

EDITORIAL

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# Editorial perspective: digital technology and the future of mental health treatment

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## Introduction

Digital technology in mental health treatment is an evolving field, rooted in decades of research on human–machine interactions. One of the earliest examples was ELIZA, a 1960s chatbot developed in the 1960s to simulate a psychotherapist. This collection, *Digital Technology and the Future of Mental Health Treatment*, explores how advanced digital tools are being integrated into mental health care, highlighting challenges and potential benefits. Today, health technologies offer opportunities to expand access, personalize interventions, and scale treatments globally. However, ethical concerns, privacy issues, and the need for human connection remain critical. The following editorial outlines key considerations for researchers, clinicians, and policymakers, including evidence-based methodologies, research frameworks, interdisciplinary collaboration, and adapting interventions for inclusive delivery.

## Global and national frameworks

As digital tools become integral to mental health care, global and national frameworks such as the WHO's digital health strategy [1], are needed to guide development,

implementation, and build public trust. These frameworks must ensure digital interventions are effective, ethical, and equitable. Addressing privacy, accessibility, and inclusivity while meeting diverse population needs. Establishing such frameworks is key to creating standardized and scalable digital mental health solutions that are suitable for different health systems. Integrating agile development processes, like user-centered design and iterative testing, into standardized, evidence-based, and reproducible research methods remains a challenge. We need frameworks that bridge tensions between rapid technological innovation and high-quality research designs and produce evidence that meets regulatory standards.

## Evidence-based methodologies

The digital mental health field faces significant challenges in creating rigorous, evidence-based methodologies for developing, trialing, and evaluating technologies. Traditional research methods require adaptation to accommodate rapid technological change, data security concerns, and ethical challenges. While frameworks like the Medical Research Council's guide for complex interventions [2] provide foundation, there is a need to operationalize these for different contexts and applications. Despite emerging user-centered approaches like the Person-Based-Approach [3], methodological guidance for research and implementation remains insufficient [4]. High-quality research and reporting are needed to inform clinical guidelines and attain regulatory approvals.

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### **Synthesizing existing evidence**

Synthesizing the growing evidence-base around digital mental health interventions will help ensure research builds on previous learning. However, rapid development and evaluation of interventions, alongside poor quality of reporting, can limit the value of reviews. For example, while a recent systematic review of mobile apps for attention deficit hyperactivity disorder (ADHD) identified 109 apps, few contained information regarding app development, and none contained data on efficacy/effectiveness [5]. When high quality research is conducted, systematic reviews, scoping reviews, and evidence maps can synthesize progress, guiding the direction of future research.

### **Building research and clinical teams skilled across multiple disciplines**

To progress digital mental health, we need multidisciplinary teams spanning applied health research, clinical practice, technological innovation, and lived experience. Funders are increasingly developing funding streams and frameworks that facilitate collaborative approaches. However, operationalizing this kind of collaboration can be challenging. National and international networks spanning key disciplines have a key role to play in developing technologies tailored to meet the mental health needs of specific populations. For example, the Digital Technologies Special Interest Group for the European ADHD Network (Eunethydis) aims to explore opportunities and challenges in developing technology-based support for people with ADHD. A key challenge is to align business, research, and patient-centered interests in ways that support rapid innovation, whilst meeting regulatory standards.

### **Developing tools for measuring relevant domains**

New outcome measures will be needed to inform development and evaluation of digital mental health interventions. Inherent differences exist between collecting data virtually or via pre-programmed tools, compared with in-person assessment. These differences can affect the internal validity of what is measured. Existing measures may not be suitable for digital administration and may require adaptation. New tools, such as compassion scales, may need to be developed or existing measures adjusted to suit digital contexts while maintaining reliability and validity.

### **Developing and scaling interventions for the digital age**

Developing effective digital mental health interventions requires collaboration among healthcare professionals, researchers, and policymakers, to streamline the

process from identifying solutions to co-development, evaluation, and implementation. Transitioning to digital formats presents both opportunities and challenges, such as adapting content for digital platforms, and using features like real-time feedback, interactivity, and multimedia to enhance engagement. Digital interventions also offer scalability, potentially expanding access to mental health care for underserved populations.

### **Ensuring digital inclusion and equitable access**

As digital mental health interventions expand, ensuring that they are inclusive and accessible remains a central concern. Issues of digital inclusion are wide-ranging, from access to technology and internet connectivity to the digital literacy required to engage effectively. Equity must be a cornerstone of digital mental health strategies, ensuring vulnerable populations are not left behind. It is critical to develop tools and methodologies that address these disparities, creating pathways for broad and equitable access to care. Without deliberate efforts to include marginalized groups, we risk worsening health inequities in the digital age.

### **Future directions**

As digital technology becomes central to mental health research and practice, frameworks are needed at all levels to guide rapid development, building on initiatives like the World Health Organization's Digital Health strategy [6]. Methodological frameworks need to promote digital inclusion and minimize harm. A shift towards multidisciplinary teams spanning healthcare, digital innovation, and lived experience is essential. Collaborations among governments, clinical organizations, industry, and researchers are key to developing digital interventions that address mental health challenges at scale. Consideration needs to be given to reducing health inequalities, addressing ethical implications of AI, and identifying contexts where human interactions are irreplaceable.

### **Conclusion**

The urgency of this topic cannot be understated. The mental health burden continues to grow worldwide, and digital technologies offer an opportunity to bridge gaps in access to care, particularly in underserved regions. However, rapid development raises critical questions about efficacy, ethical considerations, and inclusivity. We invite readers to explore how this evolving field is reshaping clinical practice, research methodologies, and policy frameworks, with the aim of ensuring digital tools are integrated in ways that are effective and equitable.

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#### Authors' contributions

The original idea for this Editorial was conceived by AVH and AP whilst collaborating as joint guest editors for the BMC Digital Health's Collection: "Digital technology and the future of mental health treatment". AP provided the initial structure and early content, then AP and AVH collaborated to write the final version. AVH led on the introduction and conclusion. AP led on submission. Both authors commented on the manuscript, provided final approval for publication, and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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