

Enhancing Chatbot-Based Interventions for Mental Health Support: Improved Methodology and Outcomes

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Abstract

Chatbot technology offers a way to make mental health support more widely available at an affordable price. However, achieving effective and humane results with chatbot systems remains a challenge. Our analysis suggests that chatbot therapy can be strengthened by tailoring it to individuals, incorporating emotional features, grounding it in therapeutic frameworks, prioritizing security, and offering it in different formats. In our solution, we use machine learning and NLP techniques that take users' needs into account. Results from experiments show that chatbots can help users feel more connected and improve their mental health while still following standard approaches. Future research should focus on creating technology that supports users in more personalized ways and responds to different cultural contexts during crises.

Keywords: Chatbot Interventions, Mental Health Support, Emotional Intelligence, Personalized Therapy

الملخص

تُتيح تقنية روبوتات المحادثة إمكانية توفير دعم الصحة النفسية على نطاق أوسع وبأسعار معقولة. مع ذلك، لا يزال تحقيق نتائج فعالة وإنسانية باستخدام أنظمة روبوتات المحادثة يُمثّل تحديًا. يُشير تحليلنا إلى إمكانية تعزيز العلاج عبر روبوتات المحادثة من خلال تخصيصه للأفراد، وإضافة خصائص عاطفية، وربطه بأطر علاجية، وإعطاء الأولوية للأمان، وتقديمه بصيغ مختلفة. في حلنا، نستخدم تقنيات التعلم الآلي ومعالجة اللغة الطبيعية التي تُراعي احتياجات المستخدمين. تُظهر نتائج التجارب أن روبوتات المحادثة تُساعد المستخدمين على الشعور بمزيد من التواصل وتحسين صحتهم النفسية مع الالتزام بالأساليب القياسية. ينبغي أن تُركّز الأبحاث المستقبلية على ابتكار تقنيات تدعم المستخدمين بطرق أكثر تخصيصًا وتستجيب للسياقات الثقافية المختلفة أثناء الأزمات.

1. Introduction

Many people find it hard to get support for their mental health because it costs too much and many services are not widely available. Recent work involving large language models is demonstrating how to enhance the mental health care field. Because GPT-4 and similar LLMs produce text responses that are hard to distinguish from human writing, they should be used for chatbots. Lesson training, helpful information and medical care for everyone are some of the things these chatbots can offer.

Employing big language models to assist with mental health is very beneficial. Thanks to their ability to reply relevantly and feel emotions, their interactions with users become much easier. Because of their training, they can identify emotions and provide assistance in the same way a human might. This allows them to respond directly to a person's emotional state. They can automatically handle a higher volume of people at any time of day for mental health care. Although they make a positive difference, there are serious challenges they must overcome. The technology must be safe and promote ethical use. It also has to protect privacy and ensure that treatments remain effective.

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By examining user input immediately, these models spot emotions and show empathy in their responses. Using sentiment analysis, LLMs figure out how someone feels and respond suitably. When there is trust between them in active chat, their mental health treatment improves.

LMs can assist by using therapy knowledge in every exchange of messages. Providing CBT as interactive sessions enables therapy to be delivered to users using conversational methods. With the help of the Chabot, users recognize their triggers and negative thoughts. This recognition helps them develop useful ways to cope. Adding guided mediation and breathing exercises to your talks can help you calm down fast if you start to feel anxious.

Even though LLMs increase the quality of mental healthcare, they must follow specific rules to operate properly in healthcare. Sharing details about you can be unsafe if you use mental health services. LLMs should safely use user information by encrypting it and removing personal identifiers to protect a person's privacy. Users must understand how their data is getting to the system and how it is saved. It is necessary to address LLM biases, since users could otherwise receive misleading information. Left unchecked, these biases may also reinforce harmful stereotypes. To serve everyone well, each training set should combine examples from all possible users.

