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INDIA MENTAL HEALTH
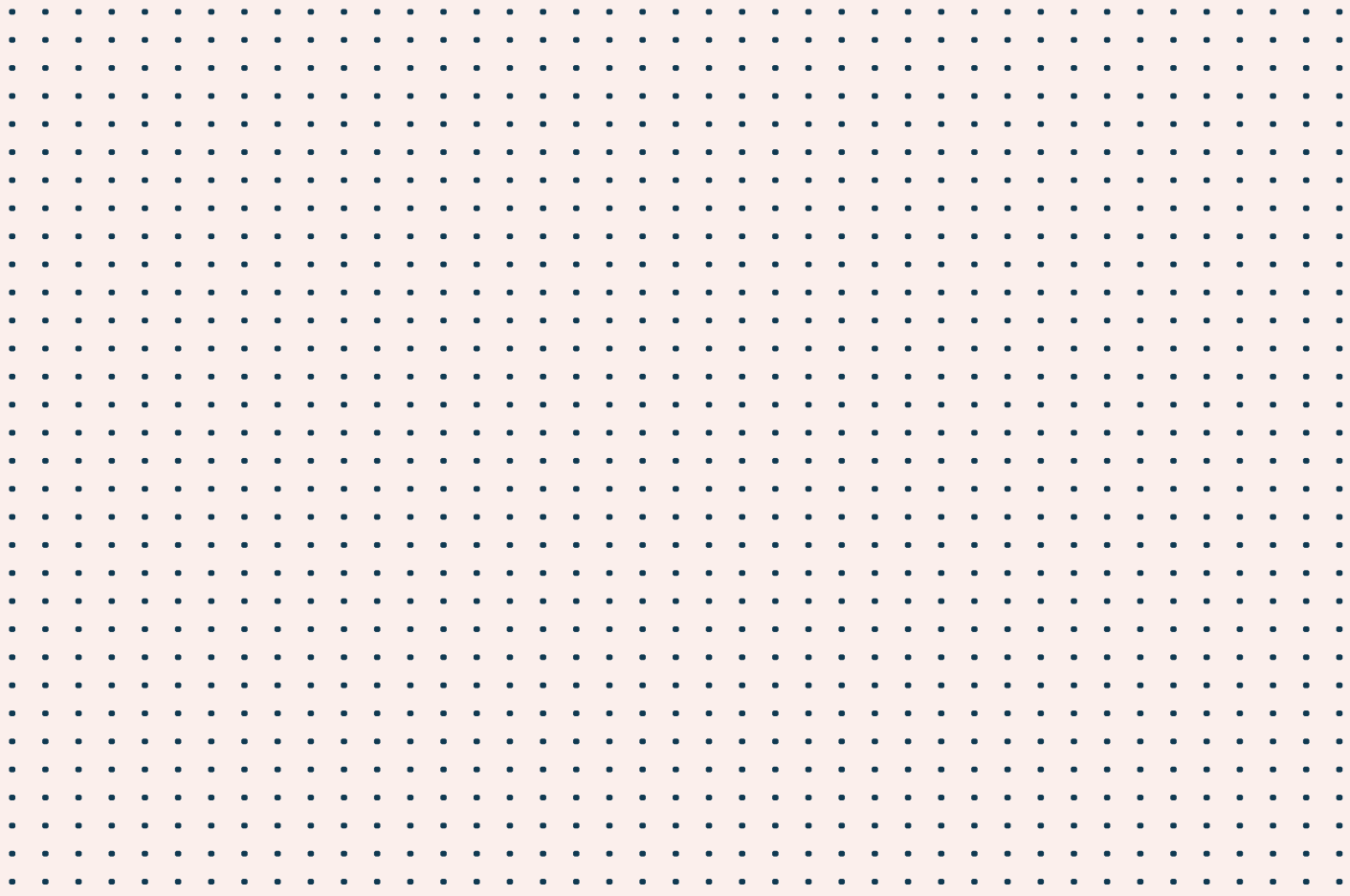OBSERVATORY

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Delving into Digital Mental Health: Part 3

Exploring research & applications of interventions in India

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Introduction

Digital mental health resources, such as smartphone applications, online platforms, chat forums, teletherapy, and AI-driven services, have gained popularity over the last decade. These innovations show potential to address the mental health burden in India and reducing the treatment gap, but not all of them are supported by evidence.

