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Digital Mental Health: Definitions, Concepts and Dimensions– A Scoping Review

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ABSTRACT

Digital mental health (DMH) interventions, powered by artificial intelligence, mobile applications, and telemedicine, are rapidly advancing. These developments are transforming mental health care delivery, particularly in the context of global clinician shortages and the persistent impacts of the COVID-19 pandemic. However, the field lacks unified conceptual foundations, hindering standardization and equitable implementation. Following PRISMA-ScR guidelines, this scoping review synthesizes definitions of DMH from 33 peer-reviewed articles (2020–2025), identifies core dimensions and indicators, and evaluates existing assessment frameworks. Systematic searches across PubMed, PsycINFO, Scopus, and Web of Science revealed an evolution from broad technology-enabled support to sophisticated, AI-driven models that emphasize personalization, predictive analytics, and real-time adaptation. The review identified twelve core dimensions—including accessibility, equity and inclusion, co-design, effectiveness, engagement, usability, data privacy, implementation, youth involvement, cultural relevance, and refugee-specific considerations—with frequently reported indicators such as adherence, retention, user satisfaction, and symptom reduction. Evaluated frameworks (e.g., APA App Evaluation Model, NASSS, Digital Therapeutic Alliance, and E-XAI) demonstrated theoretical adaptability but highlighted significant resource and implementation barriers. We propose a comprehensive, integrative definition of DMH informed by the synthesized evidence. This scoping review underscores the transformative potential of DMH to deliver scalable, personalized, and equitable care worldwide, while persistent gaps in conceptual consensus, privacy policies, and culturally sensitive evaluation tools remain critical challenges. These findings highlight the urgent need for global terminological agreement and robust assessment standards to ensure DMH becomes truly inclusive and sustainable for diverse and underserved populations.

Keywords: Digital mental health, Mental health apps, Telepsychiatry, Artificial intelligence in mental health, Health equity, Conceptual framework, Scoping review.

Introduction

Mental health disorders represent a major global public health challenge, affecting over one billion people worldwide and requiring urgent attention and innovative solutions (World Health, 2022). Currently, the mental health crisis is disproportionately severe in low- and middle-income countries (LMICs) and among underserved populations, where access

to traditional mental health services is hindered by structural barriers such as clinician shortages, geographic distances, and social stigma (Patel et al., 2018). The COVID-19 pandemic deepened these gaps by disrupting in-person services, accelerating the transition to scalable digital solutions (Moreno et al., 2020). In this context, digital mental health (DMH) — leveraging technologies like mobile apps, artificial intelligence, and telemedicine — has emerged as a promising approach to enhance accessibility, personalization, and equity in mental health care (Torous et al., 2020).

However, the rapid growth of this field has been accompanied by a fundamental challenge: the lack of conceptual integration. Conceptualizations of digital mental health (DMH) have undergone significant evolution since the early 2020s, reflecting the field's maturation amid rapid technological advancements and global health crises. Initial definitions, primarily from the late 2010s and early 2020s, were notably broad and foundational, emphasizing the general integration of digital technologies to improve mental health care delivery without delving into specific advanced mechanisms. For instance, Torous et al. (2020), as cited in Bunyi et al. (2021), defined DMH as the application of digital, mobile, and wireless technologies in mental health support and care, focusing on its overall utility in enhancing care (Bunyi et al., 2021; Torous et al., 2020). Similarly, Sorkin et al. (2021) defined DMH as the use of digital technologies for mental health management, particularly during the COVID-19 pandemic, which accelerated telework and highlighted the need for scalable solutions amid clinician shortages and barriers to mental health services (Sorkin et al., 2021). The scalability of DMH services is evident in Whitton et al. (2021), who classified DMH as web-based tools for screening and therapeutic recommendations in general practices (Whitton et al., 2021). Spadaro et al. (2021) also viewed mHealth (mobile-based mental health) tools as innovative facilitators in care delivery, emphasizing remote care support (Spadaro et al., 2021). Kemp et al. (2021) extended this by describing DMH interventions as web-based resources and mobile apps for youth mental health in Canada, prioritizing intervention accessibility over functional accuracy (Kemp et al., 2021). These early conceptualizations were often rooted in pre-AI technical frameworks. For example, Kelders et al. (2012) prioritized technology-based general empowerment and remote engagement with audiences (Kelders et al., 2012). Similarly, during COVID-19, telehealth services increased, and DMH definitions focused on flexibility and broad applicability of mental health care services to bridge treatment gaps (Fleming et al., 2024; Moreno et al., 2020). In contrast, DMH definitions from 2023 onward have shifted toward more sophisticated and specific expressions of emerging technologies, encompassing advanced elements such as artificial intelligence (AI), big data analysis, wearables, and machine learning, indicating a definitional shift toward predictive, personalized, and data-driven paradigms.

