Psychological and Addiction-Related Impacts of Artificial Intelligence on Society

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BACKGROUND: The expanding role of artificial intelligence (AI) in mental healthcare presents significant opportunities and challenges. AI has the potential to fundamentally transform traditional healthcare practices, particularly in diagnostics, interventions, and its accessibility. **AIM:** To provide an overview of the historical development of AI applications in mental health, current implementation of trends in this area, as well as benefits, risks, and ethical considerations. **METHODS:** A narrative non-systematic review was conducted between July and August 2025. The databases searched were Web of Science, Scopus, PubMed, EBSCO, Google Scholar, and Science Direct. **RESULTS:** Based on 47 studies, the findings indicated that within the domain of mental health, the utilisation of artificial intelligence is predominantly focused on the domains of diagnostics, monitoring, and personalised intervention. Recent research highlighted the necessity for human oversight and collaboration to ensure safe clinical practices, despite the existence of numerous approaches to implementation. The main identified risks included AI hallucinations, a lack of transparency and data protection, and the emerging trend of chatbot dependence. **CONCLUSIONS:** This narrative review highlights the transformative potential of AI in mental healthcare, particularly through tools such as chatbots, virtual assistants, and predictive analytics. The findings underscore that AI should not replace but rather complement human expertise.

Keywords | artificial intelligence – AI – healthcare – addiction science – behavioral addictions – digital media – mental health – innovation

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1 INTRODUCTION

"Move fast and break things" was an early motto of Facebook, intended to motivate developers not to fear taking risks, regardless of any damage caused along the way. Over time, this phrase has become a mantra for technological progress as a whole, including the development of artificial intelligence (Chesterman, 2021).

The contemporary world is characterized by the rapid development of technologies and extensive digitalization. This process affects all spheres of social life and leads to significant changes in various fields, including medicine and mental healthcare. The aim is to improve population health through the integration of innovative solutions (Tossekbayev et al., 2025).

The digital revolution is overcoming barriers – telemedicine and mHealth are particularly important approaches in healthcare delivery, for example in bridging geographical gaps and improving access to specialized care (Panahi, 2025). As a result of digitalization, the Healthcare 5.0 initiative has emerged, representing a new phase in the development of healthcare. It is primarily based on key technologies: telecommunications, cloud computing, deep learning, blockchain technologies, sensors, and The Internet of Things (IoT) (Karri et al., 2024). As Fontes et al. (2025) state, the Healthcare 5.0 concept is part of the broader framework of Society 5.0, which integrates the physical and digital environments with the aim of supporting human society through technological progress. However, the authors also note that this development simultaneously raises ethical questions concerning the impact of digital technologies on healthcare and the nature of humanity in a technologically advanced society.

Artificial intelligence (AI), and specifically chatbots that enable interaction between humans and digital devices, represent a promising technology that can bridge gaps across fields (Li, 2025). Chatbots based on generative artificial intelligence are becoming increasingly sophisticated and widespread, surpassing earlier technologies in conversational fluency and finding ever broader applications. The most widely used of these, ChatGPT, was used at least once a week by more than 250 million people worldwide as of October 2024 (Volpato et al., 2025; OpenAI, 2024). In 2025, its popularity continues to reach approximately 4.6 billion monthly visits (Cardillo, 2025).

Therefore, artificial intelligence can be a powerful tool for advancing mental healthcare both within and beyond the healthcare system. Even though current methods of treating mental disorders have demonstrated improvements, there remains a need to enhance, for example, diagnostic and therapeutic solutions for mental disorders. AI has proven to be a highly effective tool for mental health services, capable of identifying disorders and developing personalized treatment programs for individual clients (Graham et al., 2019). The use of AI in mental health is advantageous as it facilitates, among other things, the identification of connections that might otherwise remain unnoticed by human experts. The use of computers in processing numerical data has been shown to enable faster and more accurate mental health assessments (Shatte et al., 2019; Zainab et al., 2025).

This article aimed to provide an overview of the use of artificial intelligence in the field of mental healthcare, particularly to provide fundamental information on AI implementation in psychological practice and approaches to the problematic use of digital technologies, to summarize the current state of research in this area, to highlight key trends, and to describe the main benefits, risks, and ethical considerations.