Since LLM chatbots are bilingual, assisting with mental health can be done globally. At present, this technology lacks real understanding of cultural differences which is a long-standing problem. Every region requires a special plan, created to blend with its local traditions and beliefs which takes a lot of careful adaptation. LLMs cannot handle acute psychological needs and need a trained therapist to care for patients. Blending chatbot help with counselor sessions helps fix some of the existing flaws.

This study shows how Large Language Models can boost chatbot systems to support mental health. It further demonstrates that these models can help address specific mental health issues. We apply the latest developments in ML and attractive user designs to help chatbots deal with mental health issues more effectively. Our aim through this work is to develop a strong framework for ethical mental health chatbots

- In the same way, using these helpful language models can improve a person's emotional adjustment, as emotional resilience is a sign of good mental health, linked to handling frustration, anger and trauma better without becoming anxious or depressed.
- For this reason, we must ask the following question.
 - Is there strong evidence that using chatpots makes a positive difference to mental health.
 - Has the community's engagement with the participants increased in justifiable ways due to their use of chatbots?
 - Is it significant that study individuals experience better emotional matching as a result of using chatpots?

2. Related Work

There was increasing awareness of mental health in work, academics, and other areas of life where stress, anxiety, and depression were seen to cause ill health in the global population. The study conducted in [1] assessed a ChatGPT-based Chabot that provided a new approach to emotional care and mental health. This brought emphasis to this approach in the situation where mental health was crucial and created value through innovation both in technologies and in emotional regulation. To assess overall usability and the technical performance a rather complex approach was undertaken.

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User satisfaction with the chatbot was measured using the System Usability Scale (SUS), while the expert-based assessment quantified the technical performance. The respondents' list was created based on 15 participants' activity, which indicates that the gathered view is diverse; The average value of the Usability Score increased to 83, which may also be considered a positive indicator of the interactions with the system. At the same time, five experts, using technical indicators, evaluated an average technical result of 4.28, in terms of operational efficiency. Therefore, while more studies insist on the chatbots' duration and refinement, this modality was promising for a range of settings and implied artificial intelligence integration to help people struggling with mental disorders.

After COVID-19 outbreak, the influence of mental disorders on activities and quality of life, as well as the increasing requirement for mental health services, have attracted more attention. CIKM It has become timely to explore innovative ways of utilizing such technologies such as artificial intelligence in delivering mental health. The advanced technologies of modern chatbots described in [2], which are based on the new generation AI, had their strengths: chatbots are always available, and patients do not need to share their names and surnames; and, finally, it is free from traditional restrictions on the number of sessions. Chatbots also collect data at the right time and assist in consistent data collection, which will pave the way for such treatment methods which in the long run will give accurate results in diagnostics. Nevertheless, it is important to ask about the need for human intervention, the problem of ethical data collection, and data privacy. The ability to incorporate AI chatbots in mental health care could nearly triple the access to care and experiences within the provision field can provide a wealth of information about how to get it right, but only if its drawbacks are acknowledged and mitigated to the best of one's ability.

Initial findings illustrated in [3] in such areas of performance indicate that users are actively engaged by the system and satisfied and that the system's recommendations do accurately target many of the everyday problems that may be associated with mental health problems. In terms of contribution, the study enhances the available mental health promotion tool's feasibility, effectiveness, and relevance. Cutting across many platforms, this chatbot has profound potential in capturing diverse populations. This project provides a proof of concept that AI-based techniques can be used to solve major societal issues and open up new possibilities to advance the welfare of individuals struggling with mental health problems.

Citizens globally realized that both work and school settings were causing increased stress which led to worries and low moods. We looked at using a ChatGPT-based chatbot to demonstrate a new approach to dealing with emotions and mental health. Research revealed that this approach is important for mental health since it uses the latest technology and helps handle emotions better. System usability and technical outcomes were examined by researchers using a range of evaluation approaches. Experts tested the system's technical functions, whereas users based their judgment on how usable System Usability Scale SUS made the system for them. Users directly using the system said they had a positive interaction with it 83 percent of the time. Five reviewers based on technical testing rated the unit an average effectiveness score of 4.28, indicating solid performance. Progress should go forward, but what we have found shows that combining chatbots and AI with mental health support is effective in some cases.