Kaló et al. (2025) described DMH as digital mental health solutions that utilize machine learning and deep learning for psychiatric predictions and dataset analysis, emphasizing computational complexity (Kaló et al., 2025). Stein and Prost (2024) defined DMH as services heavily reliant on big data and AI, including symptom prediction, personalized treatment, chatbot therapy, and monitoring at individual and population levels, signifying a definitional shift from general tools to intelligent and adaptive systems (Stein & Prost, 2024). Qian et al. (2025) refined this definition through computational psychophysiology, portraying DMH as data-driven integration of AI, big data, and wearables to enable predictive and personalized models, such as foundation models for emotion detection and interventions (Qian et al., 2025). Löchner et al. (2025) highlighted telemedicine and health apps for global networking and low-threshold interventions in underserved areas (Löchner et al., 2025), while Wang et al. (2025) introduced the E-XAI framework with digital twin technology for real-time EEG-based monitoring and personalized interventions (Wang, Ding, et al., 2025). In comparison, recent definitions (post-2023) differ from early ones (pre-2023) by describing DMH beyond mere accessibility and incorporating functional accuracy of services

and ethical considerations such as data privacy in AI-based decision-making (Torous et al., 2020). For example, while early frameworks like Bunyi et al. (2021) focused on broad remote support (Bunyi et al., 2021), contemporaries like Stein and Prost (2024) and Qian et al. (2025) integrate hybrid models, combining AI with human support, and examine scalability limitations and functional accuracy from the early 2020s (Qian et al., 2025; Stein & Prost, 2024). These advancements emphasize deeper maturation in the field, evolving from simple technology empowerment — driven by immediate needs like pandemic response — to complex AI-based systems that enable personalization, prediction, and integration into comprehensive care platforms (Fleming et al., 2024). Such progress not only enhances effectiveness for diverse populations but also highlights the need for ongoing standardization to support equitable implementation (Naslund et al., 2019; Warrier et al., 2023).

Definitions of digital mental health fluctuate from general descriptions of digital technologies to more specialized frameworks including AI-based prediction, real-time monitoring, and big data analysis (Bunyi et al., 2021; Stein & Prost, 2024). This conceptual heterogeneity has extended to the measurement arena, complicating comparative evaluations, synthesis of scientific evidence, and development of policies and standardized interventions (Lipschitz et al., 2023). Such inconsistencies undermine the field's ability to address persistent challenges, including user engagement, data privacy, cultural relevance, and integration into health systems — particularly for vulnerable groups such as youth, refugees, and residents of low- and middle-income countries (Bridge et al., 2025; Naslund et al., 2019). Although numerous review studies have addressed various aspects of digital mental health, none have systematically mapped all conceptual frameworks in this field. For example, Torous et al. (2021) provides a valuable review of digital mental health definitions but focuses on early definitions and does not cover recent AI-based developments or objective dimensions for evaluating interventions (Torous et al., 2020). In contrast, the present review, encompassing literature up to 2025, tracks the evolutionary trajectory of definitions and identifies key dimensions along with their corresponding objective indicators. Garrido et al. (2020) also focuses on the effectiveness of digital interventions for youth depression, which is clinically significant but does not address the underlying conceptual foundations of these interventions. Whereas the present review analyzes conceptual frameworks like NASSS, DTA, and E-XAI to explain the "why" and "how" of intervention performance. Additionally, Linardon et al. (2023), with a focus on quantitative effectiveness of interventions for eating disorders, depression, and anxiety, distances itself from a comprehensive conceptual perspective (Linardon et al., 2025). In contrast, the present review provides an interdisciplinary conceptual roadmap, offering an integrated understanding of the entire digital mental health ecosystem.

This scoping review was conducted based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR; (Tricco et al., 2018)) guidelines, with three main objectives: (1) synthesizing digital mental health definitions from recent literature (2020–2025) and tracking their evolution; (2) identifying key dimensions and indicators for evaluating DMH; (3) systematically evaluating measurement tools and frameworks in the digital mental health domain. In response to the existing conceptual fragmentation in DMH, the primary research question is: "What are the key concepts, dimensions, and measurement frameworks that shape the conceptual foundations of the digital mental health field in recent literature, and how can they be integrated into a unified perspective?" By systematically reviewing peer-reviewed articles from reputable databases, this study aims to fill the gap in the literature by providing a conceptual framework for standardization, informed policy development, and designing effective and equitable interventions in digital mental health.