2 METHODS

A narrative (non-systematic) review of the literature was conducted between July and August 2025. This approach allowed us to synthesize and interpret the available evidence on the topic without strictly adhering to a systematic protocol. The aim of this narrative review was to offer a contextualized overview of the main trends and theoretical foundations, rather than an exhaustive and reproducible systematic overview. To ensure rigor and relevance, the selection of sources followed a systematic approach defined by the following Inclusion and Exclusion criteria (I/EC):

IC: Studies focusing on the application of AI, ML (Machine Learning), or GenAI specifically within the context of mental healthcare, psychology, psychiatry, or addiction were included.

IC: Sources published between 1950 and June 2025 were considered for inclusion.

IC: Only studies in English were included.

EC: General IT/AI studies were excluded.

The final selection of sources was based on scholarly judgment, prioritizing their relevance and significance in illustrating the core developments and challenges of the field. The aim was not to provide an exhaustive and reproducible overview of all available studies, but rather to offer a contextualized overview of the main trends and theoretical foundations.

Both empirical and theoretical papers, as well as systematic reviews, were included. Relevant sources were searched in the following databases: Web of Science, Scopus, PubMed, EBSCO, Google Scholar, and ScienceDirect. Sources were identified using the following keywords: *artificial intelligence, AI, ChatGPT, chat gpt, generative AI, chatbots, healthcare, mental health, mental healthcare, addiction, behavioral addiction, ethics, and AI hallucinations*. Abstracts were then screened, and articles not related to the topic were excluded, especially those dealing with medical fields unrelated to psychology, psychiatry, or addictology. After identifying the relevant sources for this study, the reference lists of these articles were analyzed to locate additional studies not captured during the initial database search. Supplementary information on specific practical examples was also retrieved. The definition of the research aim, the identification and selection of relevant sources, and the mapping of data were followed by a synthesis of the collected evidence, from which the main conclusions were drawn. The final selection was highly selective: 47 studies were ultimately included, based on their direct relevance, conceptual significance, and influence in supporting the core theoretical foundations and narrative of this review.

3 RESULTS

Development of Artificial intelligence in Healthcare – Historical and Contextual Framework

The importance of contextualizing the development of AI lies primarily in understanding its transformative potential in healthcare alongside its limitations and ethical implications (Hirani et al., 2024).

Artificial intelligence is a broad term encompassing an extensive field of research aimed at modeling intelligent behavior without direct human involvement (Hamet & Tremblay, 2017). The first question concerning AI dates back to the 1950s and is associated with the Turing test. Alan Turing posed the question of whether an artificial device could act and make decisions indistinguishable from those of humans (Shieber, 2007). At the Dartmouth Conference in 1956, many experts declared that the emergence of AI was indeed possible and that it could one day compete with—and even surpass—human intelligence (Cordeschi, 2007; *AI's Half Century: On the Thresholds of the Dartmouth Conference*, 2006).

AI with significant applications in healthcare began to develop in the 1970s (Miller et al., 1982). In 1971, INTERNIST-1, the world's first artificial medical consultant, was created; it used a search algorithm to determine diagnoses based on patients' symptoms (Hirani et al., 2024). The development of AI in healthcare has experienced rapid growth since 1993, with the most significant increase in scientific productivity occurring between 2019 and 2023. Initial research hotspots focused on neuroclinical medicine, which was key for medical imaging examinations, disease diagnosis, and personalized recommendations (Xie et al., 2025).

The modern era of artificial intelligence began in the early 21st century and brought significant advances in its use in healthcare as well as in everyday life. Interest between 2012 and 2022 gradually grew in decision support systems and medical record management (Xie et al., 2025). In 2007, IBM developed the Watson system, which used DeepQA technology for data analysis and question answering, and it found applications in medicine (Ferrucci et al., 2013; Mintz & Brodie, 2019). Another application was PharmBot (2015), which provided patients and their families with information about treatments and medications (Hirani et al., 2024).

However, current trends are strongly influenced by the third wave of AI development and the emergence of generative AI (Xie et al., 2025). One of the greatest achievements in chemistry was the development of AlphaFold2, which was awarded the Nobel Prize in Chemistry in 2024 (Nobel Prize Outreach, 2024). It solved a 50-year-old problem in biochemistry and medicine by being able to predict the three-dimensional structure of proteins directly from their amino acid sequences with unprecedented accuracy (Ille et al., 2025). Before this discovery, only about 170,000 structures were known, whereas the AI database now contains over 200 million predicted protein structures, which play a key role in all living organisms (Nobel Prize Outreach, 2024).