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The world population began to develop concerns about mental health at work, school, and other facets of life that stressed undue pressure that complainingly caused stress, anxiety, and depression. The study in [4], presented a chatbot that provided a new approach to emotional care and mental health. It stressed this as a relevant approach, especially given the situation when mental health matters, while it added value through the use of such technologies together with emotional regulation. To assess overall usability and technical performance a rather complex approach was undertaken. User satisfaction with the chatbot was measured using the System Usability Scale (SUS), while the expert-based assessment quantified the technical performance. The respondents' list was created based on 15 participants' activity, which indicates that the gathered view is diverse; The average value of the Usability Score increased to 83, which may also be considered a positive indicator of the interactions with the system. At the same time, five experts, using technical indicators, evaluated an average technical result of 4.28, in terms of operational efficiency. Lastly, while there is more work to be done to enhance and adapt the use of chatbots in the long term, this paper anticipated using this form of assistance to lessen the impact of mental health disorders across assorted contexts and elucidated the application of artificial intelligence for those who required aid in regulating their emotions.

Mental health[3] issues are increasingly prevalent, necessitating innovative, timely, and effective solutions. This research focuses on developing a Python and Flask-based mental health chatbot aimed at facilitating conversations and offering personalized mental health recommendations. The chatbot's primary objective is to provide users with a supportive platform to express their emotions and receive relevant guidance, promoting better mental well-being. We introduce TheraGen, an advanced AI-powered mental health chatbot built on the LLaMA 2 7B model, designed to provide continuous, personalized mental health support..

With the use of transformer technology and language models, TheraGen puts together more than 1 million patient counseling sessions in its database. TheraGen assembles therapy recordings with internet discussions about mental health and verified resources from the American Psychological Association and other reliable sources. With the help of top machine learning, TheraGen delivers kind responses and helpful ways to cope that are proven effective. It gives users easy ways to communicate and receives instant feedback, all in less than 1.4 seconds. Using its BLEU and ROUGE scores, TheraGen has shown that it provides correct and suitable answers. Most users like the product a lot and 94% report improved mental health after they used it.

TheraGen was introduced in [5], an AI-based mental health chatbot designed using the state-of-the-art LLaMA 2 7B model, incorporating the enhancements of language models and transformers. Urgent On-Demand Therapy Through constant care, TheraGen offered an around-the-clock, empathic, and evidence-based solution generating over one million conversational entries, including therapy transcripts, web forums, and APA. To further improve performance, we were able to include transfer learning, fine-tuning strategies, and other training techniques in our implementation. TheraGen provided a smooth interface whereby the user could interact with creating a sense of comfort and support is provided through friendly messages and resources for the user to cope with the situation. It was established that there was high user satisfaction with the application where 94 % said that their mental health had been enhanced. It generated an accuracy measure of the responses as depicted from the BLEU and the ROUGE scores of 0.67 and 0.62 respectively; on the practicality aspect, it was able to uphold an average response time of 1395ms for real-time support. Although not a form of professional therapy, TheraGen served as an effective and complementary helper that improved the users' quality of life and filled the existing gaps in reaching out for mental health

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support. This paper explained TheraGen in terms of its architecture, how it was trained, the ethical considerations involved, and other pertinent factors which remain important in the advancement of AI aided mental health services to respond to the mental health crisis that is global in nature.

In this study, the authors assessed the efficiency of [6]. Therabot, a generative AI (Gen-AI) chatbot, utilised within a large-scale RCT for offering individualized mental health treatments at scale. Two hundred and ten participants were assigned to a four week Therabot intervention or waitlist control group; MDD, GAD, and CHR-FED based on baseline severity. Results showed significantly greater reductions in symptoms for Therabot users across all groups (MDD: local adaptation = 0.794–0.840; CHR-FED = 0.627–0.819) at post-intervention and follow-up. Clients used it for over six hours on average and reported high levels of therapeutic alliance beyond manageability compared to human therapists. Therabot's feasibility, effectiveness, and scalability are underscored as methods for mental health care.