Methodology

To ensure transparency, comprehensiveness, and reproducibility, the present study followed the methodological framework for scoping reviews outlined by Arksey and O'Malley (2005) and further developed by Levac et al. (2010) (Arksey & O'Malley, 2005; Levac et al., 2010), while adhering to PRISMA-ScR guidelines (Tricco et al., 2018). A scoping review is "a form of knowledge synthesis that addresses an exploratory research question, aiming to map key concepts, identify types of scientific evidence, and research gaps in a specific domain or context, through systematic search, collection, selection, and synthesis of existing knowledge" (Colquhoun et al., 2014). In the present study, given the exploratory and broad nature of the question, a scoping review approach may be more suitable compared to other review methods. For example, unlike systematic reviews that typically focus on evaluating the effectiveness of a specific intervention, a scoping review allows for broad mapping of concepts, definitions, scientific evidence, and identifying existing gaps in a complex and evolving field. Considering the interdisciplinary and emerging nature of DMH and the lack of a unified conceptual paradigm, this method can ideally map the scope and key features of the field, providing a foundation for future standardization, policy development, and guiding subsequent research.

In this study, the literature review aimed to map conceptual frameworks related to digital mental health (DMH), synthesize definitions from the literature, identify key dimensions and indicators that define the scope and quality of DMH, and evaluate measurement tools and frameworks. No protocol was pre-registered, which is consistent with the exploratory nature of scoping reviews (Peters et al., 2015). The following sections describe the literature search strategy, inclusion and exclusion criteria, the final resource selection process, and data extraction procedures from the final resources.

Literature Search Strategy

To cover a broad range of biomedical, psychological, technological, and interdisciplinary literature in a comprehensive systematic search, four major electronic databases were selected: PubMed, PsycINFO, Scopus, and Web of Science (Bramer et al., 2017). The literature search was conducted in September 2025 to include the most recent publications available up to that date, reflecting the rapidly growing nature of DMH research. In this search strategy, text keywords and controlled terms such as Medical Subject Headings (MeSH) in PubMed were integrated to enhance the retrieval of relevant articles. Key search terms included variations related to digital mental health (e.g., "digital mental health," "e-mental health," "mHealth mental," "tele-mental health," "mental health technology"); conceptual frameworks (e.g., "conceptual framework," "conceptual model," "theoretical framework," "theoretical model," "theoretical approach," "model of digital health"); and measurement aspects (e.g., "measurement tool," "assessment framework," "evaluation scale," "indicator"). Logical operators were used to refine and combine these terms: ("digital mental health" OR "Telemedicine" OR "Mobile Applications" OR "Artificial Intelligence" OR "Health Services Accessibility" OR "e-mental health" OR "tele-mental health" OR "mHealth mental" OR "mental health technology") AND ("conceptual framework" OR "theoretical model" OR "conceptual model" OR "theoretical approach" OR “Model”) AND ("measurement" OR "assessment" OR "evaluation" OR "indicator" OR "framework"). Only English-language articles were retained for inclusion to facilitate accurate data extraction and synthesis. Consistent with strategies suggested in previous studies (e.g., (Cooper et al., 2024)), references of included articles were manually searched for additional relevant studies. Forward citation tracking using Scopus and Web of Science was also performed to identify

articles citing the included resources up to the search date. Given that many articles were indexed in more than one database, the number of unique findings was ultimately 1,856.

Inclusion and Exclusion Criteria

Articles were evaluated against predefined inclusion and exclusion criteria to align with the review's objectives for mapping DMH conceptualizations, dimensions, indicators, and measurement frameworks. Consistent with Arksey and O'Malley's (2005) recommendations for scoping reviews, these criteria were applied flexibly to include the breadth of literature (Arksey & O'Malley, 2005).

Inclusion Criteria

Articles were included if they met these criteria: (1) original peer-reviewed studies; (2) systematic or conceptual reviews or conceptual articles published between January 1, 2020, and September 24, 2025; (3) articles that explicitly define DMH; (4) articles that propose or discuss conceptual frameworks for DMH; (5) articles that evaluate measurement tools, indicators, or frameworks related to DMH interventions; (6) studies primarily focused on applications of digital mental health technologies, including AI, mobile apps, wearables, web-based platforms, virtual reality, or telemedicine. Notably, only articles published in English were included to support reliable data extraction and thematic synthesis.

Exclusion Criteria

Included articles were refined based on predefined exclusion criteria to maintain focus on relevant and high-quality resources. These criteria were applied based on initial assessment of titles and abstracts, followed by full-text review. Exclusion criteria included: (1) studies not primarily focused on mental health (e.g., those examining physical health technologies without an explicit mental health component); (2) articles exclusively focused on non-digital mental health interventions; (3) studies published before 2020 (unless cited as foundational in included studies); (4) articles lacking transparent data or methodology or sufficient detail for conceptual assessment (e.g., inadequate description of frameworks or measurement tools); (5) studies not aligned with the target population (e.g., focus on elderly while the present research emphasizes youth and adolescents); (6) commentaries, letters to the editor, or critical texts without substantial empirical or conceptual content; (7) articles focused on unrelated aspects such as non-mental health applications of digital technology (e.g., general educational tools without a mental health focus). These criteria were designed to prevent the inclusion of irrelevant resources, reducing the process from approximately 1,856 initial sources to 33 final sources, while efforts were made to examine gray literature as well. However, to maintain methodological accuracy, gray literature lacking peer review or of low quality (e.g., informal reports without valid data) was ultimately excluded, but a limited number (e.g., conference abstracts and theses from Google Scholar and preprint sites) were reviewed and included where relevant to complement scientific evidence, avoid publication bias (selective selection of studies with positive results), and provide a comprehensive view.