Development of Artificial intelligence in the Field of Mental Health

The potential use of AI is not limited to the biological aspects of illness; it can also be applied to the analysis of psychological and sociological aspects (Hirani, 2024). Like most other fields, mental healthcare has been influenced by the revolution in digital technologies, particularly AI. The emergence of digital mental health as a subfield represents the integration of technology into healthcare practices. In this area, AI-based solutions have become an important factor contributing to positive outcomes in mental healthcare (Graham et al., 2019). AI is used in the field of mental health not only as a tool for support and intervention, but also for prediction, diagnosis, classification, and monitoring (Cruz-Gonzalez et al., 2025). For example, AI has the potential for real-time monitoring and early intervention in mental health by analyzing physiological and digital signals from wearables to detect stress or anxiety (Dehbozorgi et al., 2025).

In recent years, this field has undergone a paradigmatic shift, with technological advancements playing a key role in improving the accessibility, personalization, and effectiveness of interventions. The application of AI in supporting positive mental health is multifaceted. It includes the development of apps and websites that use chatbots and virtual assistants to provide immediate mental health support and active listening in times of crisis, as well as tools for identifying potential mental health problems (Thakkar et al., 2024).

Chatbots and virtual assistants based on artificial intelligence represent a groundbreaking shift toward accessible and immediate support. The usefulness of these AI applications is further enhanced by their ability to facilitate behavioral interventions and provide users with personalized strategies and exercises based on principles such as cognitive behavioral therapy (CBT). These digital tools have been shown to complement traditional therapeutic interventions by promoting continuous engagement between sessions through reminders and self-guided tasks. The customization and adaptability of these chatbots, tailored to individual user needs and preferences, improve user experience and engagement (Monteith et al., 2022; Gual-Montolio et al., 2022). As an example, a study conducted by Inkster et al. (2018) confirmed the significant effectiveness of the Wysa app, an AI-driven chatbot, in providing mental health support and alleviating depressive symptoms, especially among individuals who engaged with the app more frequently.

Despite promising trends in the application of AI in healthcare, its use in addiction field, although increasing, is still in the early stages of development. Most studies use supervised learning (Mak et al., 2019) and focus predominantly on prediction, especially through natural language processing and pattern recognition, rather than on real interventions or practical applications with clinical significance (Mak et al., 2019; Suva & Bhatia, 2024). Early applications of artificial intelligence in the field of addictions were manifested, for example, in predicting treatment outcomes for people with alcoholism, identifying drunk drivers, or detecting substance use among youth based on the analysis of their posts on social media (Suva & Bhatia, 2024). Lee et al. (2024) found that chatbots used in interventions for substance use (specifically

smoking, alcohol, or methamphetamine use) can effectively support the prevention, diagnosis, and treatment of addictions, but more evidence from high-quality studies is lacking. Chatbots in this field help by offering anonymity and reducing stigma, being available 24/7, providing personalized and relevant information, supporting cognitive and behavioral change without time and geographical barriers, and providing psychological support through empathetic and patient interactive guidance.

The field of AI has been identified as having considerable potential in supporting clinicians when working with problematic digital technology use (Andrade & Viñán-Ludeña, 2025). Suva and Bhatia (2024) highlight its potential for the early identification of addictions in the form of screening and relapse prevention, for example through monitoring digital activity, spending patterns, or gaming time. At the same time, in diagnostics, machine learning can process extensive multimodal behavioral data, such as app activity and sensor signals, in order to unveil subtle compulsive markers and intricate addiction patterns that frequently elude conventional self-assessment-based methods (Andrade & Viñán-Ludeña, 2025). Furthermore, treatment support through AI chatbots or virtual assistants could motivate users and help manage cravings or crisis situations (Suva & Bhatia, 2024). One example is the Chinese app StayFocused, which helps combat compulsive smartphone use by employing reflective prompts to encourage users to consider their urges to check their phones and, with the support of a chatbot, increases accountability, emotional support, and the ability to maintain behavioral change even after the end of the intervention (Li et al., 2024). Despite these ambitions, Suva and Bhatia (2024) point to a lack of research into the potential use of AI in the field of behavioral addictions, even though this area represents a rapidly growing public health problem.