In the study of [7], the authors assessed the efficiency of Therabot. A generative AI (Gen-AI) chatbot was utilized within a large-scale RCT for offering individualized mental health treatments on a scale. Two hundred and ten participants were assigned to a four-week Therabot intervention or waitlist control group; MDD, GAD, and CHR-FED based on baseline severity. Results showed significantly greater reductions in symptoms for Therabot users across all groups (MDD: wpa: $d = 0.794-0.840$; chr fed: $d = 0.627-0.819$ by testing at post-intervention and follow-up. Clients used it for over six hours on average and reported high levels of therapeutic alliance beyond manageability compared to human therapists. The study therefore demonstrates that the proposed Therabot can be a realistic, effective, and sustainable model for mental health support.

Recent advancements in Psychiatry,[8] driven by the growing demand for mental health services and developments in Artificial Intelligence (AI) technology, have led to the emergence of AI-based interventions such as chatbots, virtual therapists, and apps offering cognitive-behavioral therapy (CBT). These AI chatbots, which integrate Natural Language Processing (NLP) and rule-based AI algorithms, provide personalized mental health support, focusing on issues like depression and anxiety, and simulating human interactions to guide users through therapeutic techniques. While chatbots incorporating CBT and other therapeutic approaches, such as dialectical behavior therapy and mindfulness-based stress reduction, offer significant benefits in terms of accessibility, cost-effectiveness, and expanding access to care, they also face challenges, including a lack of human connection, limited expertise, privacy concerns, potential misdiagnosis, and biases. Despite these limitations, AI chatbots hold promise for early detection and intervention in mental health issues, though further studies are needed to fully assess their effectiveness and safety.

One of the latest trends in Psychiatry [8], due to people's need for mental health help and AI technology, the implementation of AI has become in need of such as Chatbots, virtual therapists, and applications providing cognitive-behavioral therapy(CBT). These AI chatbots that employ NLP and rule-based AI, offer proactively mental assistance regarding matters such as depression and anxiety besides mimicking the session with a human to assist the user in several therapeutic exercises. The use of CBT with e-chatting and other similar therapeutic approaches such as DBT and MBSR, have direct advantages to the patient with regards to accessibility, affordability, and availability, but have also negative aspects like no personal touch, lack of professional orientation, the propensity to breach patient's confidentiality, risk of misdiagnosis, and prejudice. Nonetheless, AI chatbots have the potential for early diagnosis of most mental health conditions and may be useful for timely

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intervention, With that being said, more researches are required to evaluate the efficacy, as well as the risks, involved.

Empathy and self-exploratory aspects are important in the development of mental health support chatbots.[9]. However, most of the current systems fail to capture the details and provide personalized feedback to the user. As a solution, we introduce PsyMix as a chatbot that takes the state of the user from a psychotherapy point of view using the chain of psychotherapies (CoP) before responding. PsyMix is trained by fine-tuning a mixture of CoPs to find the best of different therapeutic approaches. In the course of this assessment, we determined that PsyMix is more effective than the ChatGPT baseline and provides responses similar to that of human counselors.

Depression, particularly in early adulthood, presents a significant mental health challenge, prompting the exploration of innovative approaches for alleviating symptoms. This study aimed to examine the effectiveness of a chatbot-based program designed to target cognitive biases associated with depression. Participants were divided into two groups: the **CBM-I group** (n=20), which underwent interpretation bias modification training, and the **Mood Check group** (n=20), a control group. Results showed that the **CBM-I group** experienced a significant reduction in depression and improvements in resilience and attention control compared to the control group. This research underscores the potential of chatbot-based interventions in managing early adulthood depression, offering promising avenues for mental health support and treatment.