Resource Selection and Data Extraction

The resource selection process followed a two-stage screening approach to identify eligible resources. In the initial stage, titles and abstracts of all retrieved articles were screened by two independent reviewers using a standardized screening form applying inclusion and exclusion criteria. Disagreements between the two reviewers were resolved through discussion, and if consensus was not reached, a third reviewer was consulted for arbitration (consistent with (Levac et al., 2010)). In the

second stage, full texts of articles were independently assessed by the same two reviewers. At this stage, reasons for excluding articles were systematically documented, such as insufficient focus on DMH or lack of peer review (consistent with (McHugh, 2012)). Inter-rater agreement was quantified using Cohen's kappa statistic, achieving substantial agreement (κ > 0.70), indicating reliable screening. The article selection process is illustrated in Figure 1 using the PRISMA-ScR flow diagram, detailing the number of identified, screened, excluded, and finally included records.

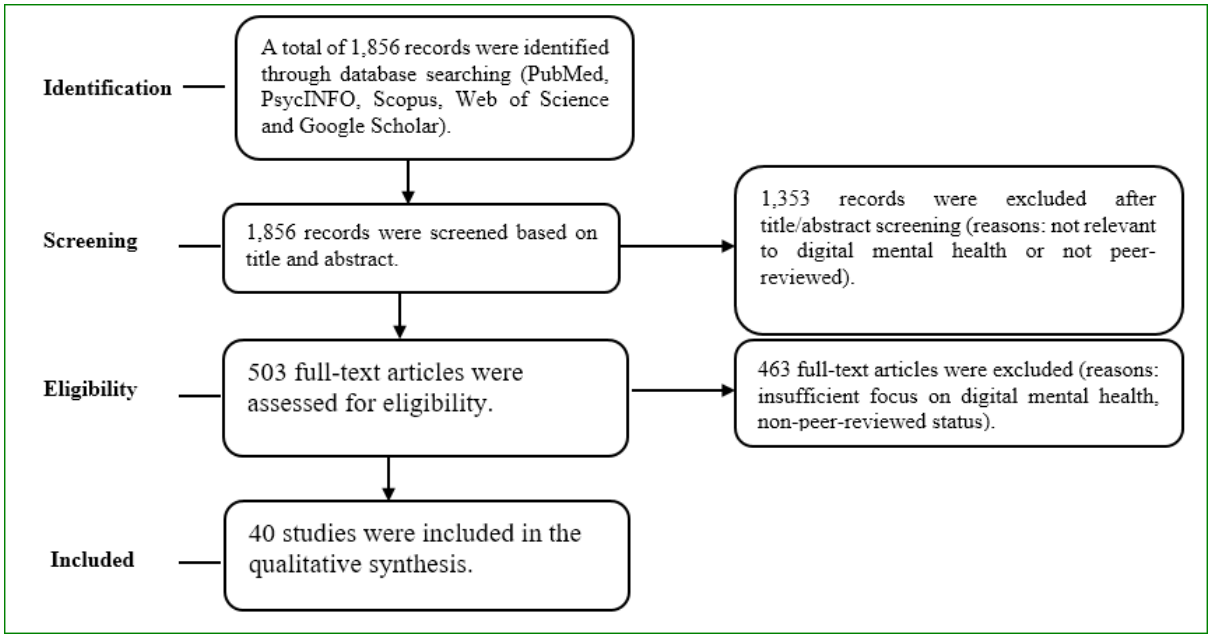

Figure 1. PRISMA-ScR flow diagram of the resource selection process.

Consistent with Peters et al. (2015), data extraction was performed using a customized charting form that was iteratively developed through pilot testing on a subset of five articles to refine its structure and ensure alignment with review objectives (Peters et al., 2015). For each included study, the following data were extracted: author(s) and year of publication; study design or type (e.g., scoping review, randomized controlled trial, conceptual article); definition(s) of DMH provided or cited; key DMH dimensions and indicators (e.g., accessibility, equity, engagement, usability); framework components (e.g., theoretical basis, domains, items); measurement tools (e.g., name, items, scoring method, response format, strengths, limitations); and related outcomes or challenges (e.g., effectiveness evidence, barriers for populations like youth or refugees). Data were charted both narratively and in tabular formats to facilitate thematic synthesis and comparison. Extraction was performed independently by two reviewers, with discrepancies resolved through consensus discussions to enhance accuracy and reduce bias. Consistent with the exploratory goal of scoping reviews and PRISMA-ScR recommendations, no formal quality assessment of included studies was conducted, as the primary aim is mapping the conceptual landscape rather than critically appraising methodological rigor or validity of individual sources (Tricco et al., 2018).

