

Therapeutic Efficacy of Artificial Intelligence based Counselling for Anxiety and Depression: A Systematic Review

Tanya Kaushik¹, Smriti Sethi^{2*}

Abstract

Background: The occurrence of the COVID-19 pandemic resulted in a notable rise in the prevalence of mental health issues, majorly anxiety and depression. Treatments like cognitive behavioural therapy (CBT) conducted in a face-to-face setting, have consistently demonstrated their effectiveness. Though not always accessible or reasonably priced for everyone, face-to-face treatment environments offer great assistance. AI-based counselling is starting to be a good replacement for those in need of real-time, tailored mental health assistance via virtual experts and conveniently available chatbots. **Objective:** The aim of this article is to evaluate the effectiveness and development of AI-based counselling in the treatment of anxiety and depression. This paper understands the effects of AI-driven interventions with respect to traditional face-to-face therapy. Main concentration being on the evaluation of user engagement, treatment adherence, and the overall effect on mental health outcomes. **Methodology:** A comprehensive review of 40 research papers published between 2012 and 2024 was used. This paper investigated the efficacy of AI-powered therapy in the treatment of anxiety and depression. The research was chosen based on specific criteria that prioritised AI-driven remedies and compared them to conventional therapies in terms of user satisfaction, results, and engagement. **Conclusion:** Including artificial intelligence into therapy has enormous opportunity to increase the accessibility and customisation of mental health treatments to satisfy specific demands. Studies reveal that merging artificial intelligence methods with conventional therapy can significantly help to reduce anxiety and sadness. Combining artificial intelligence techniques with traditional therapy may greatly improve the control of anxiety and depression. Still, challenges remain maintaining the essential human connection, motivating consumers, and facing moral conundrums. Further research is necessary to improve these instruments and easily include them with conventional therapy, ensuring their effectiveness and availability for a population seeking mental health help.

Keywords: AI counselling, anxiety, depression, psychotherapy, treatment adherence

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INTRODUCTION

Since depression and anxiety are pretty common, understanding how mental health impacts overall well-being is super important. According to data from the World Health Organization (WHO, 2017), there has been a 13% increase in the number of people worldwide experiencing mental health conditions over the last decade [1]. Depression, which affects about 3.4% of people, and anxiety, which affects 3.8% of people, are common mental health issues that many individuals deal with.

Maria Komariah et al. (2022) discovered that the COVID-19 outbreak significantly raised the rates of

sadness and anxiety, with increases reaching seven times higher [2]. Adverse responses can significantly disrupt patient adherence to treatment, even when they are receiving behavioural and pharmacological therapy. Experts often recommend prioritizing psychotherapy, particularly cognitive-behavioural therapy, over medication when treating anxiety and depression. Because it's simple to access, offers anonymity, and has various delivery options, online-based CBT has turned into a solid addition to traditional mental health therapies.

The epidemic has significantly increased its popularity, underscoring its effectiveness as a complementary treatment option. AI-driven virtual therapists and chatbots provide round-the-clock support and feature different evidence-based therapies, like quick cognitive behavioural therapy (CBT). Meng Jiang et al. (2024) explored the intricate connections between cognitive processes in social media and artificial intelligence, especially focusing on their role in facilitating effective CBT therapies in a different study [3]. In contexts where conventional therapy is not readily available, these resources prove to be quite beneficial in addressing the deficiencies in mental health care. Similar to CBT, artificial intelligence can help people develop new automatic thinking by assisting them in distinguishing their emotions, thoughts, actions, and reactions. As shown in Figure 1 individuals can monitor their daily emotions or communicate their needs to XiaoNan (chatbots), The chatbot really gets it (Liu et al., 2022) [4].