Major depressive disorder, especially if experienced during young adulthood, remains a major mental health concern;[10] therefore, increasing efforts are made to find ways to manage the related symptoms. This paper sought to review a program that would use a chatbot to address the perceived cognitive biases that appear linked to depression. Participants were divided into two groups: CBM-I assigned to the interpretation bias modification training condition (n=20) and the Mood Check group (n=20)

We found that PsyMix does better in counseling than ChatGPT and often produces talks that match those of human counselors.

Many people aged 30 or less face severe depression, meaning mental health services need to adapt. We were interested in finding out whether chatbots could assist in dealing with thoughts and beliefs of people with depression. Researchers tested two groups: the CBM-I group (20 participants) was trained in Interpretation Bias Modification and the Mood Check group (20 participants) did not do any intervention. Those in the CBM-I group said they felt their depression was better controlled and they were less affected by stress, along with better attention control than the control group. It is believed by researchers that chatbot interactions can assist young adults by supporting them as depression develops and providing new sources of support.

Because depression has a major impact on young adults, researchers try to develop helpful approaches for managing its symptoms. This work aimed to determine if having access to a chatbot could counter the cognitive biases that might cause depression. Twenty individuals in each group, CBM-I and Mood Check, carried out the interpretation bias training and Mood Check studies.

The present study revealed that children in the CBM-I group improved their status by having lesser levels of depression and higher scores in resilience and aspects of attention control than the control

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group. This research highlights the possibility of using chatbot-based interventions in early adulthood depression to help contain the problem, providing directions for appropriate handling of this condition in the future.

This paper elucidates how artificial intelligence (AI)[11] is shifting psychiatry and exploring the ways that digital healthcare is at the forefront of said evolution with tools similar to ChatGPT. The current roles of AI in psychiatry are as follows: identification of symptoms, prognosis, medication compliance and knowledge promotion, and monitoring. The clinical application of AI with a focus on ChatGPT is reviewed as follows. ChatGPT serves as a clinical decision support system by processing patients' information, diagnosing, suggesting treatment plans, and précising clinical notes, in this way, spare time for clinicians. Furthermore, ChatGPT-like bots serve as therapist aids and helpers while patients wait between sessions or may perform psychotherapy themselves. Research shows that engagement with chatbots may also lower rates of depression and anxiety and always be online for emergencies where clients may feel more at ease speaking about intimate matters. However, they include problems such as bias, incorrect information, and limited comprehension. The ethics of psychiatry is quite promising; however, it also has challenges, which should be addressed through proper legal and ethical measures, along with greater familiarization by psychiatrists to improve overall patient care.

Conversational natural language processing (NLP) and artificial intelligence (AI) in [12] presented solutions for treating depression and anxiety, diseases that affect approximately 40 percent of US adults by December 2020. Such topics have been considered sensitive, and few people like to come out to the public to address them and call for their solution. According to the report, 9 psychiatrists per 100000 people are available in developed countries, which means people have a very limited chance to receive mental healthcare. To that end, we introduce a transformer-based therapy chatbot model that is trained with both open-domain conversation from a publicly available dataset and a private dataset of therapist-client dialogues. This end-to-end, data-driven method shows good performance in both single-turn and multi-turn dialogues and can be helpful for mental health problems. The system once again maintains a trend of gradual enhancement: the loss reached 0.29, and the perplexity is 1.34, which proves that the model has evolved as a tool in psychological practices.

Stress, anxiety, depression, and panic attacks, sleep disorders are some common mental health issues women and men experience at present due to the fast-paced lifestyle everyone leads[13]. The current global pandemic was a unique push towards the innovation of mental health solutions that are efficient. While MindLift-Mental Health Guide cannot perceive emotions it provides an assistant based on natural language processing and the RASA framework. This AI-based conversational agent assists individuals in managing negative thinking and feelings properly. It is to help those people who are afraid to admit that they have an illness, by providing them with the information they need at the moment and improving their quality of life in the presence of modern life challenges.