To provide an overview of the methodological distribution of included studies, research design types were categorized based on standard coding (Table 1) and calculated as percentages. As shown in Figure 2, scoping reviews accounted for the largest share at 17.5%, indicating the exploratory and interdisciplinary nature of the digital mental health field; while experimental designs such as randomized controlled trials (RCTs) and qualitative studies each accounted for 12.5%. This distribution emphasizes the current literature's focus on conceptual mapping and initial evidence, revealing the need to

strengthen high-quality experimental studies (especially RCTs and longitudinal studies) to validate DMH interventions in the future.

The methodological characteristics, target population, and key dimensions of the 33 included studies in the scoping review are compactly presented in Table 2. This table includes row number, authors and publication year, journal, target population and country, research design (with abbreviated codes based on the relevant guide), main tool or concept, and key DMH dimensions emphasized in each study. The compact table layout allows for quick comparison of studies and clearly shows the methodological distribution (e.g., dominance of scoping reviews and experimental studies) and focus on specific populations (e.g., youth and refugees).

Table 1. Types of Research Designs Based on Standard Coding

Code	Meaning	Code	Meaning
R	Randomized Controlled Trial (RCT)	F	Fuzzy Method
A	Meta-Analysis	Q	Qualitative
M	Mixed Methods	L	Longitudinal
C	Conceptual / Proof of Concept / Cohort	P	Protocol / Perspective / Proof of Concept
O	Open Trial	V	Validation
T	Thematic Analysis		

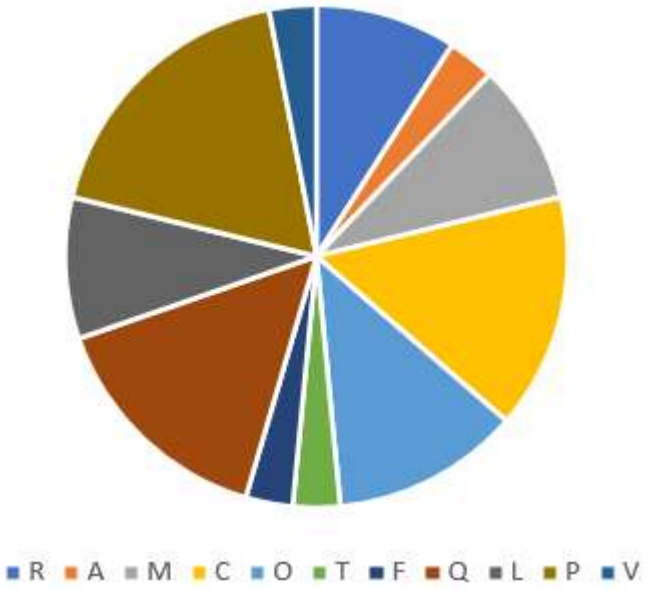

Figure 2. Statistical Analysis of Research Design Types

Table 2. Characteristics of 33 Key Digital Mental Health (DMH) Studies

#	Author, Year	Journal	Population/ Country	Design	Concept/Tool	Key Emphasized Dimension
1	McRynicola 2025	JMIR MH	Adolescent/ USA	O	Digital Clinic Model	Implementation+ Youth
2	(Wang, Zhou, et al., 2025)	JMIR MH	Adult/China	R	E-XAI + Twin	Effectiveness+ Privacy
3	(Ibitoye et al., 2025)	Franklin	General/ Nigeria	C	Transformer	Engagement + Accessibility
4	(Forane et al., 2025)	Procedia	General/ Nigeria	P	African Emotional Intelligence	Cultural + Equity
5	(Stein & Prost, 2024)	SSM - Mental Health	General	C	Societal implications of AI-driven DMH	Data privacy + security+ Equity + inclusion+ Cultural relevance+ Effectiveness
6	(Barker et al., 2025)	Dig Health	Adolescent/ Canada	Q	InnoWell	Implementation + Youth
7	(Sorkin et al., 2021)	J Med Internet Res	General population, USA (during COVID-19)	O	Digital mental health tools and technologies	Accessibility+ Equity + Inclusion+ Engagement+ Implementation
8	(Qian et al., 2025)	Med Plus	General/ China	C	Foundation Models	Effectiveness+ Engagement, Usability, Data privacy+ Accessibility