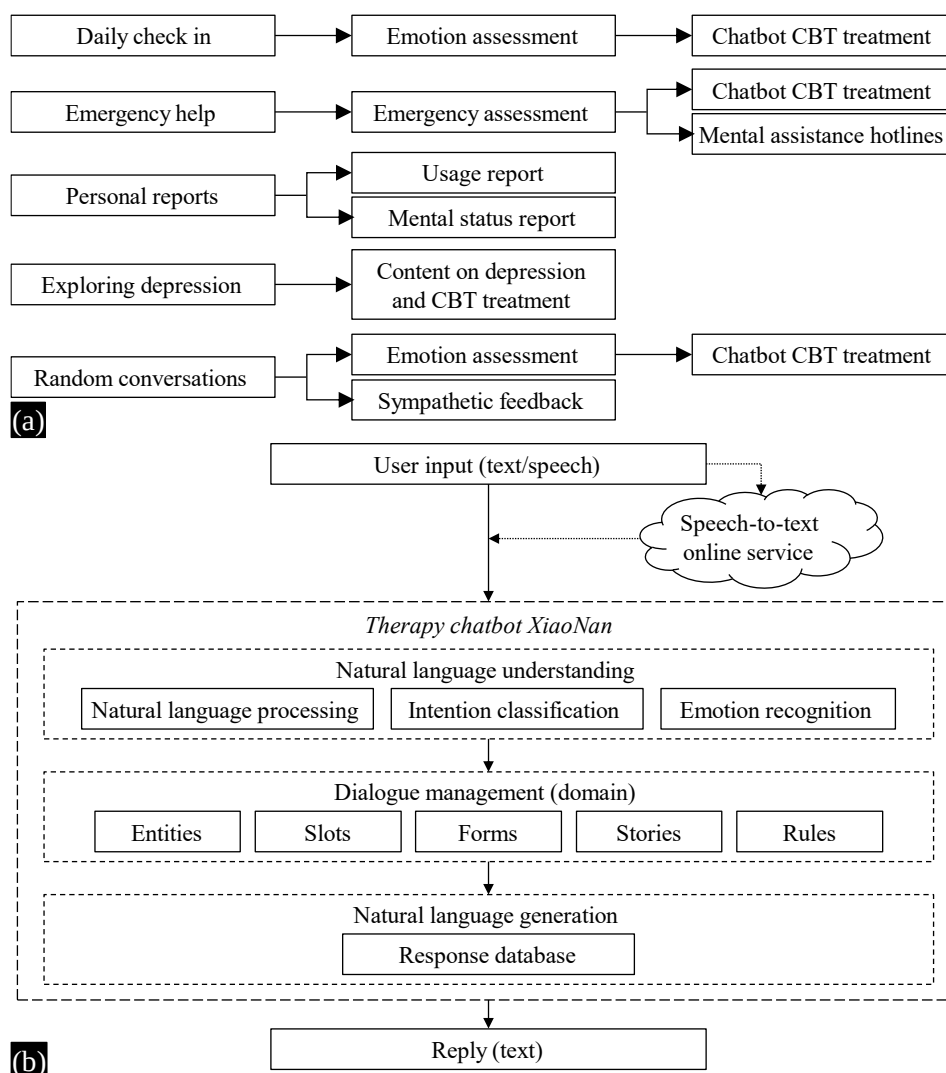


Figure 1. (a) The workflow of the chatbot XiaoNan. (b) The structure of the chatbot XiaoNan.
(Source: <https://www.sciencedirect.com/science/article/pii/S2214782922000021>)

Dr. Sandhya Bhatt (2024) explored 95 studies that focused on AI-based mental health interventions, especially online treatments and chatbots [5]. AI techniques have definitely demonstrated some positive effects, indicating that they could totally complement traditional counselling methods, particularly in rural areas, to help reduce stigma.

Psychology and psychotherapeutic approaches are really making strides and gaining traction with the rise of AI. We're diving into advanced AI technologies to figure out how they can help with early detection and intervention for depression and anxiety. This involves looking at how these tools work, their benefits, drawbacks, and what the future might hold for AI in psychiatry, all with the goal of pushing forward research and development in this area.