This brief is the third in a series of briefs about digital mental health and explores the extent of adoption in India, the evidence supporting such interventions, and recommendations for the near future.

Categories of tools in this brief

Treatment tools
Tools or interventions that support treatment including:
- In-person interventions carried out digitally
- Digital alternatives to treatment
- Additional non-professional support such as chat rooms and peer support
- Treatment aids that supplement treatment such as using virtual reality to support therapy

Monitoring tools
Manual or automatic tools to track or monitor mental health-related parameters such as mood, medication, and sleep.

Electronic health records

In-person interventions carried out digitally

Digital interventions that are a variant of commonly used in-person treatment fall under this category, and include telemedicine and online consultations, crisis helplines, asynchronous store-and-forward telepsychiatry (ATP), and alternative treatment such as mindfulness interventions delivered online.

Telemedicine involves consultations over audio or audio-video platforms and includes psychiatric consultations and counselling. For psychiatric consultations, evidence has shown online consultations via videoconferencing to be as effective as face-to-face consultations in terms of symptom reduction and satisfaction with care[1,2,3,4].

Evidence also supports reliable diagnosis for psychiatric illnesses over video consultations[1]. There is insufficient evidence for the validity of diagnosing mental illnesses through audio-based telephone interviews[5].

Research about counselling via videoconferencing shows that this approach is as effective as face-to-face counselling for anxiety[6], panic disorder[7], post-traumatic stress disorder in veterans[8], and depression[9]. A review of telephone-based counselling for depression and anxiety reported a medium to large effect size on symptom severity through telephone-based counselling[10]. A review did not find a difference between face-to-face consultations and videoconferencing for therapeutic alliance as rated by the patient or the therapist[11].

There are gaps in literature around specific populations, a mix of telemedicine and face-to-face consultations, and the difference between video consultations and audio-only consultations.

In India, there has been an uptake of audio and video modalities by the government to scale and expand mental health services across the country. The National Tele Mental Health Programme, also called Tele MANAS, is a government tele mental health service that has 53 cells in 35 states and UTs[12]. Another government initiative, eSanjeevani, is a video-based consultation system that also allows for prescription of medicines[13]. Tele MANAS has been integrated with eSanjeevani so that psychiatrists can prescribe medicines virtually to users of Tele MANAS.

However, primary care professionals attending to eSanjeevani consultations are overworked and do not have sufficient time for online consultations in addition to their primary care practice[14]. Training of more healthcare professionals is of paramount importance, and purely focusing on improving digital services is not sufficient.

SCARF also introduced a mobile telepsychiatry unit in 2010, delivering telepsychiatry to an entire district through a bus that contains a consultation room with video equipment and a pharmacy[15].

Crisis helplines have some evidence indicating improvements in immediate outcomes such as level of distress, degree of suicidal urgency, and depression status[16]. Evidence supports a significant decrease in suicidal ideation and improvement in mental state from the beginning to the end of a call, with a substantial reduction in the proportion of individuals at risk of suicide. Studies in this review largely found that a sizable portion of calls ended in resolution of distress or successful referral to mental health services. Apart from immediate outcomes, some studies measured short-term distal effects, but these studies faced significant drop-out rates. Evidence supporting long-term change is lacking, both in India and globally.

A study conducted in India noted that a little less than 10% of the callers expressed suicidal ideation[17]. Over half of the individuals given outpatient referrals kept the appointment, indicating the effectiveness of crisis helplines as a way of promoting help-seeking in vulnerable populations, and the importance of having outpatient services that responders can easily refer individuals to.

In India, there are several non-governmental helplines across states at varying levels of functioning. Some states, like Assam, Chhattisgarh and Kerala, have crisis helplines set up by the government. In addition to these helplines, in 2020, the Ministry of Social Justice and Empowerment set up a helpline called KIRAN in 13 languages. KIRAN is now merged with Tele MANAS[18].

Most helplines only run during specific periods of the day, and not 24x7. Non-governmental helplines cite shortage of manpower, burnout, and lack of funding as the challenges to running a helpline successfully.

