



Artificial Intelligence in Public Mental Health: Toward Personalized Prevention Strategies

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Abstract

Artificial Intelligence (AI) is reshaping public mental healthcare by enabling personalized, preventive, and data-driven approaches to mental wellbeing. Traditional mental health systems are often reactive, focusing on treatment after symptoms become clinically significant. In contrast, AI technologies—including machine learning, natural language processing, predictive analytics, and digital phenotyping—offer opportunities for early detection, continuous monitoring, and individualized prevention strategies.

AI-driven systems can analyse behavioural, emotional, and physiological data collected through smartphones, wearable devices, electronic health records, and digital platforms to identify early indicators of depression, anxiety, stress, and suicidal behaviour. These technologies may improve mental healthcare accessibility, particularly among adolescents, underserved populations, and regions with limited psychiatric resources.

Despite these benefits, the rapid integration of AI into public mental health raises major ethical and societal concerns. Issues related to privacy, data security, algorithmic bias, digital inequality, and reduced human interaction remain significant challenges. Ethical governance and transparent regulatory frameworks are essential to

ensure safe and equitable implementation.

This article examines the role of AI in advancing personalized prevention strategies in public mental health, highlighting current applications, benefits, ethical limitations, and future directions. The paper argues that AI should function as a supportive tool that enhances—not replaces—human-centred mental healthcare.

Keywords: Artificial Intelligence; Public Mental Health; Personalized Prevention; Digital Mental Health; Machine Learning; Digital Phenotyping; AI Ethics; Predictive Analytics



Introduction

Mental health disorders are among the leading contributors to global disability, affecting millions of individuals across all age groups. Depression, anxiety, stress-related disorders, and behavioural addictions continue to rise worldwide, particularly among adolescents and young adults exposed to increasing digital and social pressures. Public mental healthcare systems remain under strain due to workforce shortages, delayed diagnosis, stigma, and inadequate preventive infrastructure.

Traditional mental healthcare primarily relies on reactive clinical models, where intervention occurs after symptoms significantly impair daily functioning. However, advances in Artificial Intelligence (AI) are transforming healthcare toward predictive, preventive, and personalized approaches. AI systems can process large-scale behavioural and psychological data to identify mental health risks earlier and support timely interventions.

Recent developments in machine learning, wearable technologies, smartphone-based monitoring, and conversational AI have accelerated the growth of digital mental health solutions. These technologies can monitor behavioural indicators such as sleep disturbances, screen time, mobility changes, communication patterns, and emotional language use. AI algorithms may detect subtle psychological changes before traditional clinical assessments identify symptoms.

Public mental health emphasizes prevention, early intervention, and population wellbeing. AI-driven personalized prevention strategies offer a new model of care that combines behavioural science, digital technology, and predictive analytics to improve mental health outcomes at both individual and population levels.

This article critically explores the emerging role of AI in public mental health, focusing on personalized prevention strategies, technological innovations, ethical challenges, and future implications for healthcare systems.

AI and the Shift Toward Preventive Mental Healthcare

From Reactive Care to Predictive Prevention

Conventional mental healthcare systems often respond only after mental illness becomes clinically apparent. AI enables a transition toward predictive prevention by identifying individuals at risk before severe psychological deterioration occurs.

Machine learning models can analyse behavioural and environmental patterns associated with mental health decline, including:

- Sleep disruption
- Social withdrawal
- Increased screen exposure
- Reduced physical activity
- Changes in communication behaviour
- Emotional instability reflected in digital interactions



By detecting these indicators early, AI systems may support proactive interventions that reduce long-term psychological and social consequences.

Digital Phenotyping and Behavioural Monitoring

Understanding Digital Phenotyping

Digital phenotyping refers to the real-time collection and analysis of behavioural data generated through smartphones, wearable devices, and digital platforms. AI algorithms interpret these data to assess emotional and psychological wellbeing continuously.

Behavioural indicators used in digital phenotyping include:

- Typing speed and patterns
- GPS mobility tracking
- Social media activity
- Voice tone and speech analysis
- Sleep and physical activity patterns
- App usage behaviour

AI-driven digital phenotyping may help identify early signs of depression, anxiety, burnout, stress, and suicidal ideation. This approach offers significant potential for personalized mental health prevention strategies.

Personalized Intervention Models

AI systems can deliver tailored interventions based on individual behavioural profiles. Personalized prevention strategies may include:

- Real-time emotional support
- Sleep and stress management alerts
- Digital wellbeing recommendations
- AI-guided cognitive behavioural therapy exercises
- Crisis-risk notifications
- Behavioural habit tracking

Such interventions may improve engagement and increase the effectiveness of preventive mental healthcare.

AI Applications in Public Mental Health

AI Chatbots and Virtual Mental Health Assistants

AI-powered chatbots and conversational agents are increasingly integrated into digital mental health platforms. These systems provide:



- Emotional support
- Psychoeducation
- Stress management guidance
- Cognitive behavioural therapy-based conversations
- Crisis resource recommendations

Virtual mental health assistants may improve access to support services, especially for adolescents and populations facing stigma or limited healthcare access.

Predictive Analytics for Population Mental Health

AI can support population-level mental health surveillance by analysing large-scale public health and behavioural datasets. Predictive analytics may assist policymakers in:

- Identifying high-risk communities
- Monitoring mental health trends
- Designing targeted interventions
- Improving resource allocation
- Supporting suicide prevention strategies

AI-driven public health surveillance may strengthen preventive mental health systems globally.