Artificial intelligence is totally changing the game in mental health, making it way easier to spot and treat issues like depression and anxiety early on (Zafar et al., 2024) [6]. AI technologies are significantly transforming the landscape of mental health treatment, providing innovative and accessible solutions for individuals experiencing anxiety and depression. A recent study indicates that while AI applications and websites might not fully succeed in addressing emotional illnesses, experienced counsellors are still there to offer support to clients (Fadila et al., 2024) [7].

AI can help people tackle digital challenges at work. Good counsellors know how to handle and adapt to the challenges that come with online counselling. Tech-based products and services can really boost guidance and counselling services (Putri et al., 2024) [8].

Using a personalized strategy boosts the effectiveness of therapies. Tailoring therapies to fit the specific needs and responses of each person results in better outcomes. Andersson et al. (2014) examined research comparing guided ICBT with face-to-face CBT and discovered that both treatment methods are equally effective for social anxiety disorder, panic disorder, depression, body dissatisfaction, tinnitus, male sexual dysfunction, and fear of spiders [9].

Also, AI-powered systems allow for continuous patient monitoring, which helps in making quick therapy adjustments and offers important insights into how patients are doing. The fast-paced growth of these technologies is about to bring a major change to mental health treatment. This revolution is set to boost efficiency, effectiveness, and make things more accessible to a broader group of people.

AI possesses significant potential to enhance mental health care and overall well-being by analysing vast amounts of data and deriving meaningful insights from it through relevant statistics. Artificial intelligence has the potential to be applied in psychology and psychotherapeutic counselling across a range of different contexts. These tasks encompass evaluating and diagnosing patients, forecasting outcomes based on data analysis, tailoring treatment strategies to meet unique individual requirements, facilitating adaptive learning, delivering virtual therapy and chatbot support, monitoring patient progress and conducting follow-ups, supplying decision-making assistance, enhancing operational efficiency, contributing to research and development efforts, and enabling simulation experiences.

Emphasising diagnosis, it's crucial to conduct a comprehensive assessment of AI, particularly in the realms of machine learning and deep learning. The unique way humans interact makes it tough to figure out the pathological states of psychiatric diseases (Aich et al., 2023) [10].

Zhong et al (2024) conducted a meta-analysis to look into how effective AI-powered avatars are for treating anxiety and depression in adults [11]. The findings indicated notable enhancements following an 8-week intervention period. However, the three-month follow-up period did not reveal any significant effects.

Zeb et al (2024) looked into how effective AI treatments are for anxiety and depression by comparing Internet-based CBT with a virtual voice coach [12]. He demonstrated how AI algorithms analyse patient data, leading to more accurate and timely diagnoses and helping to create personalised treatment plans.

AI algorithms can analyse data from various sources, spot patterns, and predict the progression or emergence of mental health issues. This helps clinicians act quickly and step in when needed.

An innovative, interdisciplinary strategy for addressing acrophobia using virtual reality incorporated AI assistance and ethical issues. It received highly favourable reviews from patients and significantly contributed to the advancement of psychotherapy (Obremski et al., 2024) [13].

AI-driven platforms have the capability to adapt treatment materials in real-time, which helps ensure that patients receive the most effective medications tailored to their needs. Virtual therapists and chatbots offer continuous support and treatment, contributing to the reduction of the social stigma frequently associated with seeking help. AI tech could really help out human therapists a lot. It has the capability to provide well-founded recommendations grounded in evidence and identify potential issues through the analysis of extensive data sets. Considering the above, this particular study focuses on working around the aim of:

1. Evaluating the advancements in AI counselling technology and their impact on the outcomes of anxiety and depression therapy.
2. Assessing the efficacy of AI-driven counselling for anxiety and depression in comparison to traditional face-to-face treatment.