Asynchronous store-and-forward telepsychiatry (ATP) involves recording of patient interviews by the primary care provider and forwarding it to a psychiatrist who can view it in their own time and provide treatment guidance. Evidence supporting it is limited, with preliminary evidence indicating improvement in depression and post-traumatic stress symptoms[19].

Evidence about patient satisfaction is also limited, with one study reporting satisfaction with ATP that was high but lower than satisfaction with synchronous telemedicine[20].

In India, a centre in Maharashtra evaluated 94 asynchronous consultations for feasibility and referral patterns. A definitive diagnosis could not be reached in 5%. However, the accuracy of the diagnosis arrived at by ATP was not evaluated[21].

Asynchronous store-and-forward telepsychiatry could utilise specialist time more efficiently, but does not have cost-effectiveness, feasibility, and acceptability trials in India. Implementing such a method would also require investing in infrastructure such as video recording equipment, storage infrastructure and good internet access. This method is likely to face the same challenges as eSanjeevani – overworked primary care professionals, poor internet connectivity, and lack of video-based infrastructure, but a small-scale trial could evaluate its effectiveness and cost-effectiveness when compared to consultations through Tele MANAS.

Mindfulness interventions delivered online have limited evidence. Studies in other parts of the world show a small but significant impact on mild depression, anxiety, well-being, and stress[22]. The few studies that exist in India are not robust.

Digital alternatives to treatment

This category includes alternatives to in-person treatment that do not involve any professional guidance. Commonly used approaches that fall under this category are digital therapies (internet-based Cognitive Behavioural Therapy), self-care apps, artificial intelligence (AI) chatbots used for support or therapy, and AI-based tools that are not explicitly directed as mental health but are being used so (e.g., ChatGPT).

Internet-Based Cognitive Behavioural Therapy (iCBT) refers to a form of therapy that uses online platforms to deliver evidence-based cognitive-behavioural therapy (CBT) interventions adapted to self-guided use. CBT is a widely used therapeutic approach that focuses on identifying and changing negative thought patterns and behaviours. iCBT involves tools such as mobile apps that guide an individual through the steps of CBT.

It is supported by evidence for depression, anxiety disorders, obsessive compulsive disorder, severe health anxiety, irritable bowel syndrome, eating disorders, cannabis use, and pathological gambling[23,24,25,26]. Reviews found iCBT to produce similar effect sizes as in-person conventional CBT in adults[26,27]. However, a large fraction of studies on iCBT are based in the United States and provide little information in the way of cultural background factors.

> Several web platforms and phone apps claim to provide iCBT, many of which are available in India.
>
> iCBT can be carried out with minimal involvement of a professional. It is promising as it is backed by evidence and significantly reduces therapist time per patient. For iCBT to be used effectively in mental healthcare in India, iCBT apps will need to be regulated to ensure that quality therapy is provided. iCBT content will need to be adapted to the Indian context and languages. Options that do not require internet access should be developed to improve equity.

Self-care apps using meditation without the involvement of a professional have a mixed evidence base, with some studies showing a small effect for perceived stress, symptoms of depression and anxiety, life satisfaction, quality of life, burnout, and psychological well-being[28]. Adherence was poor, and adverse effects such as increased anxiety, depression, psychotic symptoms, dissociation/depersonalisation, and cognitive anomalies were present in about a quarter of the population using the apps[29].

> Plenty of self-care apps are available in app stores. In October 2024, the Indian government released a Tele MANAS application, which offers comprehensive services ranging from educational resources and success stories to self-help resources and a means to connect with healthcare professionals[30].

AI chatbots are seen as a promising step in mental healthcare. AI chatbots can be classified into two categories: rule-based chatbots and intelligent chatbots. Rule-based chatbots use some predefined rules to structure the conversation, while intelligent chatbots generate responses from scratch. Generative chatbots are inherently risky as the responses are generated on the fly. While both exist in the mental healthcare field and have different effects, studies often do not differentiate between the two.