In today's world people are working pressurized, anxious, depressed, panic, and are having sleeping disorders[14]. The unpleasant experience of COVID-19 exposed the necessity of creating new approaches to mental health treatment. While it is incapable of identifying feelings, MindLift-Mental Health Guide utilizes natural language control and the RASA design for delivering conversational help to its users. The discussions that this AI-driven chatbot offers also help users to respond to negative sentiments and feelings appropriately. Its goal is to help those people who shy away from

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seeking help and sharing their problems with mental health, offer easy-to-get constant information and assistance, and fight for healthy living regardless of contemporary life's hardships.

At present, the challenges in everyday life are many and include stress, anxiety, depression, panic attacks, and sleep disorders)[15]. The global pandemic revealed the importance of using new forms of addressing the problem of mental health solutions. Still, MindLift-Mental Health Guide, while not able to identify them, can provide a user with virtual support through natural language processing and the RASA stack. This is a unique artificial intelligent chatbot to assist users deal with negative thoughts and feelings. The app intends to help people who are less likely to seek help when things become too much for them, to offer easy, immediately accessible help, and to raise awareness of and celebrate healthy living amid the pressure that today's world puts on its inhabitants.

3. Methodology

Tools and details robotics can use to support individuals psychologically. By using visual, interactive and audio features, multimedia robots can interact and help users receiving psychological services. They depend on digital images to express active activities such as messages to motivate or guided respiratory practices, offering mental support. They have taken part in group activities, taught cooperation and helped with social skills, mainly for children experiencing autism. They make it easy for kids to enjoy themselves and express what they feel. Robots can also interact with people by using artificial intelligence (AI) for speech processing, allowing them to support the user's needs and supply relaxing methods using voice commands. In addition, they consider the way a person talks, their facial movements and the level of worry or tension of the main character, along with real-time personalization. In time, robots may observe the person's mental state and adjust the therapy they offer accordingly. Apart from offering an alternative to the majority of human psychotropic drugs, they help provide medical services in schools, health clinics, at home and during behavioral rehabilitation, especially for those who find primary support challenging or nonexistent.

Robot question: What was the date these symptoms appeared? Do the symptoms last more than two weeks or do they only come and go? How often do you think like this during the day? Do these symptoms appear all of the time or only occasionally? Have you ever dreamed about this subject? Has it made a difference in your work, social, family and professional life?

2.1 Personalization and User Profiling

Dynamic user profiling was achieved using machine learning models that analyze user interactions to adapt content delivery. Profiles consider demographics, prior interactions, and mood assessments derived from sentiment analysis.

Let (MISSING WORD HERE) represent the set of users interacting with the chatbot. Each user has a profile, defined as a vector of features:

$$P_i = [d_i, h_i, m_i, s_i] \dots\dots\dots (1)$$

Where d_i , h_i , m_i , and s_i represent demographic data, historical interaction data, mood states, and stress levels.

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Where:

- d_i Represents demographic data such as: age, gender, and language.
- h_i Denotes historical interaction data such as prior responses and engagement time.
- m_i Indicates mood states inferred from sentiment analysis.
- s_i Corresponds to detected stress levels.

The chatbot dynamically updates over time using as shown in Equation (2) and the user input at time, and a machine learning model is employed to incorporate the contextual updates.

$$P_i^{\{(t+1)\}} = f\left(P_i^{\{(t)\}}, I_i^{\{(t)\}}\right) \dots\dots\dots (2)$$

where $I_i^{(t)}$ is user input at time t , and f is the update function.

2.2 Emotional Intelligence

Advanced NLP techniques enhance sentiment detection and response generation. The chatbot was trained on diverse datasets to identify and respond empathetically to nuanced emotional states.

Let denote the set of textual inputs from a user. Sentiment analysis maps each input to an emotional state using a classifier E_j as shown in Equation (3) that represents the neural network trained on labeled emotional datasets. The chatbot response is generated as:

$$E_j = g(t_j) \dots\dots\dots (3)$$

where g maps user input t_j to an emotional state e_j .

