

Integrating AI Chatbots with Cognitive Behavioral Therapy in Digital Mental Health Care

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Email: rajini.sms@vistas.ac.in**Abstract**

AI-powered chatbots have been proposed as a scalable, accessible, and cost-effective means of providing Cognitive Behavioral Therapy (CBT) interventions within mental health settings. This study examined the effect of AI-based chatbots on CBT outcomes in digital mental health, specifically regarding the level of symptom reduction of depression, anxiety, and stress. By using NLP and machine learning, AI chatbots provide personalized therapeutic interactions that guide the user through important CBT techniques, such as cognitive restructuring, behavioral activation, and mindfulness. This paper highlights the most important benefits: real-time intervention, user engagement, and adaptation to individual emotional needs. Notable limitations of this technology are ethical concerns, data privacy issues, and a lack of human empathy in responses. The evidence shows that AI chatbots enhance mental health accessibility and support considerably, especially for people with mild to moderate psychological distress. Further research is necessary to optimize the effectiveness of such interventions, ensuring ethical implementation and integration with the traditional therapy model. The paper concludes with suggestions for improving AI chatbot-assisted CBT to enhance digital mental health care.

Keywords— AI Chatbots, Cognitive Behavioral Therapy (CBT), Digital Mental Health, Symptom Reduction, Machine Learning (ML).

1. Introduction

Various applications hold promise in the transformation of mental health with artificial intelligence. The potential of AI to evaluate huge electronic health records, brain imaging data or social media data with very high precision for foreseeability, classification, and subgrouping of mental illnesses (Graham et al., 2019; Lee et al., 2021). Machine learning algorithms recognize specific patterns and manifestations into which those manifestations need to be positioned early for intervention and personalization of the treatment strategy of the patients (Shimada, 2023). AI-enabled chatbots provide users with instant counseling, and easy access to therapy, with the potential of bridging the gap in the number of available mental health service providers (Shimada, 2023; Boucher et al., 2021). They may also play an important role in the process of diagnosis, screening, symptom management, and content delivery from digitalized mental health intervention programs (Boucher et al., 2021). There is an enormous space for objective identification of mental disorders in AI, as well as for increasing access to care; however, some ethical issues exist about privacy, bias, and transparency (Lee et al., 2021; Shimada, 2023). Cognitive Behavioral Therapy is one of the main effective methods of therapy that can be used in managing a variety of mental health conditions—mostly depression and anxiety disorders and stress. The aim is to recognize negative thought processes and behavior, contest them, and replace them with healthier cognitive responses and behaviors. The research and application on actual clinical practices are quite vast, and it has a great body of evidence supporting its efficaciousness across a wide range of conditions (Beck, 2011).

The strength of this cognitive-behavior therapy (CBT) lies in providing self-management skills for disturbing emotionalities and dysfunctional thoughts in anxiety disorders, depression, and stress-related disorders (Hofmann et al., 2012). A classic session of CBT between a therapist and a patient usually involves helping the patient identify cognitive distortion and develop problem-solving strategies. Nevertheless, some limitations brought about unavailability of skilled professionals, the time constraint, and cost often inhibit individuals from reaching CBT in its conventional format (Cuijpers et al., 2016). This is where AI-based solutions can fill and open up CBT for the rest of the population. Cognitive Behavioral Therapy (CBT) is regarded as one of the most efficacious therapeutic methods for a variety of mental health disorders, such as depression, anxiety, and stress. CBT is rooted in recognizing and replacing negative cognitive patterns and maladaptive behaviors with more adaptive cognitive and behavioral responses. This concept has been used in clinical fields examined with powerful accumulation of studies as evidences across majority of illnesses (Beck, 2011). CBT is highly effective at treating anxiety disorders, depression, and stress-related syndromes as it allows individuals to equip themselves with tools to manage debilitating emotions and maladaptive cognitions (Hofmann et al., 2012).

In a conventional CBT session, the therapist would assist the client in identifying cognitive distortions and creating problem-solving techniques. However, limitations such as no easy access to effective practitioners for everyone, time requirement, and monetary issues prevent one from obtaining CBT services in a conventional clinic (Cuijpers et al., 2016). Which opens the door for AI based interventions to come in and spread CBT to a larger audience.

Significance of Exploring AI Chatbots in Mental Health Care

AI chatbots are considered one of the best solutions to the soaring demand for mental health services, especially in under-resourced settings. Accessibility and cost-effectiveness are the key advantages of integrating AI chatbots into the mental health care system on a scalable level. These AI chatbots deliver round the clock support, thus means people can ask for therapeutic interventions for whichever hour feasible and can really help where a regular system of therapy isn't available or accessible. Advances in AI technology now permit the creation of chatbots which can mimic interactions that could offer therapeutic benefit. Such chatbots can give individuals a wide variety of interventions related to CBT principles (Fitzpatrick et al., 2017). AI chatbots can present real-time, individually tailored therapeutic dialogue, support an individual through crisis, and continue to remind that individual of ways to cope developed through CBT by processing human language with NLP and ML. Besides, the chatbots eliminate stigma because a person can discreetly communicate without feeling judged while asking for mental health help (Liu et al., 2020).

2. Research Objectives

1. To explore the potential benefits in exploring how AI chatbots can offer personalized, real-time CBT interventions, including cognitive restructuring and mindfulness.
2. Accessibility and scalability in exploring the role of AI chatbots in overcoming cost, geography, and resource-based barriers in mental health care.
3. Difficulty as well as ethical dilemma in handling limitations and ethical concerns about data privacy and human-centered ethical concerns related to the use of AI chatbots.
4. To propose future research directions while suggesting strategies to improve the effectiveness of AI chatbots and integrate them into traditional therapy models for better mental health outcomes.