Ethical and Social Challenges

Privacy and Data Protection

AI-based mental healthcare systems rely heavily on sensitive personal data. Continuous behavioural monitoring raises concerns regarding:

- Data privacy
- Confidentiality
- Informed consent
- Data ownership
- Cybersecurity risks

Strong ethical governance and transparent data policies are essential to maintain public trust.

Algorithmic Bias and Inequality

AI algorithms may unintentionally reproduce social and cultural biases if trained on non-representative datasets. Bias in AI systems could contribute to unequal mental healthcare outcomes among marginalized populations.

Additionally, digital mental health technologies may widen healthcare inequalities in low-resource settings where access to smartphones, internet connectivity, and digital literacy remains limited.

Human Connection in Mental Healthcare



Although AI can improve efficiency and accessibility, it cannot fully replace human empathy, emotional understanding, and therapeutic relationships. Excessive dependence on automated systems may reduce the human-centred nature of mental healthcare. AI should therefore function as a supportive clinical tool rather than a substitute for healthcare professionals.

Future Directions

Future public mental health systems are likely to integrate AI with behavioural science, wearable technologies, and community-based healthcare models. Key priorities for future development include:

- Ethical AI governance frameworks
- Transparent and explainable algorithms
- Cross-cultural validation of AI models
- Integration with public healthcare systems
- Human-centred digital mental health design
- Longitudinal evaluation of AI effectiveness

Interdisciplinary collaboration among public health experts, behavioural scientists, clinicians, policymakers, and AI developers will be critical for responsible implementation.

Conclusion

Artificial Intelligence has the potential to transform public mental healthcare by enabling predictive, preventive, and personalized mental health strategies. AI-driven technologies can support early detection, continuous behavioural monitoring, and individualized interventions that may improve mental health outcomes and reduce healthcare burdens.

However, the successful integration of AI into public mental health requires careful consideration of ethical, social, and regulatory challenges. Privacy protection, algorithmic fairness, accessibility, and preservation of human-centred care must remain central priorities.

AI should not replace mental health professionals but rather strengthen preventive mental healthcare systems through data-driven and evidence-based support. With responsible governance and interdisciplinary collaboration, AI may play a major role in advancing equitable and personalized mental healthcare in the future.



References

1. Topol EJ. High-performance medicine: the convergence of human and artificial intelligence. *Nature Medicine*. 2019;25(1):44–56.
2. World Health Organization. *World Mental Health Report: Transforming Mental Health for All*. Geneva: WHO; 2022.
3. Torous J, Bucci S, Bell IH, et al. The growing field of digital psychiatry: current evidence and the future of apps, social media, chatbots, and virtual reality. *World Psychiatry*. 2021;20(3):318–335.
4. Shatte ABR, Hutchinson DM, Teague SJ. Machine learning in mental health: a scoping review of methods and applications. *Psychological Medicine*. 2019;49(9):1426–1448.
5. Insel TR. Digital phenotyping: technology for a new science of behavior. *JAMA*. 2017;318(13):1215–1216.
6. Graham S, Depp C, Lee EE, et al. Artificial intelligence for mental health and mental illnesses: an overview. *Current Psychiatry Reports*. 2019;21(11):116.
7. Luxton DD. Artificial intelligence in psychological practice: current and future applications and implications. *Professional Psychology: Research and Practice*. 2014;45(5):332–339.
8. Vaidyam AN, Wisniewski H, Halamka JD, Kashavan MS, Torous JB. Chatbots and conversational agents in mental health: a review of the psychiatric landscape. *Canadian Journal of Psychiatry*. 2019;64(7):456–464.
9. 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;21(5):e13216.
10. Ben-Zeev D, Scherer EA, Wang R, Xie H, Campbell AT. Next-generation psychiatric assessment: using smartphone sensors to monitor behavior and mental health. *Psychiatric Rehabilitation Journal*. 2015;38(3):218–226.
11. Torous J, Onnela JP, Keshavan M. New dimensions and new tools to realize the potential of RDoC: digital phenotyping via smartphones and connected devices. *Translational Psychiatry*. 2017;7(3):e1053.
12. Rajpurkar P, Chen E, Banerjee O, Topol EJ. AI in health and medicine. *Nature Medicine*. 2022;28(1):31–38.
13. Gooding P. Mapping the rise of digital mental health technologies: emerging issues for law and society. *International Journal of Law and Psychiatry*. 2019;67:101498.
14. D'Alfonso S. AI in mental health. *Current Opinion in Psychology*. 2020;36:112–117.
15. World Health Organization. *Ethics and Governance of Artificial Intelligence for Health*. Geneva: WHO; 2021.
16. Mohr DC, Zhang M, Schueller SM. Personal sensing: understanding mental health using ubiquitous sensors and machine learning. *Annual Review of Clinical Psychology*. 2017;13:23–47.
17. Naslund JA, Aschbrenner KA, Araya R, et al. Digital technology for treating and preventing mental disorders in low-income and middle-income countries: a narrative review of the literature. *The Lancet Psychiatry*. 2017;4(6):486–500.
18. Hollis C, Sampson S, Simons L, et al. Identifying research priorities for digital technology in mental health care: results of the James Lind Alliance Priority Setting Partnership. *The Lancet Psychiatry*. 2018;5(10):845–854.
19. Miner AS, Milstein A, Hancock JT. Talking to machines about personal mental health problems. *JAMA*. 2017;318(13):1217–1218.
20. Blease C. Artificial intelligence and the future of psychiatry: insights from a global physician survey. *Artificial Intelligence in Medicine*. 2020;102:101753.