9	(Wang, Ding, et al., 2025)	Int Rev Fin	General/ China	L	Statistical Model	Equity + Accessibility
10	(Strudwick et al., 2025)	JMIR MH	General/ Canada	Q	NASSS	Implementation
11	(Huberty et al., 2025)	JMIR MH	Adolescent/ USA	R	Calm/Headspace	Engagement + Youth
12	(Linardon et al., 2025)	Psychiatry Research	Individuals with depression/anxiety/eating disorders /global	A	Digital interventions for multiple secondary mental health outcomes	Effectiveness + efficacy+ Engagement+ Accessibility
13	(Ng et al., 2025)	Computers in Human Behavior	Forced migrants/refugees, Global (with focus on underserved)	O	Digital interventions for mental health and wellbeing	Cultural Relevance+ Equity + Inclusion+ Refugee-Specific Considerations+ Accessibility
14	(Kaló et al., 2025)	Psych Res	General/ Hungary	C	eHTA	Effectiveness + Implementation
15	(Boucher et al., 2024)	JMIR MH	Adolescent/ USA	R	Happy Teens	Engagement + Youth
16	(Shin et al., 2024)	JMIR MH	General/ Korea	V	ChatGPT/LLM	Effectiveness + Privacy
17	(Nowels et al., 2024)	JMIR MH	Adolescent/ USA	L	Multiple Apps	Engagement + Accessibility
18	(Potts et al., 2023)	JMIR MH	Adolescent/ EU	M	ChatPal	Cultural + Youth
19	(Robinson et al., 2024)	JMIR MH	General/USA	P	Multiple Tools	Equity
20	(Cross et al., 2025)	Behav Res	Adolescent/ Australia	C	Orygen	Effectiveness + Youth
21	(De Thurah et al., 2025)	JMIR HF	General/ Belgium	Q	Sampling	Usability + Engagement
22	(Kennedy et al., 2025)	JMIR	General/ Ireland	T	Co-Design	Co-Design + Implementation
23	(Yap et al., 2025)	JMIR RP	General/UK	P	Engagement Index	Engagement + Usability
24	(Macrynikola et al., 2025)	JMIR Ment Health	Mental health care seekers, USA	O	Digital Clinic hybrid model (app + clinician-guided)	Mplementation+ Effectiveness+ Accessibility+ Engagement+ Integration into healthcare
25	(Zhang et al., 2025)	JMIR MH	Professional/UK-China	M	Multiple Tools	Engagement + Implementation
26	(Gorban et al., 2025)	JMIR MH	Adolescent/ Australia	Q	InnoWell	Youth + Engagement
27	(Rodriguez-Villa et al., 2020)	AJP	General/ India	P	Scalable digital health tools	Accessibility+ Equity + inclusion+ Implementation + integration+ Scalability
28	(Brenner et al., 2025)	Psych Serv	Military/USA	L	Application	Accessibility + Effectiveness
29	(Bunyi et al., 2021)	Frontiers in Digital Health	General /USA	P	mental health apps	Accessibility+ Equity + inclusion+ Usability + User Experience+ Co-design
30	(Ojo et al., 2025)	AI	General/ Nigeria	F	Fuzzy Method	Effectiveness + Privacy
31	(González-Spinoglio et al., 2024)	Journal of Medical Internet Research	nursing home staff/ Spain	Q	Digital mental health tools	Accessibility+ Engagement+ Implementation + integration
32	(Torous et al., 2020)	JMIR MH	General/ global, COVID-era	P	Acceleration of digital mental health post-COVID	Usability + Effectiveness
33	(Fleming et al., 2024)	Vic Uni	Adolescent/ New Zealand	M	New Zealand Tools	Youth + Cultural

Research Findings

Key Dimensions and Indicators for Evaluating DMH Interventions

The synthesis of the final literature revealed the main and essential dimensions for evaluating digital mental health (DMH) interventions, encompassing aspects of design, delivery, impact, and ethical considerations. These dimensions, also reflected in Table 3, provide a structured framework for assessing the scope, quality, and sustainability of DMH tools. Below, each dimension is presented in a bullet list with a brief definition, relevant examples from the reviewed studies, and associated indicators, including behavioral criteria (e.g., initiation rates, adherence) and subjective measures (e.g., satisfaction surveys). Where necessary, indicators are tailored to the respective dimension and enriched with primary sources and additional texts for analysis.

- **Accessibility:** Refers to the ease with which diverse individuals can obtain and use DMH care services. This feature is influenced by factors such as digital infrastructure, literacy, and device compatibility. Example: Smartphone-based apps designed for refugees that enable access despite displacement and limited resources (Bridge et al., 2025; Ng

et al., 2025). Indicators: Behavioral criteria include initiation rates (e.g., first-time logins) and access logs; subjective measures include perceived accessibility surveys, assessing barriers like internet availability (Stein & Prost, 2024; Weirauch et al., 2024).