3. Theoretical Framework**Cognitive Behavioral Therapy (CBT): Principles and Therapeutic Techniques**

CBT is considered a highly investigated and evidence-based psychotherapeutic technique, particularly concerning the relevance of cognition that can lead an individual to such emotional and behavioral responses (Beck, 1976). According to Beck (1976), the cornerstone of CBT is that these maladaptive thought processes contribute towards psychological distresses and by means of modification or changing such cognitions, psychological distress is substituted by emotional behavioral improvements (David et al., 2018). CBT is structured, goal-oriented, and based on the collaboration between therapist and client, making it a highly effective intervention for mental health disorders such as depression, anxiety, PTSD, and OCD (Hofmann et al., 2012). Its effectiveness is supported by numerous meta-analyses demonstrating significant symptom reduction across diverse populations and mental health conditions (Cuijpers et al., 2016).

The primary techniques in CBT are cognitive restructuring, behavioral activation, and mindfulness-based interventions. Cognitive restructuring entails the identification, challenging, and replacing of irrational thoughts with balanced and adaptive thought patterns (Burns, 1980). They become capable of distinguishing and replacing maladaptive cognitive distortions like catastrophizing, overgeneralization, and black-and-white thinking with evidence-based perceptions (Ellis, 1991). The other crucial ingredient of CBT is behavioral activation, aimed at increasing involvement in rewarding and meaningful activities that act as antidotes to avoidances typical in depression (Jacobson et al., 1996). It has been found that while standardized behavioral activation strategies improve both mood and motivation, the improvements tend to be on par with even pharmacological treatments (Dimidjian et al., 2006). In addition, the mindfulness-based techniques, such as MBCT, incorporate present-moment awareness, which enables individuals to disengage from automatic negative thought cycles (Segal et al., 2002). Findings suggest that mindfulness improves emotional regulation and increases the rates of recovery in recurrence depression (Kabat-Zinn, 1990; Hayes et al., 2006).

Table 1: Principles and Therapeutic Techniques of Cognitive Behavioral Therapy (CBT)

Principles & Techniques	Description	Key References
Core Principle of CBT	Maladaptive thought processes contribute to psychological distress, and modifying these cognitions leads to emotional and behavioral improvements.	Beck (1976), David et al. (2018)
Structure & Effectiveness	CBT is structured, goal-oriented, and based on therapist-client collaboration. Effective for depression, anxiety, PTSD, OCD, and more. Supported by meta-analyses.	Hofmann et al. (2012), Cuijpers et al. (2016)

Cognitive Restructuring	Identifying, challenging, and replacing irrational thoughts with balanced, evidence-based perceptions. Helps in managing cognitive distortions like catastrophizing, overgeneralization, and black-and-white thinking.	Burns (1980), Ellis (1991)
Behavioral Activation	Encourages participation in rewarding and meaningful activities to counteract avoidance behaviors in depression. Comparable in effectiveness to pharmacological treatments.	Jacobson et al. (1996), Dimidjian et al. (2006)
Mindfulness-Based Interventions	Techniques like MBCT focus on present-moment awareness, reducing automatic negative thought cycles. Enhances emotional regulation and recovery from recurrent depression.	Segal et al. (2002), Kabat-Zinn (1990), Hayes et al. (2006)

AI and Machine Learning Technologies in CBT

The expansion of AI and ML revolutionized mental health care by opening access to evidence-based interventions, such as CBT. Digital applications of mental health through NLP, a subset of AI, process, analyze, and respond to human languages, thereby supporting both automated and interactive therapy experiences (Miner et al., 2016). AI-driven tools, such as chatbots like Woebot and Wysa, mimic therapeutic conversations through NLP that recognizes emotional cues and delivers personalized responses in accordance with the principles of CBT (Fitzpatrick et al., 2017). Such tools employ sentiment analysis to determine mood patterns, monitor the shifts in emotions over time, and adjust therapeutic interventions accordingly (Gaffney et al., 2019).

Further, AI allows for massive-scale mental health assessment by text and vocal biomarkers indicative of psychological states that could lead to early diagnosis and intervention (Kumar et al., 2022). Despite these advancements, ethical considerations such as data privacy, algorithmic bias, and the limitations of AI in handling complex emotional nuances must be addressed to ensure responsible implementation (Luxton, 2014). These chatbots can be deployed in diagnostics, screening, management of symptoms, and content in digital mental health interventions (Boucher et al., 2021). This promises AI, an objective agent of change toward revolutionizing the field of mental illnesses, although access to healthcare would be boosted with several questions about privacy, bias, and transparency remaining and yet to be answered (Lee et al., 2021; Shimada, 2023).

Machine learning algorithms enhance CBT interventions by personalizing treatment approaches based on user data. AI-driven platforms can analyze behavioral patterns, predict mental health outcomes, and suggest personalized therapeutic exercises to improve engagement and adherence (Torous et al., 2021). For example, AI-powered mobile applications use ML models to identify early signs of distress and provide real-time interventions, improving symptom management for individuals with anxiety and depression (Larsen et al., 2019). Additionally, AI facilitates large-scale mental health assessments by analyzing textual and vocal biomarkers indicative of psychological states, allowing for early diagnosis and intervention (Kumar et al., 2022). Despite these advancements, ethical considerations such as data privacy, algorithmic bias, and the limitations of AI in handling complex emotional nuances must be addressed to ensure responsible implementation (Luxton, 2014).

