

# AI-Powered Chatbots for Mental Health Support

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**Abstract:** Globally, the prevalence of mental health conditions is rising, making it one of the biggest issues facing healthcare in the 21st century. These mental illnesses have long-term effects that endure a person's entire life, requiring constant care from both patients and medical professionals. The 'World Health Organization' has focused particularly on digital health interventions as a way to achieve universal health coverage and enhance public healthcare services. The focus of 'digital health intervention' changed in recent years from traditional areas like eHealth or mobile health to the boundaries of cutting-edge computational sciences, which include big data analytics, genomics, including artificial intelligence (AI). The application of artificial intelligence (AI) to healthcare has gained significant momentum, covering critical aspects such as early disease identification, disease progression interpretation, treatment regimen optimization, and the development of innovative intervention tactics. The use of AI-powered chatbots for digital assistance in healthcare has increased due to advancements in voice recognition, natural language processing (NLP), and artificial intelligence (AI). These highly developed computer algorithms are carefully designed to mimic and process spoken or typed human discussions with efficiency. As a result, consumers have the exceptional chance to communicate with technology in a way that remarkably mimics having a discussion with a real human. This research study aims to discuss the potential of AI-powered chatbots for improving the mental health of individuals. This study has discussed the positive impacts of chatbots on mental well-being and how different technologies are used by chatbots to identify mental factors. Moreover, the future challenges and issues related to AI-powered chatbots for improving mental health have also been covered in this research.

**Keywords:** AI, chatbots, mental health support, Natural Language Processing, NLP, technology, challenges, future prospects, empirical review

## I. INTRODUCTION

The improving significance of artificial intelligence (AI) in healthcare, especially in the area of mental health, has been underlined by the UN's World Health Organization (WHO). Natural Language Processing chatbots may be either smart or stupid, and they are frequently text driven. While smart chatbots employ artificial intelligence (AI) to figure out the significance and purpose of human statements, unskilled chatbots produce conversation

according to established rules or decision chains. Chatbot use in medical care has increased, especially when it comes to the treatment of mental wellness issues. 10% of kids, 25% of older people, and 29% of persons in their whole lives may all be impacted by these conditions. These illnesses have the potential to affect the standard of life, result in cognitive impairment, and cost the world's financial system over \$16 trillion between 2011 to 2030. There is a worldwide lack of mental health experts, even while treatments and psychotherapies are available for treating mental health illnesses. According to estimations by the WHO, 15% of people in poor nations and 45% of people in wealthy nations have a choice of mental health treatment. Suicidal intentions and death may rise in people with mental health conditions if therapy is not received. Conversational specialists are becoming increasingly interested in self-help methods, behavioural change, and psychological education to overcome this problem. This chapter explores the advantages and difficulties of chatbots for mental health. It also gives a summary of their features.

### A. Aim and objectives

**Aim:** The study aims to explore AI-powered chatbots for mental health support.

### Objectives

- To explore chatbots' positive effects on mental health.
- To find out how chatbots use technologies and their focus on Mental Health Factors.
- To understand the difficulties and Future possibilities for study.

### B. Principal Idea

Chatbots, also known as speaking agents, are computer programs that can talk with people on any topic or provide assistance with a specific task. If they can speak on any topic, they are classified as open-domain; if they assist with certain tasks, they are classified as context-specific. Finding patterns is one of the fundamental ideas of chatbot

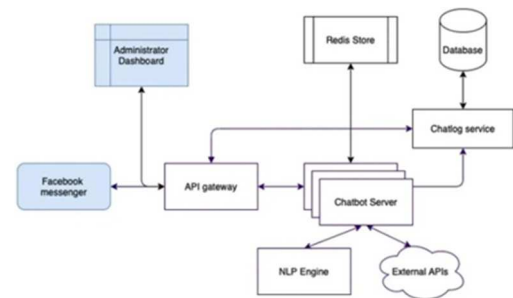
innovation; it depends on sample response-stimulation blocks. The earliest chatbots that employ machine learning were ALICE and Eliza, but they responded in an abstract, machine-like, and repetitious manner. Artificial Intelligent Markup Language (AIML) was developed in the 1990s and is used to mimic genuine speech for talking bots [1]. To build chatbots that identify relationships between words in vector form, LSA (latent semantic analysis) and AIML are often used. Although AIML can handle template-based queries like greetings and basic inquiries, LSA can respond to inquiries that remain unresolved. A network of specialists called Chatscript blends a conversation control system with an advanced computer programming engine (Cheng, and Jiang, 2020).