A recent study found a generative chatbot developed specifically for therapy to be as effective as gold-standard therapy. Safety was prioritised with the research team being at hand and ready for risk management of participants in acute crises[31]. A meta-analysis found a significant effect of AI chatbots on depression and distress, with generative chatbots and chatbots integrated with mobile/messaging applications being more effective[32]. A meta-analysis of a limited number of randomised controlled trials indicates that chatbots have a statistically significant but clinically insignificant effect on depression when compared to treatment as usual, a significant effect on stress when compared to a waitlist, no effect on anxiety when compared to an intervention that solely provided information on anxiety, and mixed results about positive and negative affect[33]. A review of AI chatbots indicated potential benefits in improving mental and emotional well-being and facilitating behaviour change. Usability, user engagement, and integration into healthcare were identified as areas of concern[34].

> Rule-based AI chatbots are presently available in Indian App stores. These apps are generally based on cognitive behavioural therapy techniques to structure conversations and use natural language processing to make the conversation more human-like. Commonly used examples of rule-based AI chatbots are Wysa and Woebot. Both Wysa and Woebot have research studies backing their use, but several of the studies conducted so far have either been funded by the respective organisation or involved employees as researchers. Wysa has launched a Hindi version of the chatbot, an important step in improving access to the chatbot among non-English speakers. As per the census in 2011, over 528 million Indians speak Hindi, and around 300 thousand speak English[35].
>
> Apart from AI chatbots, basic chatbots are also increasingly being deployed on WhatsApp by crisis services. Examples are the Tele MANAS chatbot launched in Jammu & Kashmir and the iCALL chatbot. These chatbots offer resources on mental health and well-being and encourage users to seek help.

AI chatbots hold promise because of their ability to emulate human conversation and the potential ease of access and scaling up in the Indian setting with its limited mental health professionals. A recent study in England that used AI chatbots found increased referrals to mental health services, particularly among minorities[36].

AI chatbots that have not been developed specifically for healthcare are also being used to seek healthcare information and support. Examples are ChatGPT and Bard, AI chatbots that generate responses based on questions asked in a conversational format. These chatbots are sometimes seen as a helpful tool by users but have an inherently higher risk of unsuitable or harmful responses[37,38].

More research is needed to find safe ways to leverage AI chatbots in mental health treatment. Limited public health funds could be used for research about the effectiveness, safety, and applicability of existing chatbots to the Indian mental health context. Regulations that evaluate and control which chatbots enter the market are needed.

Additional non-professional support

Online chat rooms, peer-to-peer/non-professional individual chats, and online peer support meets are often used by people with mental health concerns. Research about these alternatives is scarce. Limited evidence about chat rooms indicates that they are beneficial for improving psychological perspectives and self-efficacy and encouraging help-seeking behaviour, especially when they are moderated[40,41]. None of these options are widespread in India.

Treatment aids

This category of digital tools includes virtual reality to supplement therapy and clinician decision support tools to help primary care physicians diagnose and treat mental illnesses.

Virtual reality (VR) has been studied primarily as exposure therapy to simulate real-world situations that trigger anxiety in the form of phobias, social anxiety, and post-traumatic stress disorder. Evidence suggests that VR is effective in supplementing exposure therapy for specific phobias, social anxiety, and posttraumatic stress disorder, with an effect comparable to standard evidence-based approaches[42,43,44,45]. VR-based therapy, however, comes with the risk of depersonalisation or derealisation; a study found transient symptoms of depersonalisation or derealisation in individuals after the use of VR headsets[46]. While these effects were transient, in susceptible populations, a more prolonged or severe effect might be seen.

In India, a small number of clinics offer virtual reality enabled therapy, but the technology is not widespread. Validated and open access VR applications that can be used in research or in practice are lacking, a challenge that implies applications have to be developed from scratch and validated in clinical trials. This makes the process time- and resource-intensive and not feasible given the lack of evidence that VR alternatives will be more effective or cost-effective than traditional modes of treatment.

Clinician decision support is beneficial to expand mental healthcare to non-specialist clinicians, especially in rural or remote areas. Diagnostic tools that use algorithms or flow-charts that lead to relevant modules make it easier for clinicians to navigate a complex web of symptoms and diagnoses. Studies about the Mental Health Gap Action Programme (mhGAP), a diagnostic guide for non-specialist clinicians, demonstrated improved knowledge, attitudes and confidence post-training, and improved symptoms and engagement with care[47]. The mhGAP is also available in a mobile phone app format.