Table 2: The Role of AI and Machine Learning in Mental Health Care

Aspect	Description	Key References
AI and NLP in Mental Health	AI-powered Natural Language Processing (NLP) applications process and analyze human language to support interactive and automated therapy experiences.	Miner et al. (2016)
Chatbots in CBT	AI-driven chatbots like Woebot and Wysa simulate therapeutic conversations using NLP, recognizing emotional cues and delivering personalized responses based on CBT principles.	Fitzpatrick et al. (2017)
Sentiment Analysis & Mood Monitoring	AI tools analyze mood patterns, monitor emotional shifts over time, and adjust interventions accordingly.	Gaffney et al. (2019)
AI in Mental Health Assessment	AI enables large-scale assessments using textual and vocal biomarkers to detect psychological states, facilitating early diagnosis and intervention.	Kumar et al. (2022)
Ethical Considerations	Data privacy, algorithmic bias, and AI limitations in understanding complex emotional nuances must be addressed for responsible implementation.	Luxton (2014)
AI in Digital Mental Health Interventions	Chatbots aid in diagnostics, screening, symptom management, and therapeutic content delivery in digital mental health platforms.	Boucher et al. (2021)
ML in Personalizing CBT	Machine learning algorithms analyze user data to personalize CBT interventions, improving engagement and adherence.	Torous et al. (2021)
Predicting Mental Health Outcomes	AI-powered platforms analyze behavioral patterns, predict mental health risks, and suggest personalized therapeutic exercises.	Larsen et al. (2019)
Challenges & Future Considerations	AI promises enhanced mental health care access, but concerns about privacy, bias, and transparency require further exploration.	Lee et al. (2021); Shimada (2023)

Synergy Between AI-Driven Tools and CBT

The integration of AI-driven tools with established therapeutic models such as CBT will therefore provide an effective synergy of access, efficiency, and scalability for mental health interventions. The continuous, on-demand support AI-powered CBT provides helps individuals bridge the gap, as the need for access to in-person therapy may often be hindered by geographical, financial, or logistical barriers (Andersson et al., 2019). The use of AI-assisted therapy can be seen as complementary to traditional CBT because it provides automated psychoeducation, self-monitoring tools, and interactive interventions that help reinforce treatment strategies outside the session (Kazdin & Blase, 2011). A distinct strength of AI-augmented CBT is the possibility of highly personalized interventions.

This is quite different from traditional CBT, which is usually applied in a standardized therapeutic framework. The AI-driven system uses real-time data analysis in adapting treatment plans according to the progress and feedback of the individual (Wright et al., 2019). This is the level of personalization which raises the level of engagement and adherence of the users, which results in healthier treatment outcomes (Richards et al. 2018). Furthermore, AI tools help human therapists bypass some administrative work by reminding them of session summaries and progress but will allow clinicians to focus on complex therapeutic interactions that require a human touch (Bickmore et al., 2016). However, it is of concern that AI may further promote the depersonalization of therapy, misinterpret cues of emotionality, and reduce human empathy when communicating with patients during therapy (Schueller et al., 2021). To achieve this, future studies should be done on hybrid models that merge AI-driven interventions with human-led therapy, making sure that the advancements in technology augment rather than supplant the therapeutic relationship (Henson et al., 2020).

Table 3: Integration of AI with Cognitive Behavioral Therapy (CBT)

Aspect	Description	Key References
Synergy of AI and CBT	AI-driven tools enhance access, efficiency, and scalability of CBT interventions, addressing geographical, financial, and logistical barriers.	Andersson et al. (2019)
AI as a Complement to Traditional CBT	AI-assisted therapy supports CBT through automated psychoeducation, self-monitoring tools, and interactive interventions that reinforce treatment strategies.	Kazdin & Blase (2011)
Personalized Interventions	AI enables real-time data analysis to adapt treatment plans according to individual progress and feedback, enhancing user engagement and adherence.	Wright et al. (2019); Richards et al. (2018)
AI in Therapist Support	AI tools assist therapists by summarizing sessions and tracking patient progress, reducing administrative workload and allowing a focus on complex therapeutic interactions.	Bickmore et al. (2016)
Concerns About AI in Therapy	AI may contribute to therapy depersonalization, misinterpret emotional cues, and reduce human empathy in therapeutic communication.	Schueller et al. (2021)
Future Directions	Hybrid AI-human models should be explored to ensure AI enhances rather than replaces the therapeutic relationship.	Henson et al. (2020)

4. Conceptualization of AI Chatbots in CBT

Overview of AI Chatbots: Definitions, Capabilities, and Functions

AI chatbots are artificially intelligent, conversational agents that deliver human-like interaction and, through text or voice communication, give real-time responses. Chatbots use natural language processing (NLP) and ML to process the inputs of a user, which further infers their emotions, and then responds based on the context (Fitzpatrick et al., 2017; Shum et al., 2018). These chatbots use NLP and ML techniques to interpret users' inputs and analyze their emotional states in providing contextually accurate responses (Fitzpatrick et al., 2017). In mental healthcare, AI-powered chatbots assume different roles including psychoeducation provision, delivery of structured therapeutic treatments, and also emotional support interventions (Gaffney et al., 2019). These chatbots utilize NLP and ML methods in the interpretation of user inputs to analyze their emotional states in order to provide contextually accurate responses (Fitzpatrick et al., 2017). In mental healthcare, AI-powered chatbots play different roles such as providing psychoeducation, delivering structured therapeutic treatments, and also

offering emotional support interventions (Gaffney et al., 2019). Unlike the typical therapy approach, chatbots run around-the-clock, and hence, they offer continuous access 24/7 and can be very helpful for people under geographical, financial, or social restrictions, where access to mental health professionals is limited (Torous et al., 2021). Some examples of AI-based mental health chatbots are Woebot, Wysa, and Replika, which use varying mechanisms to enact AI in the direction of psychological well-being and support evidence-based therapies like CBT (Darcy et al., 2020).