However, the use of AI goes beyond psychology focused on individuals and also encompasses the sociological dimensions of illness, addressing the social determinants of health. In a study by Carroll et al. (2022), an AI model was developed to analyze a wide range of data, including patient demographics, medical history, and social determinants of health factors (e.g., housing stability, access to transportation, or nutrition). The model was able to predict the risk of hospital readmission by considering not only patients' medical histories but also factors such as their living conditions and social support systems.

Integration of the Human factor with Artificial intelligence

As shown, for example, by the findings of Palmer et al. (2025), the greatest benefit in the context of digital interventions in mental health lies in combining AI with human support. This reflects the concept of a sociotechnical system, in which humans and AI collaborate. A key challenge of this paradigm is the need to design work so that both components, the social and the technical, are jointly optimized to function effectively, safely, and sustainably (Appelbaum, 1997).

A study by Bienefeld et al. (2024) examined this optimization based on interviews with data scientists and a Delphi study involving physicians working in intensive care units. Both groups agreed that AI has potential for automating patient documentation. Regarding the analysis of clinical data, patient monitoring, and the prescribing of therapies and medications, both groups also agreed that AI can serve as a supportive tool in these areas, but that final decisions must remain with humans. There was broad consensus on the issue of patient interaction; both groups emphasized that AI must not replace human contact and empathy. Ideally, AI could help clinicians gain more time for patients by taking over administrative and data-related tasks or by assisting in preparation for interactions with more complex patients. However, they stressed that human contact and empathy cannot be replaced by machines.

In the context of interventions, Palmer et al. (2025) report that AI tools, such as conversational agents based on cognitive behavioral therapy principles, can effectively deliver structured content and reduce anxiety symptoms while requiring less therapist time. However, it is crucial to emphasize that technology alone is not sufficient – it may lack the ability to respond flexibly to individual needs, empathize with clients' situations, or ensure safety in crisis situations. The study clearly shows that the human factor remains indispensable despite the significant capabilities of technology. Human professionals provide expert oversight, regular feedback, and ensure ethical and safe practice. It is precisely the combination of the structured and scalable support offered by AI with human empathy and expertise that enables not only the expansion of access to care, but also the preservation of its quality and trustworthiness.

Benefits of AI

To briefly summarize the key benefits of AI that highlight the importance of integrating technology into healthcare and mental healthcare, it is essential to mention increased diagnostic accuracy, optimization of clinical processes, reduction of administrative burden, and the acceleration of new drug development. AI also brings benefits to public health, for example by predicting epidemics or identifying at-risk groups (Ellis, 2024; Freedman et al., 2025; Orhan, 2025).

In the mental health field, its use focuses primarily on the ability to analyze language, voice tone, facial expressions, or data from digital devices to detect early signs of psychological difficulties, monitor symptom development, and adapt interventions in real time. Mobile applications and wearable technologies further enable continuous and non-invasive monitoring, paving the way for more personalized and accessible care; this is considered a significant contribution of AI (Orhan, 2025). In the field of addiction, AI can identify the risk of developing substance use disorders early through big data analysis and pattern recognition, enabling personalized predictions. In treatment, AI can help address the shortage of addiction treatment professionals, especially in developing countries. AI also plays a significant role in relapse prevention, where geolocation-based systems alert users to trigger points, predictive models evaluate relapse risk based on treatment progress, and machine learning tools monitor digital or financial behavior in behavioral addictions and provide personalized feedback for early intervention (Suva & Bhatia, 2024).

An example of good practice is the study by De Russis et al. (2024), which explored mainstream chatbots (ChatGPT, Gemini, Bing Copilot, Claude) that support users' digital well-being. These chatbots are attributed with the ability to personalize interventions by tailoring them to specific problem situations. They can provide practical, immediately applicable measures or offer ongoing coaching. Some models also allow the adaptation of interaction styles while maintaining a clear and supportive tone that can foster a sense of friendliness and encouragement among users (De Russis et al., 2024).

At the same time, it has been shown that some AI agents are perceived by users as compassionate and attentive communication partners, and in some cases, the support provided by AI is even rated more positively than support from human counselors in real life (Kuhail et al., 2024; Ovsyannikova et al., 2025).