In India, the use of clinician decision support has been limited to a few research trials, with only one trial testing a digital application for clinician support. The trial, conducted at 3 centres in Himachal Pradesh, Uttarakhand and Jammu & Kashmir, involved an application used by non-psychiatrists in remote locations to diagnose psychiatric conditions. The diagnostic system consisted of an initial screening module, followed by modules for 18 mental health conditions. The application was found to have good sensitivity and reliability across disorders[48]. A similar tool was developed for children and adolescents which demonstrated moderate to substantial agreement for all disorders except psychosis for 50 patients[49].

Monitoring

Several types of monitoring tools exist. They can be broadly categorised as tools that require manual updating and automatic monitoring or tracking tools.

Manual tracking tools include medication tracking apps, mood/sleep monitoring, and journalling. Not much evidence exists about the effectiveness of mood/sleep monitoring or digital journalling in improving mental health outcomes. Evidence supports medication tracking apps improving adherence to medical regimens[50].

Automatic monitoring tools include digital pills, digital phenotyping, and monitoring and surveillance by other entities such as social media organisations. Digital pills are pills with sensors that detect whether medication is taken or not. Some evidence shows that digital pills are effective in determining whether the medication was taken or not, but not that digital pills lead to better adherence. Digital pills also pose ethical challenges around patient autonomy and privacy[51].

Digital phenotyping is the use of personal digital devices for moment-by-moment monitoring to create a profile of the person. In the field of mental health, digital phenotyping takes on the form of using data collected automatically in the background by smart devices including phones and smart watches as proxies of behaviour and mental health. This data includes language used, movement, biomarkers such as heartrate etc. to develop a model of the user's mental health using machine learning. Digital phenotyping is being studied increasingly across the world, with evidence supporting its use for mood disorders, anxiety disorders, schizophrenia, and substance use[52].

In India, manual tracking apps are widespread, digital pills are not in use, and surveillance by other social media organisations such as Meta is present but not localised to India. Digital phenotyping, considering its promise in making mental healthcare more efficient, is a focus of research in India, with a multi-site study indicating its effectiveness for schizophrenia[53]. Further, studies to evaluate the reliability and cost-effectiveness of digital phenotyping should be conducted.

Electronic Health Records

Electronic health records are digital versions of all patient health data and are considered important in the process of achieving universal health care. They have the potential to make healthcare more efficient, cost-effective, and accessible.

The Indian government is promoting the creation of electronic health records and has launched the Ayushman Bharat Digital Mission (ABDM). The Ayushman Bharat Digital Mission calls for the creation of a Unique Health Identifier (UHID), a unique identification number for each individual linking to the electronic health record of that individual.

A project has been initiated through which ABDM health records will be created for all healthcare facilities at 100 microsites (a collection of over 1000 or 500 healthcare facilities) across the country[54]. The project is now expanding with 120 microsites active so far[55].

The Karnataka government has a system called e-Manas, a mental healthcare management system. An aspect of e-Manas is the creation of a record for service users across inpatient and outpatient care, including treatment, supported admissions, and patient history, but it is unclear whether this will be integrated into the Ayushman Bharat Digital Missions UHIDs[56].

Conclusion

It is important to direct attention and resources to the solutions most likely to improve mental healthcare as it currently stands in India. The situation is characterised by a dearth of trained professionals, reduced access to quality healthcare in remote areas, insufficient buy-in for task sharing in primary healthcare, high stigma, and shortage of resources required to improve public mental healthcare. Given this setting, the most promising digital interventions are those that can reduce the burden on available professionals, improve access to high quality care, and use lesser resources.

Limited access to digital devices and the internet in rural or low-income areas threatens to increase the healthcare gap between those in different socio-economic strata. Digital illiteracy can be countered through user-friendly interfaces, easy-to-understand instructions, and providing necessary support or training to enhance digital literacy, backed by user studies and research. There are no regulations in India assessing the effectiveness and safety of digital healthcare tools, and this needs to change. These regulations could include evaluating safety, adherence to the claims they make and their advertising, and accuracy of the information provided with respect to the current evidence for the tools in question. Regulations around liability in the case of adverse outcomes will also need to be determined through discussions around who is responsible when technology goes awry.

While digital tools can enhance mental wellbeing in resource-poor settings, they cannot be seen as a complete solution to the mental health treatment gap. Public health and intersectoral solutions to improve access to conventional treatment remain important and should not fall by the wayside.