- **Equity and Inclusion:** Involves ensuring that DMH care services address access disparities and facilitate equitable distribution of benefits among marginalized and underserved groups. Example: Customized platforms for adolescents and refugees to reduce digital access gaps in LMICs (Huberty et al., 2025; Ng et al., 2025; Robinson et al., 2024). Indicators: Behavioral criteria such as participation rates across diverse demographics; subjective measures like inclusion surveys assessing perceived representation and equity (Weirauch et al., 2024).
- **Co-Design and User-Centeredness:** Emphasizes the involvement of end-users (e.g., patients, clinicians, vulnerable populations) in the development process to enhance relevance, acceptance, and personalization. Example: Participatory design of virtual reality therapies with youth and refugees to incorporate lived experiences (Cross et al., 2025; De Thurah et al., 2025; Kennedy et al., 2025). Indicators: Behavioral criteria include attendance in co-design sessions and iterative feedback loops; subjective measures like user-centered questionnaires assessing satisfaction with involvement.
- **Effectiveness and Efficacy:** Evaluates the capacity of DMH interventions to achieve desired mental health improvements under real-world (effectiveness) and controlled (efficacy) conditions, validated through empirical evidence. Example: Randomized controlled trials demonstrating symptom reduction in depression and anxiety via AI-based apps, including EEG-based classifications for refugees (Boucher et al., 2024; Linardon et al., 2025; Wang, Ding, et al., 2025). Indicators: Behavioral criteria such as pre-post outcome changes (e.g., adherence leading to symptom improvement on scales like PHQ-4); subjective measures like self-efficacy reports and satisfaction surveys (Brenner et al., 2025; Weirauch et al., 2024).
- **Engagement:** Measures the degree of user interaction, retention, and active participation with DMH services, influenced by design features and support mechanisms. Example: Human-supported chatbots addressing attitudinal barriers among adolescents and refugees for sustained use (Lipschitz et al., 2023; Ng et al., 2025; Starvaggi & Lorenzo-Luaces, 2025). Indicators: Behavioral criteria include adherence rates, login frequency, session duration, and completion rates; subjective measures like motivation and satisfaction surveys (Weirauch et al., 2024; Yap et al., 2025).
- **Usability and User Experience:** Assesses the intuitiveness, efficiency, and overall satisfaction derived from interacting with DMH tools, impacting long-term adoption. Example: Customizable apps with mood tracking and guided exercises, noting inconsistencies in experience sampling methods (Chau et al., 2025; De Thurah et al., 2025). Indicators: Behavioral criteria such as task completion rates and error frequency; subjective measures like usability scales (e.g., System Usability Scale) and experience satisfaction surveys (Weirauch et al., 2024; Yap et al., 2025).
- **Data Privacy and Security:** Focuses on protecting user information and ensuring confidentiality to build trust, especially for sensitive mental health data. Example: AI platforms with encrypted monitoring for vulnerable groups like adolescents and refugees (Kennedy et al., 2025; Stein & Prost, 2024). Indicators: Behavioral criteria include compliance rates with privacy protocols; subjective measures like trust and security perception surveys.

- **Implementation and Integration:** Examines the success of embedding DMH into existing healthcare systems, requiring infrastructure, policy, and stakeholder support. Example: Hybrid models integrating apps into clinical workflows, examining clinician buy-in and systemic challenges for refugees (Bridge et al., 2025; Gorban et al., 2025; Nowels et al., 2024; Strudwick et al., 2025). Indicators: Behavioral criteria such as adoption rates and integration success; subjective measures like feasibility surveys and stakeholder feedback (Weirauch et al., 2024).
- **Youth Involvement:** Highlights active participation of youth (ages 16-25) in creating, testing, and refining DMH interventions to align with their unique needs. Example: Chatbots and co-designed apps incorporating youth feedback for mental health literacy and support (Cross et al., 2025; Huberty et al., 2025; Potts et al., 2023). Indicators: Behavioral criteria include participation rates in involvement activities; subjective measures like youth satisfaction surveys on relevance.
- **Cultural Relevance:** Involves adapting DMH interventions to cultural values, contexts, and norms to foster trust and effectiveness. Example: Africa-centric frameworks emphasizing Ubuntu (African philosophy based on solidarity and humanity) and emotional intelligence, or adaptations for refugee cultural sensitivities (Forane et al., 2025; Ng et al., 2025; Zhang et al., 2025). Indicators: Behavioral criteria like culturally customized adherence rates; subjective measures like cultural fit surveys.
- **Refugee-Specific Considerations:** Addresses unique barriers experienced by refugee populations, including supply-side issues (e.g., funding, care suitability) and demand-side issues (e.g., awareness, stigma). Example: AI-based tools for trauma reduction in forced migrants, overcoming displacement-related challenges (Bridge et al., 2025). Indicators: Behavioral criteria include initiation and retention rates in refugee contexts; subjective measures like barrier-specific satisfaction surveys.