Another open-sourced, free simple text scripting language for creating chatbots is called Rive Script. It uses a line-based grammar. Natural Language Processing (NLP), which powers Apple's Siri and Google, is crucial to speech detection. NLP uses practical evaluation and dialogue cooperation to discover the appropriate interpretation of a given word or sentence. NLG generates a meaningful response by using text understanding and text strategy. Due to the confusion of language's construction about grammar, vocabulary, and language elements like metaphors or similes, NLP has significant challenges in comprehending the complexity of genuine spoken language.

## II. LITERATURE REVIEW

### A. Chatbots use technologies

A variety of methods and strategies are used in chatbot creation, such as voice or word input apps, chatting services, and coding languages such as the programming language C++, Java, Python, Clojure, or Ruby. The goal of programmers is to build chat robots that can respond, provide correct depictions, and have a bank of balanced replies in case the user's words are not fully understood. A modular approach to building breaks down every framework into its various parts, starting with the structure of the chatbot as a whole. To build chatbots, there exist several free and commercial applications accessible, and the selection of options is expanding quickly. Designers may design machine learning-based NLU apps using one of six primary NLU cloud services. While these networks share some characteristics, they vary widely in other areas [2]. A wide range of devices and methods, including coding languages, structures, libraries, and solutions, as well as low-level code form-based channels, may be used to construct chatbots. The variety of tools available and the complexity of realizing the chatbot's theoretical framework make it tough to choose which one is appropriate for creating a certain chatbot. Moreover, certain tools are confidential, which makes chatbot migration challenging and promotes lock-in between suppliers.



**Figure 1:** The overall architecture of chatbots

### B. Chatbots focused on Mental Health Factors

The field of machine learning has made significant strides in the identification and diagnosis of mental wellness issues, particularly in the early identification of depression and related signs. Analysis of spoken acoustic characteristics, biometrics and accelerometer information, mobile texting motion, anxiety assessments, mobile sensory data, and pressure assessments from location are some of the techniques used. To evaluate sufferers' mental and psychological well-being, recent developments in human-robot or operator treatments were also used [3]. In addition, machine learning has been applied to predict potential risks of committing suicide, client anxiety, hospital stay risk, and manic or depressed periods in bipolar illness patients. A working system was created that monitors for symptoms of sadness and nervousness by altering assessment inquiries by users' answers and their feelings.

### C. Chatbots' positive effects on mental health

Chatbots can enhance mental health by giving patients who find it hard to share their struggles with mental illness because of shame widespread access to assistance and therapy. They are appropriate for people with limited spoken language, a computer system, and medical skills since they are simple to operate and engage with. Through feelings for others, focus, and intimate closeness, integrated chatbots may build an emotional connection with sufferers [4].

Because of their natural, engaging, and similar human user interface, chatbots have great potential as substitutes for conventional automated treatments. Prior research has documented the possible advantages of applying chatbots in the context of mental disorders, including reducing the intensity of depressive disorders and anxiety, imparting social abilities, and identifying issues associated with mental health. For example, when it came to job interview techniques and self-assurance, chatbot users greatly outperformed waiting-list groups.

Additionally, it has been shown that chatbots can accurately identify a wide range of mental health-associated conditions, including dementia, with an excellent success rate in identifying those suffering from dementia. This shows that because chatbots provide a more interactive and human-looking method for mental health treatment, they may be an acceptable substitute for conventional approaches [5].

### D. Challenges

There are several issues with AI in mental well-being chatbots, involving challenges with installation, legal challenges, technological restrictions, and transparency concerns. Technical drawbacks include general and repeated abilities, no capacity to recall past talks, and the possibility that self-education computers would make their regulations and judgments. The absence of research-based chatbots for mental health, the little information on their effectiveness in therapy, and the possibility of information misuse and theft are some of the ethical difficulties. Since chatbots often forbid private chats and could be connected to users' arguments, security and anonymity are also significant issues. Another issue is protection, as chatbots often can't handle critical situations and may depend too much on users, which can result in addiction and a rejection of human contact [6]. Artificially intelligent chatbots could fool clients into believing they are speaking with a person, but from a medical standpoint, this might be unacceptable. Chatbots may lack the kindness and empathy that are fundamental to treatment. The use of chatbots for improper purposes may worsen already-existing health disparities, and there is a shortage of legal and moral standards for mHealth treatments. A declaration of agreement about requirements for mental health applications has been established, taking into account customer experience/adherence, efficacy, confidentiality, security of data, and data connection. Usage of chatbots may affect the patient-therapist interaction, and continued use may result in the loss of personal connections and a failure to resolve conflicts [7]. Furthermore, several people may find that psychological chatbots are unsuitable for them because of their particular tastes or mental health conditions. There are not many responsibility effects on chatbots, and fresh laws are in the works to restrict the use and sharing of data obtained by software-driven helpful systems.