References

1. Hilty DM, Ferrer DC, Parish MB, Johnston B, Callahan EJ, Yellowlees PM. The Effectiveness of Telemental Health: A 2013 Review. *Telemedicine and e-Health*. 2013;19(6):444-454.

2. Barnett P, Goulding L, Casetta C, et al. Implementation of Telemental Health Services Before COVID-19: Rapid Umbrella Review of Systematic Reviews. *Journal of Medical Internet Research*. 2021;23(7).

3. Shaker AA, Austin SF, Storebø OJ, et al. Psychiatric Treatment Conducted via Telemedicine Versus In-Person Modality in Posttraumatic Stress Disorder, Mood Disorders, and Anxiety Disorders: Systematic Review and Meta-Analysis. *JIMR Mental Health*. 2023;10.

4. O'Reilly R, Bishop J, Maddox K, Hutchinson L, Fisman M, Takhar J. Is telepsychiatry equivalent to face-to-face psychiatry? Results from a randomized controlled equivalence trial. *Psychiatric Services*. 2007;58(6):836-843.

5. Muskens EMH, Lucassen P, Groenleer W, van Weel C, Voshaar RO, Speckens A. Psychiatric diagnosis by telephone: is it an opportunity? *Social Psychiatry and Psychiatric Epidemiology*. 2014;49:1677-1689.

6. Berryhill MB, Halli-Tierney A, Culmer N, et al. Videoconferencing psychological therapy and anxiety: a systematic review. *Family Practice*. 2019;36(1):53-63.

7. Bouchard S, Paquin B, Payeur R, et al. Delivering cognitive-behavior therapy for panic disorder with agoraphobia in videoconference. *Telemedicine and e-Health*. 2004;10(1):13-25.

8. Germain V, Marchand A, Bouchard S, Drouin MS, Guay S. Effectiveness of cognitive behavioural therapy administered by videoconference for posttraumatic stress disorder. *Cognitive Behavior Therapy*. 2009;38(1):42-53.

9. Berryhill MB, Culmer N, Williams N, et al. Videoconferencing Psychotherapy and Depression: A Systematic Review. *Telemedicine and e-Health*. 2019;25(6):435-446.

10. Coughtrey AE, Pistrang N. The effectiveness of telephone-delivered psychological therapies for depression and anxiety: A systematic review. *Journal of Telemedicine and Telecare*. 2016;24(2).

11. Seuling PD, Fendel JC, Spille L, Göritz AS, Schmidt S. Therapeutic alliance in videoconferencing psychotherapy compared to psychotherapy in person: A systematic review and meta-analysis. *Journal of Telemedicine and Telecare*. 2023;30(10).

12. *Tele MANAS*. https://telemanas.mohfw.gov.in/#/home

13. *eSanjeevani*. https://esanjeevani.mohfw.gov.in/#/

14. Barnagarwala T. The numbers don't tell the real story: Centre's ambitious telemedicine initiative is struggling. Scroll.in. January 13, 2023. Accessed March 28, 2024. https://scroll.in/article/1041450/the-numbers-dont-tell-the-real-story-centres-ambitious-telemedicine-initiative-is-struggling

15. Thara R, Sujit J. Mobile telepsychiatry in India. *World Psychiatry*. 2013;12(1):84. doi:10.1002/wps.20025

16. Hoffberg AS, Stearns-Yoder KA, Brenner LA. The Effectiveness of Crisis Line Services: A Systematic Review. *Frontiers in Public Health*. 2020;7.

17. Shrivastava AK, Johnston M, Stitt L, et al. Suicidal ideation in callers to a crisis hotline in Mumbai, India. *Journal of Public Health and Epidemiology*. 2013;5(7):305-308.

18. Ministry of Health and Family Welfare. Dr. V K Paul, Member NITI Aayog inaugurates National Workshop on Mental Health. Accessed April 8, 2024. https://pib.gov.in/PressReleseDetailm.aspx?PRID=2006265&reg=3&lang=1

19. O'Keefe M, White K, Jennings JC. Asynchronous telepsychiatry: A systematic review. *Journal of Telemedicine and Telecare*. 2019;27(3).