Risks of AI

The already mentioned mantra *"Move fast and break things"* suggests that such rapid development may pose challenges for regulation (Chesterman, 2021). The necessity of maintaining the human component when collaborating with AI is further underscored by the following risks. AI in healthcare faces a number of limitations, including substantial data demands, as predictive models require extensive and detailed records of doctor–patient interactions across diverse sociocultural settings, which places high demands on human resources (Suva & Bhatia, 2024). If AI algorithms are trained on limited data, they may reinforce existing inequalities and produce poorer outcomes for marginalized groups (Powell, 2025). A lack of transparency and interpretability is also a concern, as generative models can produce incorrect or fabricated information (so-called AI hallucinations). Integration into clinical practice is often difficult due to technical barriers and resistance from some professionals (Wubineh et al., 2024; Horowitz, 2022). Ethical issues related to privacy, data security, and legal liability are also crucial. A currently discussed risk is the dangerous trend of using generic chatbots directly as replacements for therapists, which may give users the impression that they are communicating with a professional. However, these systems lack clinical validation. Professional organizations, such as the American Psychological Association, warn about the potential risks to vulnerable groups and the need to implement regulatory measures (Abrams, 2025). Another challenge is that professionals also need to be sensitized to the need for AI in routine practice and must be provided with resources to update their knowledge and skills. Additionally, there remains a lack of pilot studies that would evaluate the feasibility, acceptability, and usability of AI applications in patients in real-world settings (Suva & Bhatia, 2024).

In the field of mental health, specific risks arise, including the handling of highly sensitive information, the possibility of false negatives or positives, the need for high accuracy and contextual correctness, and the trade-off between inclusivity and privacy protection. Without robust frameworks for consent, data security, and validation, there is a risk that the technology will not be safe or effective for use in clinical practice (Orhan, 2025). In addition to providing useful information, AI can also generate misleading content, a risk previously identified as "AI hallucinations". A study by Song et al. (2025) showed that hallucinations have a significantly negative impact on the evaluation of AI services, especially in crisis situations where they may endanger users' lives. The negative effect manifests as increased cognitive load and negative emotions. The study also confirmed that recommendations from a human expert can mitigate this effect.

With the widespread adoption of chatbots based on artificial intelligence, the frequency of everyday interactions with them for various purposes is naturally increasing. This has also brought about a newly emerging risk trend–chatbot addiction. These addictive behaviors can now be assessed using a newly developed 17-item scale created by Zhang et al. (2025).

Shevtsova et al. (2024) focused on the factors that influence trust in and acceptance of new AI applications in healthcare. The identified factors were grouped into 19 overarching categories divided into four domains: human factors (e.g., the institutions from which AI experts originate), technological factors (e.g., the explainability and transparency of processes and outcomes), ethical and legal factors (e.g., transparency in data use), and other factors (e.g., environmental impact). The results showed that 16 out of the 19 factors (84%) were rated highly relevant for building trust in and acceptance of AI in medicine. In contrast, patient demographic characteristics (age, gender, education) were considered to be of low significance. The authors further note that understanding key factors related to trust in AI can help developers and implementers of AI systems design strategies that enhance trust and support the adoption of these technologies in healthcare.

Future Research Directions

The use of artificial intelligence in healthcare and mental healthcare has already led to significant changes and holds considerable potential for the future. Future research in these areas is expected to focus on enhancing diagnostic accuracy and personalized medicine through multimodal systems that integrate data from various sources, including medical imaging, genomics, and wearable sensors. There is also substantial potential in the development of new drugs, predictive genomics, and the application of AI to target rare diseases (Panahi, 2025). Further progress is anticipated in strengthening public health, for example through real-time pandemic monitoring, analysis of environmental data, or identifying communities at risk of healthcare access inequities (Panahi & Ezzati, 2025a; Panahi & Amirloo, 2025b).

A key area is also the ethical implementation of AI, which includes developing algorithms, mitigating system biases, creating ethical frameworks, and ensuring equitable access to digital health technologies. The expansion of telemedicine and remote patient monitoring has the potential to be supported by AI-powered virtual assistants, wearable devices, and specialized mental health solutions (assistants for professionals, diagnostics, monitoring, treatment plans, etc.). Infrastructure strengthening will focus on leveraging cloud computing platforms and blockchain technology (Panahi, 2025). Finally, AI is

expected to play an increasing role in supporting the healthcare workforce—from training simulations and real-time clinical decision support to integrating data science into education (Omid & Shabnam, 2025). These directions point toward a more proactive, personalized, and equitable healthcare system capable of breaking down barriers and enhancing access to care (Panahi, 2025).