### III. RESEARCH METHODOLOGY

The empirical review carefully reviews AI-powered mental health chatbot literature. The academic databases PubMed, PsycINFO, and Google Scholar were searched for "AI chatbots," "mental health," "therapy," and "NLP." Peer-reviewed papers on chatbots in mental health interventions from 2010 to 2024 were included. The title and abstract were used to screen 10 relevant articles. Moreover, the researcher adopted the interpretivism research philosophy and followed the inductive research approach. The interpretivism philosophical approach helped the researchers to evaluate the research topic more briefly. Whereas the inductive research approach allowed the researchers to analyse the potential trends in the dataset to develop logical conclusion about the impact of AI-powered Chatbots for improving mental health. These constitute the research design of this study.

Data extraction involved categorising studies by positive effects, problems, and future potential. Chatbots can increase mental health support, user engagement, and

diagnosis, according to studies. Several research showed that chatbots reduce depression and anxiety, teach social skills, and provide personalised solutions. Technical limits, ethical problems, and patient-therapist relationship dangers were discovered. Technical issues including conversational limitations and memory loss were widespread. The lack of mental health chatbot legislation, privacy, and data security raised ethical concerns.

Improved chatbot language abilities, personalised therapies, and chatbot integration into mental healthcare systems were all considered for future research. Furthermore, chatbot solutions' long-term efficacy and safety should be studied, and ethical and responsible use of this technology should be regulated [10].

Quality assessment assessed included research' methodological rigour and validity. Study design and methods varied, but the literature was generally good. Analysis of the retrieved data revealed similar themes and trends, revealing the current and future state of AI-powered chatbots for mental health assistance research.

### IV. DISCUSSION

More and more research is being done on how well AI-powered robots can help with mental health issues. This shows that more and more people want to use technology to solve mental health problems. A lot of research has been done on the good effects of chatbots on mental health, showing that they could be useful and easy-to-use tools for helping people with a wide range of mental health problems. Recent study shows that chatbots powered by AI can help with mental health problems. Studies show that people who use it have a lot fewer signs of depression and anxiety. Longitudinal studies show that crowd accompanying social anxiety disorder can increase their public skills over period [10]. But questions like consumer engagement and righteous issues still subsist, and they need to be checked earlier they can be used in mental health management.

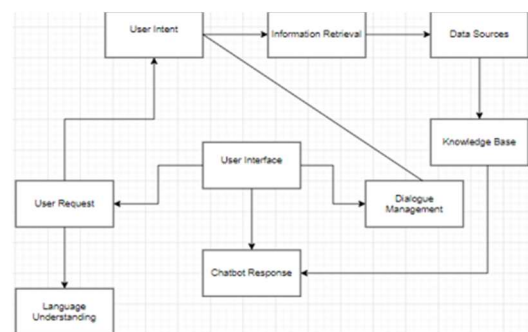
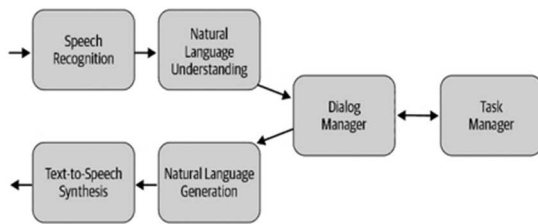


Figure 3. Chatbot system

A study by [11] employed a randomised controlled trial (RCT) to visualize if a chatbot attack could help college pupils accompanying sadness and worry. The data granted that people the one communicated with the chatbot had considerably lower scores for both concavity and anxiety distinguished to a control group. This implies that chatbots

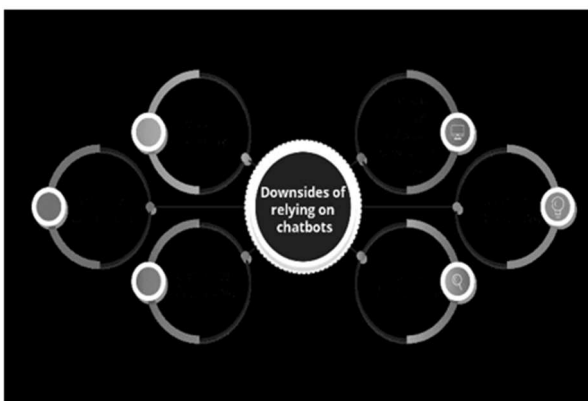
may be useful for helping young men with low mental health problems.