20. Yellowlees PM, Burke MM, Gonzalez AD, et al. Patient and Provider Satisfaction with Asynchronous Versus Synchronous Telepsychiatry in Primary Care: A Secondary Mixed-Methods Analysis of a Randomized Controlled Trial. *Telemedicine and e-Health*. 2024;30(4).

21. Balasinorwala VP, Shah NB, Chatterjee SD, Kale VP, Matcheswalla YA. Asynchronous Telepsychiatry in Maharashtra, India: Study of Feasibility and Referral Pattern. *Indian Journal of Psychological Medicine*. 2014;36(3):299-301.

22. Spijkerman MPJ, Pots WTM, Bohlmeijer ET. Effectiveness of online mindfulness-based interventions in improving mental health: A review and meta-analysis of randomised controlled trials. *Clinical Psychology Review*. 2016;45:102-114.

23. Polak M, Tanzer NK. Internet-Based Cognitive Behavioural Treatments for Obsessive–Compulsive Disorder: A Systematic Review and Meta-Analysis. *Clinical Psychology & Psychotherapy*. 2024;31(3).

24. Zhong J, Zhang Y, Sun Y, Wang Q, Dong G, Li X. The efficacy of internet-based cognitive behavioral therapy for adult binge spectrum eating disorders: A meta-analysis. *Journal of Affective Disorders*. 2024;361:684-692.

25. Haddad RH, Alhusamiah BK, Haddad RH, et al. The effectiveness of using cognitive behavioral therapy and internet-based cognitive behavioral therapy interventions on relapse prevention and severity of symptoms among patients diagnosed with major depressive disorder: a systematic review of randomized controlled trials. *Mental Health and Social Inclusion*. 2024;28(6).

26. Hedman E, Ljótsson B, Lindefors N. Cognitive behavior therapy via the Internet: a systematic review of applications, clinical efficacy and cost–effectiveness. *Expert Review of Pharmacoeconomics & Outcomes Research*. 2012;12(6):745-764.

27. Hedman-Lagerlöf E, Carlbring P, Svärdman F, Riper H, Cuijpers P, Andersson G. Therapist-supported Internet-based cognitive behaviour therapy yields similar effects as face-to-face therapy for psychiatric and somatic disorders: an updated systematic review and meta-analysis. *World Psychiatry*. 2023;22(2):305-314.

28. Gál É, Ștefan S, Cristea IA. The efficacy of mindfulness meditation apps in enhancing users' well-being and mental health related outcomes: a meta-analysis of randomized controlled trials. *Journal of Affective Disorders*. 2021;279:131-142.

29. Farias M, Maraldi E, Wallenkampf KC, Lucchetti G. Adverse events in meditation practices and meditation-based therapies: a systematic review. *Acta Psychiatrica Scandinavica*. 2020;142:374-393.

30. Ministry of Health and Family Welfare. Measures taken to Improve Mental Healthcare. Accessed March 3, 2025. https://pib.gov.in/PressReleaseIframePage.aspx?PRID=210059

31. Heinz, M. V., Mackin, D. M., Trudeau, B. M., Bhattacharya, S., Wang, Y., Banta, H. A., Jewett, A. D., Salzhauer, A. J., Griffin, T. Z., & Jacobson, N. C. (2025). Randomized Trial of a Generative AI Chatbot for Mental Health Treatment. NEJM AI, 2(4).

32. Li H, Zhang R, Lee YC, Kraut RE, Mohr DC. Systematic review and meta-analysis of AI-based conversational agents for promoting mental health and well-being. *npj digital medicine*. 2023;6.

33.   Abd-Alrazaq AA, Rababeh A, Alajlani M, Bewick BM, Househ M. Effectiveness and Safety of Using Chatbots to Improve Mental Health: Systematic Review and Meta-Analysis. *Journal of Medical Internet Research*. 2020;22(7).

34.   Casu M, Triscari S, Battiato S, Guarnera L, Caponnetto P. AI Chatbots for Mental Health: A Scoping Review of Effectiveness, Feasibility, and Applications. *Applied Sciences*. 2024;14.

35.   Ministry of Home Affairs. Language Census. Accessed March 3, 2025. https://language.census.gov.in/showLanguageCensusData

36.   Habicht J, Viswanathan S, Carrington B, Hauser TU, Harper R, Rollwage M. Closing the accessibility gap to mental health treatment with a personalized self-referral chatbot. *Nature Medicine*. 2024;30:595-602.