Table 4: Role of AI Chatbots in Mental Healthcare

Aspect	Description	Key References
Definition of AI Chatbots	AI-powered conversational agents that provide human-like interaction via text or voice communication.	Fitzpatrick et al. (2017); Shum et al. (2018)
NLP and ML Integration	AI chatbots use NLP and ML to process user inputs, infer emotions, and deliver contextually accurate responses.	Fitzpatrick et al. (2017)
Roles in Mental Healthcare	AI chatbots assist in psychoeducation, structured therapeutic treatments, and emotional support interventions.	Gaffney et al. (2019)
24/7 Accessibility	Unlike traditional therapy, chatbots provide continuous access, beneficial for individuals facing geographical, financial, or social barriers.	Torous et al. (2021)
Examples of AI Chatbots	Woebot, Wysa, and Replika utilize AI to support psychological well-being and evidence-based therapies like CBT.	Darcy et al. (2020)

Mechanisms of AI Chatbots in Delivering CBT

AI chatbots use NLP and ML algorithms to provide CBT interventions in the form of identifying cognitive distortions, steering users through exercises, and observing mood patterns over time (Miner et al., 2016). Through NLP, chatbots understand linguistic nuances and detect emotional cues, generating appropriate responses based on CBT principles (Bendig et al., 2019). Machine learning models enhance the capabilities of chatbots by processing user engagement data and adjusting therapeutic recommendations based on the progress of individuals (Larsen et al., 2019). Other chatbots utilize sentiment analysis to analyze the emotional tone of the text input, thereby offering tailored feedback or crisis intervention when appropriate (Fiske et al., 2019). Reinforcement learning techniques further enhance the adaptability of a chatbot by learning from previous user interactions and allowing for more personalized conversations (Kumar et al., 2022). Moreover, reinforcement learning methods have improved chatbot flexibility, with the ability to hold more tailored conversations by learning from past interactions with users (Kumar et al., 2022). Together, these AI approaches support the provision of interactive and adaptive CBT, simulating a human therapist to some extent as scalable and efficient (Richards et al., 2018).

Table 5: AI Chatbots in Cognitive Behavioral Therapy (CBT) Interventions

Aspect	Description	Key References
CBT Intervention Delivery	AI chatbots use NLP and ML algorithms to identify cognitive distortions, guide users through exercises, and track mood patterns over time.	Miner et al. (2016)
Linguistic Analysis	NLP enables chatbots to understand linguistic nuances and detect emotional cues, generating CBT-based responses.	Bendig et al. (2019)
User Progress Adaptation	Machine learning models analyze user engagement data and adjust therapeutic recommendations accordingly.	Larsen et al. (2019)
Sentiment Analysis	Chatbots assess the emotional tone of text inputs to provide tailored feedback or crisis intervention when necessary.	Fiske et al. (2019)
Reinforcement Learning	Enhances chatbot adaptability by learning from past interactions to create more personalized therapeutic conversations.	Kumar et al. (2022)
Scalability and Efficiency	AI-powered chatbots simulate human therapists to some extent, making CBT interventions more scalable and efficient.	Richards et al. (2018)

Conceptual Analysis of Chatbot-Guided CBT Techniques in a Digital Environment

AI chatbots act as digital therapists by leading users through evidence-based, structured techniques of CBT, including cognitive restructuring, behavioral activation, and mindfulness training (Andersson et al., 2019). Cognitive restructuring involves challenging negative thought patterns through the presentation of alternative scenarios and other forms of evidence-based reasoning to the user (Fitzpatrick et al., 2017). Reminders from the chatbot and scheduling of activities support behavioral activation that encourages user participation in pleasurable activities that overcome depressive states (Kazdin & Blase, 2011). Mindfulness techniques are integrated through guided meditation exercises, stress-reduction prompts, and reflective journaling features, helping to promote emotional regulation and self-awareness (Luxton, 2014). However, AI chatbots do not match the depth of human therapists' understanding of complex emotions and non-verbal cues, which might limit their application in treating more severe mental health conditions (Schueller et al., 2021). But, for less serious to moderate levels of psychological distress, chatbot-guided CBT is helpful as an adjunct or even a replacement to conventional therapy and makes mental health accessible and more engaging (Wright et al., 2019).

Table 6: AI Chatbots as Digital Therapists in CBT

CBT Technique	Description	Key References
Cognitive Restructuring	AI chatbots challenge negative thought patterns by presenting alternative perspectives and evidence-based reasoning.	Andersson et al. (2019), Fitzpatrick et al. (2017)
Behavioral Activation	Chatbots provide reminders and schedule activities to encourage user participation in pleasurable activities that counteract depressive states.	Kazdin & Blase (2011)
Mindfulness Training	Chatbots integrate guided meditation, stress-reduction prompts, and reflective journaling to enhance emotional regulation and self-awareness.	Luxton (2014)
Limitations	AI chatbots lack the depth of human therapists in understanding complex emotions and non-verbal cues, limiting their effectiveness for severe mental health conditions.	Schueller et al. (2021)
Effectiveness	Chatbot-guided CBT is beneficial for mild to moderate psychological distress, serving as an adjunct or alternative to conventional therapy.	Wright et al. (2019)

User-Centered Design in AI Chatbots: Adapting to Emotional Needs and Ensuring Engagement

The success of AI chatbots in CBT is determined by their adaptability to users' emotional needs and maintaining user engagement through a user-centered design approach (Bickmore et al., 2016). Personalization is one of the most important aspects of user engagement, where AI-driven chatbots adapt interactions according to individual preferences, mental health history, and real-time emotional states (Berry et al., 2020). Using an adaptive response, such as an empathetic form of language model and reinforcement learning, chatbots can build rapport and establish user connection (Pereira & Diaz, 2019). In addition, chatbots implement gamification practices like tracking progress, rewarding achievements, and engaging exercises that increase motivation and adherence to CBT-based interventions (Lattie et al., 2019). There are also ethical issues: data privacy, algorithmic transparency, and the risk of over-reliance on AI for care in mental health, which needs to be addressed to maintain trust and safety with the users (Luxton, 2014). Finally, designing AI chatbots that emphasize emotional intelligence, adaptability, and ethical responsibility can be the best strategy to optimize the effectiveness of AI chatbots in digital therapeutic interventions for mental health care (Torous et al., 2021).