**Figure 4.** Mental health evaluation through chatbot

In the same way, [11, 12] produced a longitudinal study that looked at how a chatbot-located intervention for nation accompanying social worry disorder distressed them over period. Their results displayed that people the one employed the chatbot for six months had better social functioning and fewer symptoms of social worry. This implies that chatbots may help community accompanying sure mental fitness questions in the long term also. To answer issues, conversational masters are flattering more and more curious in rhetoric using psychological terms techniques, changeful community's behaviour, and teaching family about medicine.

Also, [12] acted a meta-study that put together the results of many studies that look at how well chatbots worked for various types of mental strength problems, to a degree cavity, anxiety, and worry. The study raises powerful proof that utilizing chatbots to help folk with mental well-being problems can defeat syndromes and improve their overall well-being. This implies that chatbots could be a beneficial adding to traditional mental health services. There are, still, questions and limits with utilizing robots to help with mental fitness that have been indicated. For example, [13] showed questions accompanying user date and devotion. Some participants were sad accompanying the conversational characteristic of the chatbot and allure inability to support personalised support.



**Figure 5.** Issues with chatbot in mental health support

There have likewise been ethical concerns made about data privacy, secrecy, and the risk of harm [14]. Making sure that chatbots attend moral rules and maintain consumers' trust is important for merging ruling class well into mental health management situations. Machine learning has too been used to recognize the chances of dignitary delivering suicide, bearing client worry, calling for to stay in the

nursing home, and enduring crazy or depressing episodes in community accompanying manic-depressive illness. It was likely to create a system that changes evaluation questions established consumers' comments and by means of what they are feeling to expect signs of unhappiness and worry. Therefore, studies have proved that AI-powered chatbots have the potential to help lower manifestations and better intellectual welfare across a range of populations, making bureaucracy conceivably useful forms for mental health support. However more study is wanted to resolve in what way or manner to form chatbots work and make sure they are fairly and clinically appropriate for course crowd accompanying mental health questions.

## V. FUTURE POSSIBILITIES FOR STUDY

Though there are still several unresolved questions about the dependability and acceptance of AI-based chatbots in medical services, these technologies have the possibility of completely transforming the mental healthcare industry. These include enhancing language skills, personalizing chatbots for each user, and taking into account each person's level of health knowledge. Although it's yet unknown if information transferred from chats and other sources of information leads to trustworthy chatbot platforms or whether access to system replies gets lost, learning from customer discussions might be helpful. Chatbots for mental health evaluation must take into account measurements, requirements, and technological issues. As 'Level 1' proof from randomized controlled studies (RCTs) provides trust in electronic therapies, Evidence-Based Medicines (EBM) advises using it. Before performing an RCT, however, a range of accuracy metrics across different categories should be employed to assess possibility and face validity owing to the variety of chatbots and their relationship with consumers [8]. To interpret advice from medical experts and guarantee that chatbots are conscious of treatment objectives stated in therapy sessions, academics should also concentrate on how chatbots might aid mental healthcare professionals. This will include creating fresh forms of service that integrate chatbots. In outcome, artificial intelligence healthcare chatbots are exciting novel instruments for daily medical care; but, to fully explore their capabilities, several unresolved problems and obstacles must be resolved, and further insights and lessons particularly concerning their drawbacks must be gained [9].

## VI. CONCLUSIONS

The reviewed literature provided insightful information about the usefulness and efficacy of chatbots driven by AI in the treatment of mental illness. In general, a number of studies have demonstrated a promising level of acceptability for AI-powered chatbots used for mental health self-management, as well as favourable user feedback for perceived usefulness, satisfaction, and simplicity of use. Future studies should, however, aim to fill in the gaps in the literature by providing thorough and detailed explanations of the technical elements of the chatbots powered by AI used, backed by the creation of an

understandable and comprehensive taxonomy unique to AI-powered chatbots used in the healthcare industry. Even though AI chatbots offer opportunities to support marginalized and underserved areas, there are still problems in assessing the efficacy and quality of these tools. Future research should clarify these areas, and the level of care required for emergency intervention. Artificial intelligence (AI)-powered chatbots should be seen as additional tools rather than a replacement for real mental health professionals.

## VII. ACKNOWLEDGMENT

This was an excellent opportunity to learn about machine learning and personal growth in knowledge. I sincerely appreciate that you gave me the chance to create this empirical study. I would want to express my gratitude to everyone who has helped me along the way and made sure that I finish the research on schedule. I also want to express my gratitude to God Almighty, who has enabled me to conquer every obstacle I encountered while working on the assignment. Last but not least, having the chance to study sentiment analysis in social media contributed to my understanding of machine learning and its allied fields.

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