In connection with the widespread adoption of generative artificial intelligence models, there is growing scholarly interest in thoroughly evaluating their applicability in the field of addiction research and treatment. Assessing the effectiveness of these tools is considered essential for their responsible integration into the healthcare system (Tate et al., 2023).

In the Czech context, this direction is being pursued, for example, by the CZDEMOS4AI project (2024–2029), supported by the Technology Agency of the Czech Republic. Its aim is to develop a socially responsible multi-agent AI avatar that adheres to the principles of open democracy, value-based dialogue, and transparency. The project includes the development of several AI assistants for key societal domains—ranging from education, media, and security to law and mental health. The authors of this article are contributing to the development of a mental health assistant focused on supporting mental health and addiction care. This tool will be designed to assist with diagnostics and counseling related to risks in the digital environment, facilitating the subsequent identification of problematic behavior in online settings.

4 DISCUSSION

The integration of artificial intelligence (AI) into healthcare and mental healthcare represents a fundamental shift with the potential to significantly enhance diagnostic accuracy, support the personalization of treatment interventions, and improve the accessibility and overall quality of provided care (Sun et al., 2023). Given the dynamic development of these technologies, it is essential that professionals reflect their benefits and implement them responsibly in practice. This article provides a theoretical introduction to the use of AI in healthcare and mental healthcare. It offers an overview of key concepts to facilitate orientation within the topic and presents the general benefits and risks of AI tools in these areas, aiming to emphasize the importance of combining a human-centered approach with innovative technologies.

In healthcare and mental healthcare, the benefits of AI can be seen particularly in the use of mobile health applications and other portable technologies that enable continuous user monitoring, early symptom detection, and the adaptation of interventions. Significant potential is perceived in the development of chatbots and virtual assistants based on evidence-based practices, particularly in the field of mental healthcare. These tools may partially compensate for the shortage of professionals and services, for which demand continues to increase (Ellis, 2024; Freedman et al., 2025; Orhan, 2025).

For the responsible implementation of innovative technologies such as AI, it is necessary to understand the risks associated with these tools. Frequently mentioned areas requiring attention include the lack of transparency and interpretability of algorithms, which can negatively affect trust among professionals and users (Wubineh et al., 2024; Horowitz, 2022). Moreover, generative artificial intelligence models are prone to so-called AI hallucinations, the effects of which can be severe and even life-threatening for users (Song et al., 2025). The use of AI technologies in the field of mental health also raises questions regarding ethical use, privacy protection, and the risk of false-positive or false-negative results (Orhan, 2025).

Current literature suggests that while the benefits of AI in Healthcare and mental healthcare are undeniable, the risks associated with its implementation emphasize the importance of collaboration with the human factor, which remains irreplaceable (Palmer et al., 2025). Implementation is also limited by lack of evaluation, which should become one of the key directions for future research (Tate et al., 2023).

To address the limitations of this study, it is appropriate to mention that the review primarily relies on scholarly judgment. Unlike a systematic review or meta-analysis, this approach did not include a formal risk of bias assessment, potentially limiting the reproducibility of the selection process. Therefore, the findings represent a contextual synthesis rather than a quantitative summary of evidence.

With regard to further limitations, although sources published between 1982 and 2025 were included, due to the rapid development in this field, sources published between 2018 and 2025 were prioritized. A broad keyword search was used, however due to the dynamic nature of AI, some of the most recent or specialized development trends may not have been captured.

CONCLUSIONS

This narrative review offered a contextualized overview of the theoretical foundations and key trends associated with the integration of AI into mental healthcare, highlighting both its transformative potential and inherent risks.

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The findings confirm that AI-driven tools offer a viable solution for enhancing the accessibility and personalization of care, particularly through mobile and chatbot applications. However, the responsible advancement of the field crucially depends on overcoming current limitations in transparency, interpretability, and evaluation.

We conclude that the long-term success of AI in mental healthcare hinges on a human-centric implementation strategy that prioritizes ethical guidelines and guarantees the irreplaceable role of the human professional in clinical decision-making. Future regulatory efforts must focus on setting robust standards for algorithm validation and addressing the severe risks posed by generative models, such as AI hallucination.

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