REVIEW OF LITERATURE

This study takes a *quantitative research approach*, focussing on a detailed analysis of 40 research that explore AI-based therapy for anxiety and depression. The research highlights measurable improvements in participants' mental health through AI-driven solutions that are available on mobile and web platforms, based on data gathered from earlier trials. These systems use cognitive-behavioural therapy and real-time feedback, combined with machine learning techniques, to provide personalised support. Even though the findings are promising, there definitely is need more research to really understand how effective these therapies are in the long run and to make them more accessible, involve users better, and enhance their overall effectiveness in treating mental health issues.

METHODOLOGY

Aim

To understand and evaluate the efficiency of AI based therapy in the treatment of anxiety and depression.

Objectives

1. To investigate how AI-based counselling systems improve anxiety and depression treatment results
2. To compare AI-driven counselling against face-to-face treatment for anxiety and despair.
3. To evaluate AI-based anxiety and depression therapy user engagement, satisfaction, and adherence.
4. To fully comprehend the obstacles and limits of AI-based therapy for anxiety and depression treatment and necessarily explore the possible improvements.

Method

This review study undertook a thorough examination of 40 *peer-reviewed* research articles to assess the effectiveness of AI-based counselling in addressing anxiety and depression. The study sought to evaluate the efficacy of AI-driven interventions, comparing them to traditional face-to-face therapy, and determining the factors that influence their outcomes. This analysis aimed to consolidate existing knowledge, showcase the progress made in AI counselling technology, and pinpoint potential avenues for future research.

Literature Selection

- The literature search was conducted using major scholarly databases, including PubMed, Science Direct, JMIR Publications, Sage Journals, Frontiers and Google Scholar, to ensure a broad and interdisciplinary collection of studies.

- The search was limited to articles published between 2012 and 2024 in order to encompass the latest developments in AI-based mental health interventions.
- Words including “Artificial Intelligence”, “AI counselling”, “Anxiety”, “Depression” and “Psychotherapy” were used in the search filters to find related review literature

Inclusion and Exclusion Criteria

Inclusion Criteria

- Research studies that have a specific focus on the utilisation of AI-driven counselling interventions for the treatment of anxiety and depression.
- Articles that examine the effectiveness of AI-based counselling in comparison to traditional face-to-face therapy or other conventional mental health treatments.
- Studies that have undergone rigorous evaluation by experts in the field, utilising various research methods such as randomised controlled trials, observational studies, and qualitative research, to evaluate the effectiveness of therapeutic interventions.

Exclusion Criteria

- Articles that fail to distinguish between AI-based and traditional therapeutic approaches.
- Research that focuses on mental health conditions other than anxiety or depression.
- Publications that have not undergone the rigorous process of peer review, such as opinion pieces, editorials, and conference abstracts.

Each of the 40 papers was subjected to a thorough review for methodological rigour using a qualitative research evaluation.

DISCUSSION

AI in Mental Health Therapy

The objective of this study was to explore the therapeutic effectiveness of AI-based counselling for anxiety and depression. This was achieved through an analysis of technological advancements, comparative effectiveness, user engagement, and the challenges that accompany these interventions. The significant global demand for mental health services, juxtaposed with the constrained supply, has led to the emergence of artificial intelligence (AI) as an essential resource for enhancing access to psychological interventions. Cognitive-behavioural therapy (CBT) is a well-established intervention that has been successfully adapted from traditional in-person formats to technology-assisted models. This encompasses the use of AI-driven conversational agents in psychotherapy (Vilaza and McCashin, 2021) [14].

The implementation of AI-driven counselling systems has notably changed the delivery of mental health services, especially in the context of electronic cognitive-behavioural therapy (e-CBT). This innovative method facilitates personalisation tailored to specific care needs, with the degree of therapist engagement being modified as necessary.

Contributions and Potential Benefits of AI driven Therapy

A recent study conducted explored the role of artificial intelligence in enhancing mental health therapy, highlighting various ways in which AI contributes to the improvement of therapeutic practices as shown in Figure 2.