Table 7: Key Factors in the Success of AI Chatbots in CBT

Key Factor	Description	Key References
Personalization	AI chatbots adapt interactions based on user preferences, mental health history, and real-time emotional states.	Berry et al. (2020)
Adaptive Responses	Chatbots use empathetic language models and reinforcement learning to build rapport and establish user connection.	Pereira & Diaz (2019)
Gamification	Incorporates progress tracking, achievement rewards, and engaging exercises to enhance motivation and adherence.	Lattie et al. (2019)
Ethical Considerations	Issues include data privacy, algorithmic transparency, and the risk of over-reliance on AI for mental health care.	Luxton (2014)
Optimized Design	AI chatbots should emphasize emotional intelligence, adaptability, and ethical responsibility for effective mental health interventions.	Torous et al. (2021)

5. Benefits of AI Chatbots in Digital Mental Health

Real-Time Therapeutic Intervention: Immediate Access to Mental Health Support: One of the most valuable benefits of AI chatbots in digital mental health is immediate therapeutic intervention. AI chatbots don't require scheduled appointments and have waiting hours until they are available to a patient, whereas traditional therapy would require such services (Torous et al., 2021). These chatbots use Natural Language Processing (NLP) and sentiment analysis to detect distress signals in user input, provide immediate coping strategies, **crisis interventions, or referrals to professional help when needed (Fitzpatrick et al., 2017).** For people who are anxious, depressed, or stressed, real-time interventions can de-escalate negative emotions before they get worse (Gaffney et al., 2019). In addition, chatbots can offer 24/7 support, responding to the increasing demand for on-demand mental health services and giving users a sense of security knowing they have constant access to help (Larsen et al., 2019).

Increased User Engagement: The Role of Interactivity and Personalization: AI chatbots augment user interaction with mental health treatment by incorporating the elements of interactivity and personalization in treatment. As gain static self-help resources, AI chatbots establish dynamic conversational experiences, hence keeping the user engaged and motivated to continue their therapy (Bendig et al., 2019).

In addition to these strategies, gamification techniques like progress tracking, goal-setting, and providing incentives further enhance motivation and adherence to therapy (Lattie et al., 2019). Compared to traditional online interventions, completion rates are higher when feedback and interactive elements are provided in AI-driven therapy platforms, making the users feel a sense of connection with digital interventions (Berry et al., 2020). Moreover, chatbots give consistent positive reinforcement and reminders, keeping users committed to their mental health goals without forcing or judging them (Kazdin & Blase, 2011).

Accessibility and Scalability: Reaching Underserved Populations: With the capacity of AI chatbots to remove historical barriers to care through cost, stigma, and geographical limitations (Andersson et al., 2019), these technology-delivered mental health support systems are able to reach underserved populations. Several people, especially in rural or low-income areas, do not have access to mental health clinicians due to limited availability of professionals or money constraints to see them (Torous et al., 2021). This gap is filled by AI chatbots in that they provide evidence-based mental health interventions via smartphones, among other digital devices, to ensure that those who might otherwise not receive treatment get help (Bickmore et al., 2016). Additionally, chatbots minimize the stigma associated with seeking therapy because the user can communicate with them in private and anonymity without fear of judgment (Berry et al., 2020). AI chatbots can support thousands of users at a time due to their scalability, thus becoming a possible solution for mass mental health crises or disaster relief scenarios where human therapists may not be available (Fiske et al., 2019).

Cost-Effectiveness: Reducing Expenses While Maintaining Quality Care: AI-powered chatbots are cheaper compared to the conventional therapy treatment as they cut the cost burden from mental health treatment while still delivering quality care (Kazdin & Blase, 2011). Conventional psychotherapy involves a significant cost: large sums of money for face-to-face sessions and lack of support of insurance coverage for in-person mental health services (Luxton, 2014). In contrast, AI-driven chatbots offer solutions at a fraction of the cost and provide scalability while requiring minimal human intervention to deliver evidence-based therapy (Richards et al., 2018). Employers, health care systems, and insurance organizations are adopting more AI chatbots in mental health programs for low cost and efficient improvement in worker well-being and productivity (Lattie et al., 2019). In addition, research indicates that AI chatbots can serve as an effective first-line intervention for individuals who suffer from mild to moderate psychological distress, thereby reducing the requirement of expensive face-to-face therapy and allowing human therapists to focus on more severe cases (Schueller et al., 2021). Although AI chatbots cannot be a complete substitute for human therapists, they pose an impressively efficient and low-cost solution toward the wider scope of accessibility offered by mental healthcare.