37.   Siddals S, Torous J, Coxon A. "It happened to be the perfect thing": experiences of generative AI chatbots for mental health. *npj Mental Health Research*. 2024;3.

38.   De Freitas J, Uğuralp AK, Oğuz-Uğuralp Z, Puntoni S. Chatbots and mental health: Insights into the safety of generative AI. *Journal of Consumer Psychology*. 2024;34(3):481-491.

39.   Indian Council of Medical Research. *Ethical Guidelines for Application of Artificial Intelligence in Biomedical Research and Healthcare*.; 2023.

40.   Prescott J, Rathbone AL, Hanley T. Online mental health communities, self-efficacy and transition to further support. *Mental Health Review Journal*. 2020;25(4).

41.   Wadden D, August T, Li Q, Althoff T. The Effect of Moderation on Online Mental Health Conversations. In: ; 2021.

42.   Schröder D, Wrona KJ, Müller F, Heinemann S, Fischer F, Dockweiler C. Impact of virtual reality applications in the treatment of anxiety disorders: A systematic review and meta-analysis of randomized-controlled trials. *Journal of Behavior Therapy and Experimental Psychiatry*. 2023;81.

43.   Wiebe A, Kannen K, Selaskowski B, et al. Virtual reality in the diagnostic and therapy for mental disorders: A systematic review. *Clinical Psychology Review*. 2022;98.

44.   Emmelkamp PMG, Meyerbröker K. Virtual Reality Therapy in Mental Health. *Annual Review of Clinical Psychology*. 2021;17:495-519.

45.   Geraets CNW, van der Stouwe ECD, Pot-Kolder R, Veling W. Advances in immersive virtual reality interventions for mental disorders: A new reality? *Current Opinion in Psychology*. 2021;41:40-45.

46.   Peckmann C, Kannen K, Pensel MC, Lux S, Philipsen A, Braun N. Virtual reality induces symptoms of depersonalization and derealization: A longitudinal randomised control trial. *Computers in Human Behavior*. 2022;131.

47.   Keynejad R, Spagnolo J, Thornicroft G. WHO mental health gap action programme (mhGAP) intervention guide: updated systematic review on evidence and impact. *BMJ Mental Health*. 2021;24(3).

48.   Malhotra S, Chakrabarti S, Shah R, et al. Telepsychiatry clinical decision support system used by non-psychiatrists in remote areas: Validity & reliability of diagnostic module. *Indian Journal of Medical Research*. 2017;146(2):196-204.

49.   Malhotra S, Chakrabarti S, Shah R, Mehta A, Gupta A, Sharma M. A Novel Screening and Diagnostic Tool for Child and Adolescent Psychiatric Disorders for Telepsychiatry. *Indian Journal of Psychological Medicine*. 2015;37(3):288-298.

50.   Zhou T ting, Wang R, Gu S jia, et al. Effectiveness of Mobile Medical Apps in Ensuring Medication Safety Among Patients With Chronic Diseases: Systematic Review and Meta-analysis. *JMIR mHealth and uHealth*. 2022;10(11).

51.   de Miguel Beriain I, Morla González M. 'Digital pills' for mental diseases: an ethical and social analysis of the issues behind the concept. *Journal of the Law and Biosciences*. 2020;7(1).

52.   Bufano P, Laurino M, Said S, Tognetti A, Menicucci D. Digital Phenotyping for Monitoring Mental Disorders: Systematic Review. *Journal of Medical Internet Research*. 2023;25:e46778.

53.   Cohen A, Joshi D, Bondre A, et al. Digital phenotyping correlates of mobile cognitive measures in schizophrenia: A multisite global mental health feasibility trial. *PLOS Digital Health*. 2024;3(6):e0000526.

54.   Ministry of Health and Family Welfare. National Health Authority launches 100 Microsites Project to accelerate digital health adoption across the country. Accessed March 4, 2025. https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1943601

55.   Ministry of Health and Family Welfare. Microsites Dashboard. Accessed March 4, 2025. (https://dashboard.abdm.gov.in/abdm/microsite

56.   Karnataka Government. e-Manas. Accessed March 4, 2025. https://e-manas.karnataka.gov.in/#/