It is important to acknowledge that this customisation process could lead to increased costs (Stephenson et al., 2023) [15]. The significance of these innovations is profound, particularly when we consider the various challenges people face, such as societal stigma, fears regarding job security, and the influence of their social networks, all of which can impede their willingness to seek help in the early stages of anxiety and depression. Research indicates that AI-driven psychotherapy shows potential in overcoming these challenges, as highlighted in study by Arif et al. (2020) [16].

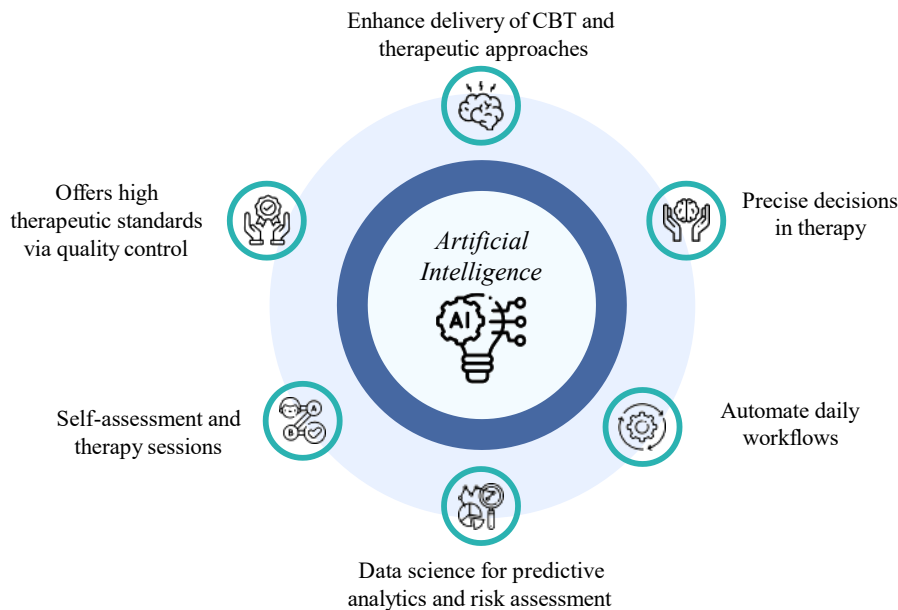


Figure 2. Contributions of AI to enhanced health therapy.

(Source: <https://firminiq.com/how-is-artificial-intelligence-helping-improve-the-mental-health-therapy/>)

The lower costs and adaptable accessibility linked to this method enhance its overall potential. The prevailing trend in mental health is shifting towards personalised medicine, leveraging machine learning and AI to match patient characteristics with tailored treatment approaches. Artificial intelligence systems facilitate tailored decision-making by offering predictions at the individual level regarding the efficacy of independent digital interventions or integrated care models (Jacobson and Nemesure, 2021) [17].

A significant aspect of AI-driven counselling is its ability to connect with marginalized communities, especially in areas where conventional psychotherapy is not readily available. Studies have shown that online therapies, particularly internet-based cognitive behavioural therapy (iCBT) and computerised cognitive behavioural therapy (cCBT), are effective, affordable, and feasible. These alternatives can be especially advantageous for individuals who are in the process of awaiting in-person therapy sessions. Additional research is necessary to fully comprehend the therapeutic impacts of AI-driven interventions on patient engagement and adaptability, as suggested by earlier studies (Gual et al., 2022; Abd-Alrazaq et al., 2023 [18, 19].

AI-driven tools are progressing notably in the realm of behavioural health care, assisting clinicians in collecting objective data, enhancing workflows, and automating various tasks. This ultimately promotes a more efficient and effective therapeutic process (Sadeh et al., 2023) [20]. The efficacy of these tools, including AI-enabled chatbots, has been shown to deliver interventions that were once the domain of healthcare professionals. The outcome of this has been enhanced access to healthcare for at-risk groups, which has contributed to tackling the issues related to cost and performance management (Omarov et al., 2023) [21]. Virtual reality (VR) and augmented reality (AR) technologies demonstrate significant promise in addressing anxiety disorders and improving social skills among individuals. The innovative tools present a new viewpoint on therapeutic interventions, as emphasised by recent research (Carlson, 2023) [22].