Table 8: Benefits of AI Chatbots in Digital Mental Health

Benefit	Description	Key References
Real-Time Therapeutic Intervention	AI chatbots provide immediate mental health support without scheduled appointments, using NLP and sentiment analysis to detect distress signals and offer coping strategies or crisis intervention.	Torous et al. (2021), Fitzpatrick et al. (2017), Gaffney et al. (2019), Larsen et al. (2019)
Increased User Engagement	AI chatbots enhance user motivation through interactivity, personalization, gamification (e.g., progress tracking, goal-setting), and consistent positive reinforcement.	Bendig et al. (2019), Lattie et al. (2019), Berry et al. (2020), Kazdin & Blase (2011)
Accessibility and Scalability	AI chatbots overcome cost, stigma, and geographical barriers, making mental health support available to underserved populations and scaling to support thousands of users simultaneously.	Andersson et al. (2019), Torous et al. (2021), Bickmore et al. (2016), Berry et al. (2020), Fiske et al. (2019)
Cost-Effectiveness	AI-driven chatbots reduce therapy expenses while maintaining quality care, serving as a first-line intervention for mild to moderate distress and allowing human therapists to focus on severe cases.	Kazdin & Blase (2011), Luxton (2014), Richards et al. (2018), Lattie et al. (2019), Schueller et al. (2021)

6. Ethical Considerations and Limitations

Ethical Dilemmas in AI-Based Mental Health Care: Concerns Related to Consent, Privacy, and Autonomy: With the integration of AI in mental health care, various ethical dilemmas arise, with informed consent being one of them, alongside concerns for user privacy and patient autonomy. Unlike therapy, which receives explicit informed consent through direct face-to-face encounters with a human clinician, AI-driven interventions are characterized by complex terms of service that many users do not understand (Luxton, 2014). Many users that interact with mental health chatbots may not fully understand how their data is being collected, stored, and used; this raises questions over transparency and user rights (Fiske et al., 2019). The autonomy of patients has also been questioned in AI-based interventions because the use of predictive algorithms by the chatbots suggests therapeutic strategies, which may influence the users' decision-making processes without necessarily being in the best interest of such patients (Burr et al., 2020). Ethical frameworks for AI-driven mental health interventions must therefore ensure that users are fully aware of the capabilities and limitations of AI, enabling them to make conscious, informed choices in their care (Richards et al., 2018).

Data Privacy and Security: Challenges in Protecting Sensitive Personal Information: One of the concerns, among the most in AI-driven mental health interventions, is the issue of data privacy, as users often share very sensitive personal information during interactions with a chatbot (Torous et al., 2021). Although technical methods involving encryption and anonymization can increase security over data, there always remains the likelihood of cyberattacks or accidental data breaches (Lattie et al., 2019). Many AI-based mental health tools are also unclear on the regulatory framework under which they operate, causing inconsistencies in the management of data across different platforms and jurisdictions (Mittelstadt, 2019). Users may unwittingly agree to data-sharing policies that allow third parties to have access, an ethical issue because it commodifies data and puts users at the risk of being exploited (D'Alfonso et al., 2017). Addressing these issues of privacy demands strict regulations, robust cybersecurity, and clear policies that prioritize the confidentiality of the user and data protection in digital mental health care.

Lack of Human Empathy: Conceptualizing AI's Limitations in Replicating Emotional Depth: Despite the tremendous improvement in AI technology, chatbots and other forms of digital therapy are still limited in their capabilities to be even remotely like a human when it comes to being empathetic and understanding (Schueller et al., 2021). NLP provides the basis through which a chatbot can determine emotional cues based on text-to-text communication but cannot genuinely grasp human emotions and respond compassionately or read more subtle non-verbal signals like facial expressions or tone of voice (Bendig et al., 2019). This limitation can also affect the therapeutic alliance, that is the feeling of rapport and trust between a patient and a therapist - this is a crucial predictor of the outcomes of therapy (Kazdin & Blase, 2011). Moreover, pre-programmed responses, though helpful to AI chatbots, may feel impersonal or repetitive, possibly leading to user frustration or disengagement (Berry et al., 2020). Moreover, those with extreme psychological distress or in a crisis may need deep emotional validation and specific human support that AI-driven systems cannot offer (Fiske et al., 2019). Though AI can be used to complement traditional therapy, it is not a substitute for the rich empathetic engagement provided by human therapists.

Potential Risks: Dependency on Technology, Misinterpretation of Responses, and Barriers for Vulnerable Populations: The increasing dependency on AI-based mental health applications poses several threats, such as over-reliance on technology, misinterpretation of the responses generated by chatbots, and accessibility limitations for specific groups. Users who become overly reliant on chatbots for emotional support may avoid receiving human-led therapy, which can limit their contact with more intensive mental health treatment (Luxton, 2014). Moreover, though AI chatbots are programmed to give automated therapeutic guidance, sometimes people misinterpret the outcomes as failing or even possibly harmful (D'Alfonso et al., 2017). There has been a concern that chatbots may often provide generalized or inappropriate advice that fails to adequately address the specific emotional needs of users, especially in a sensitive or high-risk case such as suicidal ideation (Torous et al., 2021). Moreover, many AI-driven mental health applications require people to have access to the internet and be digitally literate. That creates a challenge for older adults, low-income individuals, and people with disabilities, who might face significant difficulties with technology (Mittelstadt, 2019). That is why counterbalancing these risks requires combining AI with human oversight, ensuring that algorithmic errors remain within predetermined limits, and holding those digital mental health solutions nondiscriminatory and equitable.

