications in mental healthcare
- Included clinical, technical, or ethical evaluations

Exclusion Criteria

- Opinion articles
- Editorials
- Non-English publications
- Duplicate studies
- Studies unrelated to mental healthcare
- Papers lacking methodological details

3.5. Data Extraction

The following information was extracted from each selected study:

- Authors
- Publication year
- AI technique
- Mental health application
- Dataset (if applicable)
- Research methodology
- Key findings
- Limitations
- Future recommendations

The extracted information was organized into comparative tables to facilitate systematic analysis.

3.6. Data Analysis

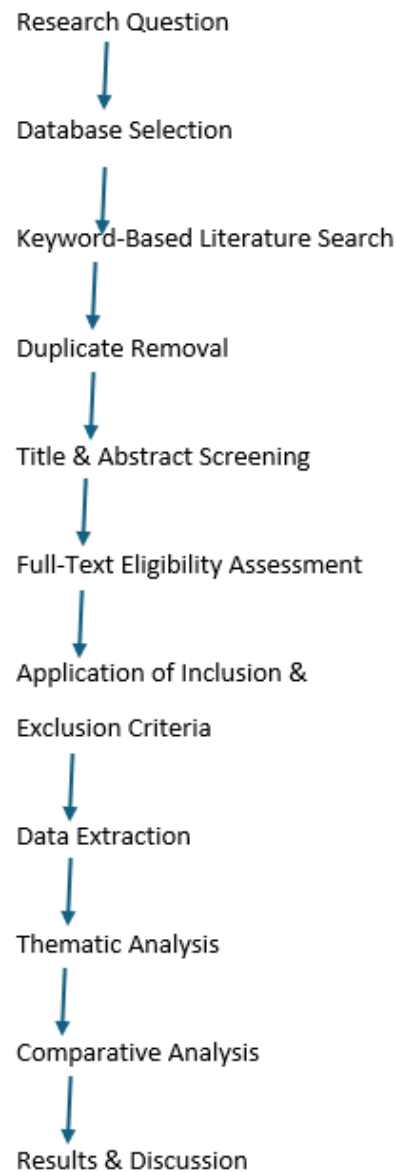
A thematic analysis was performed by categorizing the selected studies into the following themes:

- AI-powered chatbots
- Large Language Models
- Emotion recognition
- Personalized interventions
- Ethical AI
- Privacy and security
- Explainable AI

- Future research directions

The findings were compared to identify similarities, differences, advantages, limitations, and emerging research trends.

Methodology Workflow



4. Results and Discussion

The systematic review identified recent studies demonstrating the growing role of **Generative Artificial Intelligence (GenAI)** in supporting mental healthcare. The selected literature consistently indicates that AI-powered conversational agents, Large Language Models (LLMs), emotion recognition systems, and personalized digital therapeutic platforms can significantly improve the accessibility, efficiency, and scalability of mental health services. The analysis also reveals persistent concerns related to clinical reliability, ethical governance, privacy, algorithmic bias, and the need for continuous human oversight.

4.1. Overview of Reviewed Studies

The selected publications collectively investigated various applications of Generative AI in mental healthcare, including conversational counselling, early detection of psychological disorders, emotion recognition, personalized intervention, and digital mental health assistance. Most studies employed transformer-based language models, Natural Language Processing (NLP), deep learning, and sentiment analysis techniques to provide intelligent and context-aware mental health support.

Table 1. Comparative Analysis of Reviewed Studies

Author	Application	AI Technique	Major Findings	Limitations
Deodhar et al. (2024)	Mental health support	Large Language Models	Improved accessibility and emotional support	Privacy concerns, misinformation
Gupta et al. (2024)	Clinical decision support	Machine Learning	Better diagnosis and monitoring	Algorithmic bias
Chen et al. (2024)	AI mental health platform	NLP & Sentiment Analysis	High emotion recognition accuracy	Limited clinical validation
Inkster et al.	AI chatbot (Woebot)	Conversational AI	Reduced anxiety and depression symptoms	Short-term evaluation
Fitzpatrick et al.	CBT chatbot	NLP	Improved emotional wellbeing	Limited sample size

The comparative analysis demonstrates that conversational AI remains the most extensively investigated application, while multimodal emotion recognition and explainable AI are emerging research areas.

4.2. Applications of Generative AI in Mental Healthcare

The literature indicates that Generative AI contributes to mental healthcare in several important ways:

- AI-powered chatbots provide immediate emotional support and psychoeducation.
- Virtual mental health assistants facilitate continuous patient engagement.
- Emotion recognition systems assist in identifying stress, anxiety, and depression.
- Large Language Models generate personalized therapeutic recommendations.
- AI-based monitoring supports early identification of psychological distress.
- Personalized interventions improve adherence to treatment and patient engagement.

Several studies reported that AI systems improve healthcare accessibility, particularly in rural and underserved communities where qualified mental health professionals are scarce.

4.3. Benefits Identified from the Literature

The review identified several recurring advantages of Generative AI in mental healthcare.

Improved Accessibility

AI systems are available 24 hours a day, enabling users to obtain immediate emotional support without geographical limitations. This is particularly beneficial in regions experiencing shortages of mental health professionals.

Personalized Care

Generative AI analyses user interactions to provide individualized recommendations, coping strategies, and wellness plans tailored to personal emotional states.

Early Detection

Machine learning algorithms analysing language patterns, behavioural changes, and emotional expressions can support the early detection of depression, anxiety, and stress-related disorders.

Reduced Healthcare Burden

AI-assisted systems help reduce clinicians' workload by automating routine screening, documentation, appointment support, and preliminary assessments.

Cost-Effective Services

Digital mental health platforms reduce consultation costs and expand access to affordable mental healthcare.