CHALLENGES AND ETHICAL CONSIDERATIONS

Even with these encouraging developments, AI-based counselling systems continue to face numerous challenges. There remain considerable ethical issues that must be resolved prior to the complete integration of AI into mental health practice. Concerns in this context encompass the transparency of algorithms, the autonomy of patients, and the evaluations of risk (Fiske et al., 2019) [23]. Additionally, it is important to

consider the worries surrounding job displacement for mental health practitioners and the enduring effects that AI technologies may have on society in the realm of mental health (Luxton, 2014) [24].

Assessing the effectiveness of AI-driven interventions necessitates a comprehensive analysis of both engagement and satisfaction metrics. Research findings suggest that people using AI-enhanced psychotherapy, particularly in real-time or close to real-time situations, have expressed notably high levels of satisfaction. The use of AI could significantly enhance accessibility to mental health care for those who might be reluctant to pursue assistance, particularly through its role in facilitating pre-screening evaluations for anxiety and depression. Nonetheless, the full potential of these technologies can only be achieved through improvements in user compliance and continuous research aimed at maximising their therapeutic effects (Oh et al., 2020; Mehta et al., 2021) [25, 26].

FUTURE RECOMMENDATIONS AND SUGGESTIONS

Ultimately, the use of AI-driven counselling could significantly enhance the quality of mental health care. Offering affordable, readily available, and tailored therapeutic interventions for anxiety and depression can significantly influence outcomes. It is essential to tackle challenges like ethical concerns, engagement, and technological limitations to enhance the effectiveness of these systems. Continued research and development are crucial for improving AI-based mental health interventions and increasing their availability to marginalised groups (Nosrati et al., 2020) [27]. Mental health professionals are essential in shaping, assessing, and ethically incorporating AI technologies into their practice. Their knowledge guarantees that AI serves as an enhancement to conventional therapeutic methods, instead of acting as a substitute (Fulmer et al., 2018; Heinz et al., 2023) [28, 29].

CONCLUSION

The integration of AI-based therapy presents significant potential in addressing global challenges associated with the treatment of anxiety and depression. While there is a general consensus that face-to-face cognitive-behavioural therapy (CBT) represents the optimal method in psychotherapy, it frequently encounters limitations such as accessibility, financial constraints, and the potential for social stigma. AI-driven treatments offer a scalable and accessible approach to delivering personalised mental health care at a reasonable cost. While advancements in artificial intelligence technologies are increasingly impressive, it is unlikely that they will fully supplant human therapists. The human elements of empathy, emotional understanding, and complex problem-solving are inherently unique and cannot be replicated by artificial intelligence. Conversely, within the realm of psychotherapy, it seems that artificial intelligence is likely to serve as a beneficial tool that complements, rather than substitutes, the work of human professionals.

Key Findings

- Solutions powered by artificial intelligence have the potential to enhance routine tasks such as monitoring patients, tracking their progress, and applying standardised therapeutic approaches. This allows therapists to focus on more complex and individualised cases.
- In areas where traditional therapy options are limited, AI-driven counselling platforms can significantly aid marginalised populations by providing accessible and cost-effective support.
- The integration of real-time insights, personalised therapy, and decision support systems is anticipated to enhance therapeutic processes, positioning AI as a valuable resource for therapists.
- With the advancement of artificial intelligence, it is anticipated that hybrid therapist roles will emerge. In these roles, human therapists will collaborate with AI technology to deliver more data-driven and effective treatments, all while maintaining the essential qualities of human empathy and understanding.
- The increasing integration of artificial intelligence in mental health care necessitates continuous ethical evaluation. This addresses the necessity for transparency, respecting patient autonomy, and ensuring that artificial intelligence functions as a supportive tool rather than taking a dominant role in medical treatment.