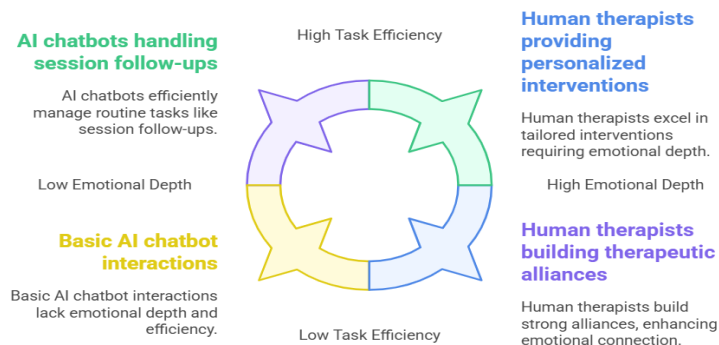
Conceptual Models and Integration with Traditional Therapy

The complementary integration of AI chatbots in traditional therapeutic models, such as face-to-face CBT, will take the form of enhancement of human-led intervention rather than replacement. Integration based on a conceptual framework with a stepped-care model is provided by offering different levels of intervention according to individual needs (Kazdin & Blase, 2011). This model allows AI chatbots to provide the first level of support with psychoeducation, mood tracking, and self-guided CBT exercises while intensive therapy is maintained for those that require human input (Andersson et al., 2019).

AI-driven interventions are especially beneficial in early stages of mental health conditions, prevention of relapse, and after-therapy follow-ups, providing for the continuation of care outside clinical settings (Torous et al., 2021). Routine components of CBT such as cognitive restructuring activities, journaling prompts, and progress monitoring can be accomplished using AI chatbots so that the therapist is able to engage more deeply with issues of psychological complexity requiring nuanced human judgment and empathy (Richards et al., 2018).

The Role of Human Therapists: AI Chatbots as a Supplement, Not a Replacement: While AI chatbots can offer much-needed mental health support, they certainly cannot substitute human therapists, for without emotional depth and subtle grasp of understanding and interpreting non-verbal cues (Schueller et al., 2021). Human therapists administer assessments that are complexly diagnostic and build well-structured therapeutic relationships. They provide interventions that are tailored to the individual considering cultural, social, and personal contexts, a function that AI systems cannot perfectly mimic (Kazdin & Blase, 2011). But AI chatbots can complement human therapy by handling tasks that take time, like psychoeducation, follow-up of sessions, and monitoring of behavior. This allows the therapist to focus more time on individualized interventions (Bickmore et al., 2016). Additionally, chatbots can bridge gaps between sessions where users engage with interactive CBT exercises and coping strategies for continued learning and reinforcement of progress (Fitzpatrick et al., 2017). Moreover, for those who are reluctant to seek conventional therapy because of stigma or other practical barriers, AI chatbots provide an entry point that may nudge users toward in-person therapy when needed (Berry et al., 2020).

Complementary Roles of AI Chatbots and Human Therapists



Potential Hybrid Models: Combining AI-Driven Support with Human Oversight

Hybrid models that combine AI-driven mental health support with human oversight provide the possibility of maximizing the advantages of both AI and traditional therapy. These models will involve automated chatbot interventions, complemented by frequent periodic therapist involvement, providing a balanced approach where the AI-driven guidance remains both clinically sound and contextually relevant (Lattie et al., 2019). One example is a therapist-assisted digital CBT model, where AI chatbots provide structured therapy modules, and human therapists review progress and intervene when necessary (Andersson et al., 2019). Another model involves AI-assisted therapy sessions, where chatbots gather preliminary patient data, track symptom changes, and generate reports for therapists to tailor treatment more efficiently (Bendig et al., 2019). Hybrid models can also incorporate AI-powered teletherapy platforms, where chatbots facilitate initial interactions, offer self-help resources, and escalate high-risk cases to human professionals (Fiske et al., 2019). By ensuring that AI remains an adjunct rather than a substitute, hybrid models can improve accessibility, maintain quality of care, and enhance overall treatment effectiveness in digital mental health care (Torous et al., 2021).

7. Future Directions and Research Needs

Conceptual Ideas for Improving AI Chatbots in CBT: To improve the use of AI chatbots in Cognitive Behavioral Therapy, future innovations should be directed toward capturing emotional nuances, as well as improving user feedback systems and the capacity for personalization. The current state of AI-powered chatbots stands to recognize sentiment but cannot adequately understand complex emotions and nonverbal communication, such as tone and facial expression, or pause (Schueller et al., 2021). Future versions may be developed to incorporate multimodal AI systems that scan voice tone, facial recognition, and biometric data to make responses more emotionally attuned (Berry et al., 2020). Second, chatbots should have mechanisms for real-time user feedback where individuals can rate the response, suggest improvements, and set their interaction preferences (Lattie et al., 2019). Advanced machine learning algorithms may enhance personalization by adapting the interactions based on history engagement, therapy process, and psychological needs to provide more individualized and responsive treatment (Bendig et al., 2019).

Ethical and Regulatory Frameworks for Deploying AI Chatbots in Mental Health: However, the emergent role of AI chatbots in mental health care requires firm, well-articulated ethical and regulatory frameworks to secure safety, maintain privacy, and ensure effectiveness. Regulatory frameworks for AI in healthcare have been fragmented thus far, and there is vast variation between jurisdictions. The future frameworks must clearly enunciate standardized guidelines with respect to chatbot transparency, user consent, and data security so that users have prior information regarding how their data is being used (Fiske et al., 2019). Moreover, AI chatbots should be designed with human intervention triggers, such as users displaying high-risk behaviors like suicidal ideation, built into the system (Torous et al., 2021). Developers and policymakers should collaborate to develop AI governance models that balance innovation with responsible mental health care so that chatbots function within the best practices in ethics and clinical practice (Luxton, 2014).