4.4. Challenges Identified

Despite significant progress, several challenges remain.

Privacy and Confidentiality

Mental health information is highly sensitive. Unauthorized disclosure may affect employment, insurance, and personal relationships. Strong encryption, secure storage, and compliance with healthcare regulations are therefore essential.

Algorithmic Bias

Bias in training datasets can produce unequal recommendations across different demographic groups, potentially affecting healthcare quality.

Hallucinated Responses

Large Language Models occasionally generate incorrect or fabricated information, creating risks if users rely exclusively on AI-generated advice.

Lack of Clinical Validation

Many reviewed systems have been evaluated only in controlled research environments. Long-term clinical evidence remains limited.

Emotional Dependency

Continuous interaction with AI companions may create excessive emotional attachment, potentially reducing healthy human social interactions.

4.5. Ethical Implications

Ethical concerns remain central to AI-enabled mental healthcare.

The literature consistently recommends:

- Human supervision for all clinical decisions.
- Explainable AI models to improve transparency.
- Fairness-aware machine learning techniques.
- Secure management of patient information.
- Compliance with national and international healthcare regulations.
- Continuous monitoring for harmful or biased outputs.

These recommendations reinforce that AI should function as a **clinical decision-support system rather than an autonomous healthcare provider**.

5. Discussion

The overall findings demonstrate that Generative Artificial Intelligence has substantial potential to transform mental healthcare by improving accessibility, personalization, and efficiency. AI-powered chatbots, virtual therapists, and emotion recognition systems offer continuous support, especially for individuals with limited access to traditional mental health services. However, current technologies cannot fully replace qualified mental health professionals because they lack clinical judgment, emotional understanding, and accountability.

The reviewed literature consistently concludes that the future of AI-enabled mental healthcare depends on responsible deployment, transparent algorithms, robust privacy protection, interdisciplinary collaboration, and continuous human oversight. Therefore, Generative AI should be viewed as a complementary technology that enhances clinical practice rather than replacing professional mental healthcare services.

6. Conclusion

Generative Artificial Intelligence (GenAI) is emerging as a transformative technology in mental healthcare, offering innovative solutions to address the increasing global burden of mental health disorders. This review examined recent advancements in AI-powered mental health applications, including conversational chatbots, Large Language Models (LLMs), emotion recognition systems, and personalized digital therapeutic platforms. The analysis of the selected literature indicates that these technologies have the potential to improve the accessibility, affordability, and scalability of mental health services by providing continuous emotional support, early detection of psychological conditions, personalized interventions, and assistance in clinical decision-making. These capabilities are particularly valuable in regions facing shortages of mental health professionals and limited access to traditional healthcare services.

Despite these promising developments, the review also highlights several significant challenges that must be addressed before Generative AI can be widely adopted in clinical practice. Concerns related to data privacy, cybersecurity, algorithmic bias, misinformation, hallucinated responses, transparency, explainability, and accountability remain major obstacles to safe and reliable implementation. Furthermore, the absence of long-term clinical validation and standardized regulatory frameworks limits the integration of AI systems into routine mental healthcare. The literature consistently emphasizes that while Generative AI can enhance mental healthcare delivery, it cannot replace qualified psychiatrists, psychologists, or counsellors because effective mental health treatment requires human empathy, ethical judgment, and clinical expertise.

The comparative analysis further reveals important research gaps, including the need for culturally diverse and multilingual AI models, explainable and trustworthy AI techniques, standardized evaluation protocols, and interdisciplinary collaboration among AI researchers, healthcare professionals, psychologists, and policymakers. Future research should focus on conducting large-scale longitudinal clinical studies, developing privacy-preserving and fairness-aware AI models, integrating multimodal data sources such as speech, facial expressions, and wearable sensors, and establishing comprehensive ethical and regulatory guidelines for responsible AI deployment.

In conclusion, Generative Artificial Intelligence represents a powerful complementary technology that can significantly strengthen mental healthcare when implemented responsibly. Rather than replacing mental

health professionals, AI should function as an intelligent decision-support system that enhances clinical practice, improves patient engagement, and expands access to quality mental healthcare. The successful integration of Generative AI into healthcare will depend on continuous technological advancement, rigorous clinical validation, transparent governance, and adherence to ethical principles that prioritize patient safety, privacy, fairness, and human well-being. This review provides a comprehensive overview of the current landscape of Generative AI in mental healthcare and offers insights that may guide future research, policy formulation, and the responsible development of AI-enabled mental health services.

Acknowledgements

The authors would like to express their sincere gratitude to the faculty members of the **Department of Computer Science and Applications** for their valuable guidance, continuous encouragement, and constructive suggestions throughout the preparation of this review paper. The authors also extend their appreciation to the researchers and scholars whose published works provided the scientific foundation for this study. Their significant contributions to the fields of Generative Artificial Intelligence and mental healthcare have greatly enriched this review. Finally, the authors acknowledge the support of their institution for providing the academic resources necessary to complete this work.

Funding

"This research received no external funding."

Conflict of Interest

"The authors declare no conflict of interest."

Data Availability Statement

The data supporting the findings of this study are derived entirely from publicly available peer-reviewed journal articles, conference proceedings, and academic publications accessed through recognized scientific databases, including IEEE Xplore, ScienceDirect, SpringerLink, ACM Digital Library, PubMed, and Google Scholar. No primary data were collected, generated, or analyzed as part of this research. Therefore, no additional datasets are associated with this review paper. All sources used in the preparation of this manuscript are appropriately cited in the References section and are available through their respective publishers or repositories.

AI Usage Disclosure

The authors used **OpenAI ChatGPT (GPT-5.5)** as an AI-assisted writing tool during the preparation of this manuscript. The tool was utilized to assist with language refinement, grammatical editing.

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