- Professionals working in mental health must engage in training and adaptation to successfully integrate AI tools into their practices. This entails acquiring the necessary knowledge and skills to provide treatment in an ethical and empathetic manner.

REFERENCES

1. Depression WH. Other common mental disorders: global health estimates. Geneva: World Health Organization. 2017 Feb;24(1).
2. Komariah M, Amirah S, Faisal EG, Prayogo SA, Maulana S, Platini H, Suryani S, Yosep I, Arifin H. Efficacy of internet-based cognitive behavioral therapy for depression and anxiety among global population during the COVID-19 pandemic: a systematic review and meta-analysis of a randomized controlled trial study. *InHealthcare* 2022 Jun 30 (Vol. 10, No. 7, p. 1224). MDPI.
3. Jiang M, Yu YJ, Zhao Q, Li J, Song C, Qi H, Zhai W, Luo D, Wang X, Fu G, Yang BX. AI-Enhanced Cognitive Behavioral Therapy: Deep Learning and Large Language Models for Extracting Cognitive Pathways from Social Media Texts. *arXiv preprint arXiv:2404.11449*. 2024 Apr 17.
4. Liu H, Peng H, Song X, Xu C, Zhang M. Using AI chatbots to provide self-help depression interventions for university students: A randomized trial of effectiveness. *Internet Interventions*. 2022 Mar 1; 27:100495.
5. Bhatt S. Digital Mental Health: Role of Artificial Intelligence in Psychotherapy. *Annals of Neurosciences*. 2024 Apr 22:09727531231221612.
6. Zafar F, Alam LF, Vivas RR, Wang J, Whei SJ, Mehmood S, Sadeghzadegan A, Lakkimsetti M, Nazir Z. The Role of Artificial Intelligence in Identifying Depression and Anxiety: A Comprehensive Literature Review. *Cureus*. 2024 Mar;16(3).
7. Fadila WR, Fitri SE, Azzahra MP. Utilization of AI to Support the Diagnosis of Emotional Disorders in Counseling. *BICC Proceedings*. 2024 Jun 10; 2:125-31.
8. Putri RA, Mailana Z, Fadilah N, Mardenil F, Oktarini I. The Effectiveness of Artificial Intelligence Technology in Facing the Challenges of Guidance and Counseling in the Digital Age. *BICC Proceedings*. 2024 Jun 10; 2:213-9.
9. Andersson G, Cuijpers P, Carlbring P, Riper H, Hedman E. Guided Internet-based vs. face-to-face cognitive behavior therapy for psychiatric and somatic disorders: a systematic review and meta-analysis. *World psychiatry*. 2014 Oct;13(3):288-95.
10. Aich K, Kashyap S, Tyagi K, Verma I, Chauhan A, Jain CK. Understanding the potentiality of artificial intelligence in psychological disorders detection and diagnostics. *OBM Neurobiology*. 2023 Nov;7(4):1-22.
11. Zhong W, Luo J, Zhang H. The therapeutic effectiveness of artificial intelligence-based chatbots in alleviation of depressive and anxiety symptoms in short-course treatments: A systematic review and meta-analysis. *Journal of Affective Disorders*. 2024 Apr 15.
12. Zeb S, Nizamullah FN, Abbasi N, Fahad M. AI in healthcare: revolutionizing diagnosis and therapy. *International Journal of Multidisciplinary Sciences and Arts*. 2024 Aug 17;3(3):118-28.
13. Obremski D, Wienrich C. Autonomous VR Exposure Therapy for Anxiety Disorders Using Conversational AI—Ethical and Technical Implications and Preliminary Results. *Journal of Computer and Communications*. 2024 Apr 1;12(4):111-38.
14. Vilaza GN, McCashin D. Is the automation of digital mental health ethical? Applying an ethical framework to chatbots for cognitive behaviour therapy. *Frontiers in Digital Health*. 2021 Aug 6; 3:689736.
15. Stephenson C, Jagayat J, Kumar A, Khamooshi P, Eadie J, Pannu A, Meartsi D, Danaee E, Gutierrez G, Khan F, Gizzarelli T. Comparing clinical decision-making of AI technology to a multi-professional care team in an electronic cognitive behavioural therapy program for depression: protocol. *Frontiers in Psychiatry*. 2023 Dec 21; 14:1220607.
16. Arif M, Basri A, Melibari G, Sindi T, Alghamdi N, Altalhi N, Arif M. Classification of anxiety disorders using machine learning methods: a literature review. *Insights Biomed Res*. 2020;4(1):95-110.