Future Research Areas: Theoretical and Empirical Studies on Chatbot Effectiveness

Despite the encouraging results of AI chatbots in delivering CBT-based interventions, rigorous theoretical and empirical research is required to investigate their long-term effectiveness. Most of the previous studies, however, emphasize short-term user engagement and symptom reduction and have restricted research in assessing the sustained impact of chatbot-guided therapy over months or even years (Andersson et al., 2019). Long-term treatment adherence and relapse prevention studies must compare AI-driven intervention to conventional therapies, future research in the studies of (Kazdin & Blase, 2011). In addition, studies are to be conducted on user satisfaction, therapeutic alliance, and determinants of chatbot engagement, including personality traits, cultural differences, and different levels of digital literacy (Berry et al., 2020). Further expansion in empirical studies of these areas will establish a more robust evidence base for introducing AI-driven chatbots into mainstream mental health care (Lattie et al., 2019).

Exploring AI Chatbot Capabilities for More Complex Mental Health Conditions

Presently, AI chatbots primarily aim at people who are mildly to moderately psychologically distressed, such as anxiety and depression. However, how to create them for treating more severe mental illness is much less explored. Future research will look into developing how chatbots can be created to be applied for people who have conditions like bipolar disorder, schizophrenia, and personality disorders that are more heterogeneously and require more complex interventions (Torous et al., 2021). This may be in the form of embedding AI chatbots in hybrid treatment models where human therapists monitor the chats and adjust their interventions accordingly (Bendig et al., 2019). AI mental health systems can also include predictive analytics to indicate early warning signs of worsening symptoms, thus ensuring proactive interventions and crisis prevention (Fiske et al., 2019). Such expansion in the capabilities of chatbots toward more diverse mental health conditions would necessitate continued training of AI models on clinically validated datasets and would have to be ensured as being ethical, safe, and effective (Mittelstadt, 2019).

AI Chatbots for Complex Mental Health Conditions: Current Research and Future Potential

According to recent studies, AI chatbots have been able to support mild to moderate mental health conditions effectively, but in the case of more severe disorders, such as schizophrenia and bipolar disorder, this application is yet to be fully explored. Loniza et al. (2020) presented a microcontroller-based system for schizophrenia

patient detection, showing the potential of technology in facilitating the care of patients in inpatient settings through the monitoring of behavioral changes. While this study in itself does not focus on chatbots, it says AI-driven monitoring tools will play a part in tracking symptoms and providing early interventions for people with more severe psychiatric conditions (Loniza et al., 2020). More, Seck et al. in their study of psychiatric care in Senegal reported that psychotic disorders are expensive and chronic and proposed that AI chatbots could offer continuous, low-cost psychological support to reduce the rate of hospitalization (Seck et al., 2017).

The future of AI chatbots in complex mental health conditions would be in integrating with advanced neurotechnology. Optogenetics has been discussed in the role that it plays in psychiatry. Precise modulation of the neurons may lead to targeted therapeutic interventions (Sidor, 2012). Thus, if these AI chatbots were integrated with such neural monitoring technologies, then they could probably assist in the real-time tracking of symptoms and automated therapeutic guidance tailored to the needs of complex mental health issues. Further, there are ethical and practical challenges in the decision-making process of AI, such as ensuring accuracy, avoiding the misinterpretation of user inputs, and setting appropriate escalation protocols for crises. In the future, research should focus on hybrid AI-human models that integrate chatbot-driven support and clinician oversight to ensure AI is an enhancement over traditional psychiatric care rather than a replacement.

8. Conclusion

The conceptual framework developed in this research is very relevant to the goal of determining whether AI chatbots can provide customized, real-time CBT interventions. As digital mental health platforms integrate AI chatbots, the latter make it possible to easily access evidence-based CBT strategies like cognitive restructuring and mindfulness for users. In this regard, these interventions will be individualized to the needs of the user, thus forming a very rich supplement to the traditional CBT. This addresses the first research objective in exploring the possible benefits of AI chatbots for delivering personalized therapeutic interventions, as it demonstrates effectiveness in enhancing mental health care. Reflecting on the research objective, which was to do with accessibility and scalability, AI chatbots are promising solutions in overcoming the main barriers to mental health care. As highlighted in the conclusion, these platforms address the problems of geographical limitation, high cost of therapy, and long waiting time. The use of AI chatbots enables users to access their tailored CBT interventions at their convenience, thus offering scalable mental health solutions that can reach a global audience. This directly relates to the second research objective, which shows how AI can be used to increase the accessibility and affordability of mental health services, especially in underserved populations or regions with limited access to traditional therapy.

The ethical and practical limitations of AI chatbots align well with the third research objective, which deals with data privacy, ethical issues, and the absence of human empathy in AI interactions. The conclusion reinforces the message that strong ethical standards are meant to be implemented with proper data security to guarantee users' privacy. Additionally, AI may improve therapeutic practice but cannot replicate empathy and the rich meanings associated with human therapists' intervention in the therapy process. This aspect resonates with the relevance of balancing the level of integration of AI with the irreplaceable value of human intervention as concerns identified by the third research objective about the capacity of AI to ensure genuine therapeutic relationship generation.

9. Recommendations for future research directions: Optimizing AI chatbot effectiveness

This study also underlines the future research that would further optimize the effectiveness of AI chatbots. It aligns with the fourth objective of the research. Some of the recommendations for future research are further personalization of interventions through the AI, enhancing the detection and response to emotional cues in the chatbot, and integration of AI chatbots with the traditional models of therapy. All of this would enable the creation of a more all-rounded, hybrid mental health treatment strategy, combining the best attributes of AI with human therapists' expertise. This paper concludes with a need to further research on how these technologies could be streamlined and integrated with more effectiveness and in a seamless way into the systems of mental health care and would prove better at providing comprehensive well-being support.

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