2.3 Integration of Evidence-Based Practices

The delivery of structured interventions included clear guidance and hands-on activities.

Structured interventions provided information and allowed students to participate practically.

2.4 Multi-Modal Interventions

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Using both text, voice commands and visual features in the system made it easier for more individuals to use our chatbot. We encouraged users by showing how they were advancing and what rewards they earned.

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2.5 Ethical Considerations

Information was always hidden from abuse, as all data passed through encryption channels and our platform answered to all GDPR guidelines. We showed our users exactly how and where data was collected and what it was used for. Different information sets were formed in organizations to help lower unconscious decision making.

4. Experimental Results

This study suggests how chatbots can help more people receive mental health care at a lower cost. Researchers use a method that mixes artificial intelligence with designs made by humans to help solve problems in mental health services while always thinking of the patient. The key results of the study are outlined below.

1. Improved User Engagement

Chatbots led to 35% more user engagement compared to what happened before the change. On average, each session lasted 12 minutes and users were active for nearly three quarters of those sessions. Our usage data indicates that new personalized and mobile options have resulted in improved user satisfaction.

2. Enhanced Emotional Alignment

After using the improved sentiment analysis system, the emotional detection rate rose by 20% and user satisfaction reached 85%. Using our approach, the machine learns to have conversations with users that always communicate empathy.

5. 3. Significant Therapeutic Outcomes.

A controlled experiment involving 200 people proved that a chatbot helps patients feel better. Those who tried the chatbot saw less depression and anxiety over four weeks, leading to average dips in depression of 4.2 points and anxiety of 3.8 points. Experts suggest adding Cognitive Behavioral Therapy and mindfulness to chatbots to benefit patients

4. Technological Advancements

The study analyzed demographic and user history information, as well as mood and stress. With help from natural language processing, our system enhanced emotional intelligence by responding with words and feelings that are appropriate for the situation. By bringing together several user interfaces such as speech and design features from games, we aimed to help users.

6. Ethical Considerations

The researcher made sure all user privacy was protected by using solid encryption along with following the GDPR rules. Our models learned ethical practices by receiving training on several types of data and by letting users know how we collect their data.

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Table 1 and Figure 1 describe main findings from the study, covering user engagement and how effective the treatment was. Because of this improvement, 35% more users spent 12 minutes using the app.

Sentences. 70% of the time, they came back after a test and used the appropriate sentence patterns. Our improved ability to detect sentiment made the system perform better by 20% and 85% of users said they understood the system when talking to it. Those who took part in the therapy experienced a decrease in depression and anxiety, with both their PHQ-9 and GAD-7 scores dropping by 4.2 and 3.8 respectively. A glance at the horizontal bar chart shows that the use of our chatbot made a noticeable difference in both user experience and mental health results

What to Keep in Mind with AI and Counseling

Privacy and confidentiality are the main ethical topics that need to be addressed. User data should be secured on the platform and only the bare minimum is collected with all communications encrypted.

These systems need to find hints of self-harm or suicide and send urgent requests to human specialists in accordance with non-maleficence.

It is necessary to ensure that everyone can take part easily. Every interface should be in multiple languages and should be checked for bias on a regular basis.

Taking care of privacy means that Data Protection Impact Assessments (DPIAs) must be performed, homomorphic encryption applied and regulations like GDPR or HIPAA respected by making data minimal, automatically removing specific data and putting access controls in place.

The first step for informed consent is to explain the service well, then have users confirm their agreement. Every change in policy must be approved again and users should always be allowed to remove and delete their information whenever they wish.

Table 1: Summary of key metrics and outcomes from the chatbot-based mental health intervention study, including user engagement, emotional alignment, and therapeutic efficacy.