17. Jacobson NC, Nemesure MD. Using artificial intelligence to predict change in depression and anxiety symptoms in a digital intervention: evidence from a transdiagnostic randomized controlled trial. *Psychiatry research*. 2021 Jan 1; 295:113618.
18. Gual-Montolio P, Jaén I, Martínez-Borba V, Castilla D, Suso-Ribera C. Using artificial intelligence to enhance ongoing psychological interventions for emotional problems in real-or close to real-time: a systematic review. *International Journal of Environmental Research and Public Health*. 2022 Jun 24;19(13):7737.
19. Abd-Alrazaq A, AlSaad R, Aziz S, Ahmed A, Denecke K, Househ M, Farooq F, Sheikh J. Wearable artificial intelligence for anxiety and depression: scoping review. *Journal of Medical Internet Research*. 2023 Jan 19;25: e42672.
20. Sadeh-Sharvit S, Camp TD, Horton SE, Hefner JD, Berry JM, Grossman E, Hollon SD. Effects of an artificial intelligence platform for behavioral interventions on depression and anxiety symptoms: randomized clinical trial. *Journal of Medical Internet Research*. 2023 Jul 10;25: e46781.
21. Omarov B, Narynov S, Zhumanov Z. Artificial Intelligence-Enabled Chatbots in Mental Health: A Systematic Review. *Computers, Materials & Continua*. 2023 Mar 1;74(3).
22. Carlson CG. Virtual and augmented simulations in mental health. *Current Psychiatry Reports*. 2023 Sep;25(9):365-71.
23. Fiske A, Henningsen P, Buyx A. Your robot therapist will see you now: ethical implications of embodied artificial intelligence in psychiatry, psychology, and psychotherapy. *Journal of medical Internet research*. 2019 May 9;21(5): e13216.
24. Luxton DD. Artificial intelligence in psychological practice: Current and future applications and implications. *Professional Psychology: Research and Practice*. 2014 Oct;45(5):332.
25. Oh J, Jang S, Kim H, Kim JJ. Efficacy of mobile app-based interactive cognitive behavioral therapy using a chatbot for panic disorder. *International journal of medical informatics*. 2020 Aug 1; 140:104171.
26. Mehta A, Niles AN, Vargas JH, Marafon T, Couto DD, Gross JJ. Acceptability and effectiveness of artificial intelligence therapy for anxiety and depression (Youper): longitudinal observational study. *Journal of medical Internet research*. 2021 Jun 22;23(6): e26771.
27. Nosrati S, Sabzali M, Heidari A, Sarfi T, Sabbar S. Chatbots, counselling, and discontents of the digital life. *Journal of Cyberspace Studies*. 2020 Jul 1;4(2):153-72.
28. Fulmer R, Joerin A, Gentile B, Lakerink L, Rauws M. Using psychological artificial intelligence (Tess) to relieve symptoms of depression and anxiety: randomized controlled trial. *JMIR mental health*. 2018 Dec 13;5(4): e9782.
29. Heinz MV, Bhattacharya S, Trudeau B, Quist R, Song SH, Lee CM, Jacobson NC. Testing domain knowledge and risk of bias of a large-scale general artificial intelligence model in mental health. *Digital Health*. 2023 Apr; 9:20552076231170499.