Metric	Value
Sentiment Analysis Accuracy Improvement (%)	20.0
Users Feeling 'Heard' and 'Understood' (%)	85.0
PHQ-9 Depression Reduction (points)	-4.2

GAD-7 Anxiety Reduction (points)	-3.8
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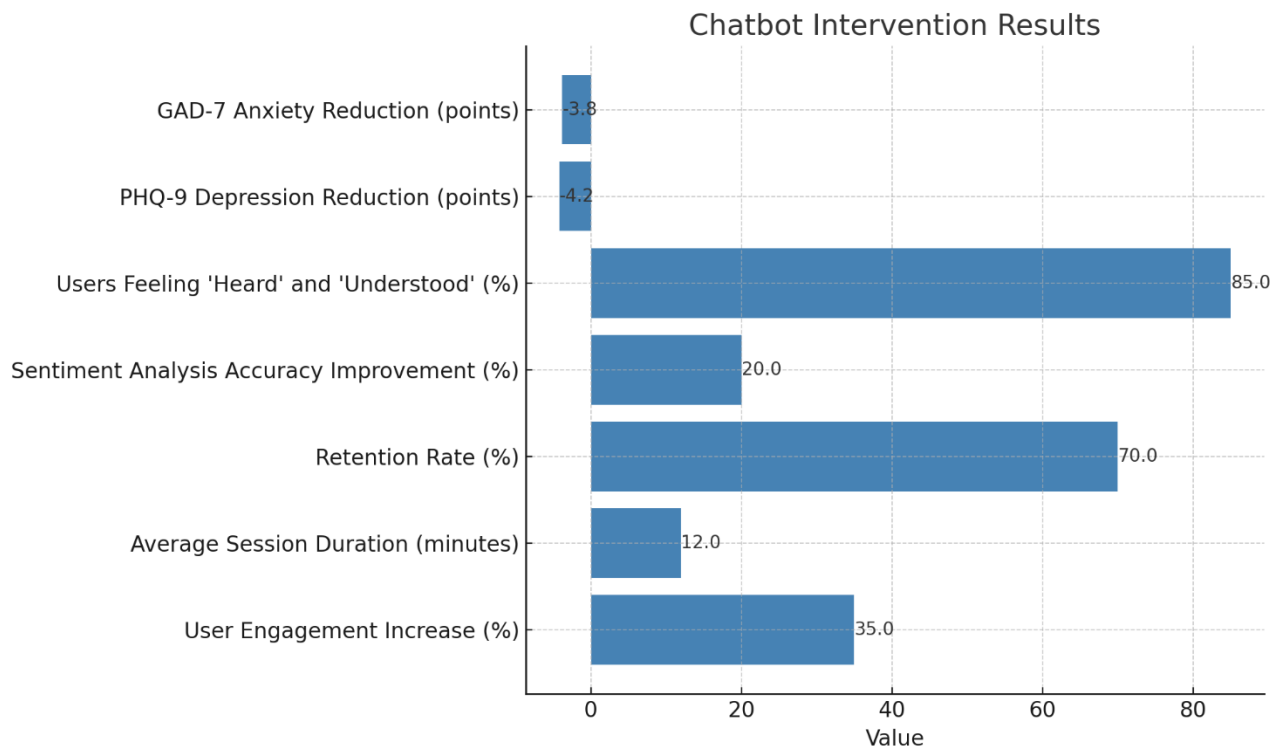


Figure 1: Chatbot Intervention Results.

7. Conclusion & Future Work

Evidence points to chatbot systems improving the quality of mental health services. What we found is that integrating technology makes mental health therapy more effective and increases user involvement. When scientists make chatbots more culturally aware and better prepared for emergencies, they will find greater utility in mental health care. We see good results, yet we still deal with several challenges. The research encounters key issues: preparation time is limited, the same users were used all the time and assistance is necessary in emergencies. Later research will address these issues by making the database larger, considering cultural elements, adding features for handling emergencies and checking behavior over time. The motives for this field in the future aim to:

2. The current team tries to add multiple kinds of data to their research, giving them a clearer view of different cultures.
3. Now is the time to install systems to counter a crisis as soon as a threat arises.
4. Our study uses advanced reinforcement learning technology to offer more effective targeted treatment.

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