Table 3. Key Dimensions, Definitions, Examples, and Indicators of Digital Mental Health (DMH) Interventions

Dimension	Definition	Examples from the Literature	Indicators (Behavioral / Subjective)
Accessibility	The ease with which diverse populations can obtain and use DMH services, influenced by digital infrastructure, literacy, and device compatibility.	• Smartphone-based apps for refugees despite displacement and limited resources (Bridge et al., 2025; Ng et al., 2025) • Low-threshold telehealth platforms in LMICs (Rodriguez-Villa et al., 2020)	Behavioral: First-login rate, access logs, geographic coverage Subjective: Perceived accessibility, barriers to internet/device (surveys)
Equity and Inclusion	Ensuring that DMH services reduce rather than exacerbate disparities and provide fair benefits to marginalized and underserved groups.	• Platforms adapted for adolescents, refugees, and LMIC populations (Robinson et al., 2024; Wani et al., 2024)• Gender- and culture-sensitive chatbots	Behavioral: Participation rates by demographic group (age, gender, ethnicity, income) Subjective: Perceived fairness and representation (surveys)
Co-Design and User-Centeredness	Active involvement of end-users (patients, clinicians, youth, refugees) in the design and refinement of DMH interventions.	• Participatory design of VR therapies with youth (Cross et al., 2025) • Refugee co-design workshops for trauma apps (Ng et al., 2025)	Behavioral: Number of co-design sessions, iterations based on feedback Subjective: User satisfaction with involvement process
Effectiveness and Efficacy	The ability of DMH interventions to produce desired mental health outcomes in real-world (effectiveness) and controlled (efficacy) settings.	• RCTs showing reduction in depression/anxiety symptoms via AI apps (Linardon et al., 2025) • EEG-based personalized interventions (Wang, Ding, et al., 2025)	Behavioral: Pre-post change in validated scales (PHQ-9, GAD-7, etc.), clinical remission rates Subjective: Self-reported improvement, satisfaction
Engagement	Degree and continuity of user interaction with the DMH intervention, including retention and active use.	• Human-supported chatbots for adolescents (Lipschitz et al., 2023) • Gamified apps for youth (Huberty et al., 2025)	Behavioral: Adherence rate, login frequency, session duration, completion rate Subjective: Motivation, enjoyment, intention to continue (surveys)
Usability and User Experience	How intuitive, efficient, and satisfying the interaction with the DMH tool is for the user.	• Mood-tracking apps with simple interfaces (Chau et al., 2025) • Multilingual chatbots (Potts et al., 2023)	Behavioral: Task completion time, error rate Subjective: System Usability Scale (SUS), User Experience Questionnaire (UEQ)
Data Privacy and Security	Protection of sensitive mental health data and establishment of user trust through robust confidentiality measures.	• End-to-end encrypted AI monitoring platforms (Stein & Prost, 2024) • GDPR-compliant refugee apps (Hopkin et al., 2025)	Behavioral: Compliance with privacy protocols, audit logs Subjective: Perceived trust and security (privacy concern scales)

Implementation and Integration	Successful embedding of DMH into existing health systems, workflows, and policies.	• Hybrid clinic models combining apps with clinician support (Macrynikola et al., 2025) • NASSS-guided implementation projects (Strudwick et al., 2025)	Behavioral: Adoption rate by clinics, integration success metrics Subjective: Organizational readiness, clinician acceptance surveys
Youth Involvement	Specific, meaningful participation of young people (typically 16–25 years) in the creation and evaluation of DMH tools.	• Youth-led design of mental health literacy apps (Cross et al., 2025; Potts et al., 2023)	Behavioral: Youth participation rate in design/testing Subjective: Youth-reported relevance and ownership
Cultural Relevance	Adaptation of content, language, and design to local cultural values, norms, and contexts.	• Africa-centric frameworks based on Ubuntu philosophy (Forane et al., 2025) • Culturally tailored interventions for forced migrants (Ng et al., 2025)	Behavioral: Adherence in culturally matched vs. non-matched groups Subjective: Cultural acceptability and fit scales
Refugee-Specific Considerations	Addressing unique barriers faced by refugee and displaced populations (trauma, language, stigma, intermittent connectivity, etc.).	• Trauma-focused apps for forced migrants (Bridge et al., 2025) • Offline-capable tools for low-connectivity settings	Behavioral: Initiation and retention rates in refugee cohorts Subjective: Perceived safety, stigma reduction, relevance to lived experience

Proposed Comprehensive Definition of Digital Mental Health

Drawing on the synthesized literature, we propose the following integrative definition of digital mental health (DMH):

Digital mental health encompasses the use of digital technologies—including artificial intelligence, mobile applications, wearable devices, web-based platforms, virtual reality, telepsychiatry, and big data analytics—to prevent, screen, diagnose, treat, monitor, and promote psychological well-being in an accessible, equitable, and culturally responsive manner. DMH includes both standalone and human-supported interventions that are co-designed with end-users to maximize engagement, usability, and integration into existing healthcare systems, while prioritizing data privacy, security, and ethical considerations across diverse populations, including youth, refugees, and underserved communities.

This definition integrates the broad technological scope (Stein & Prost, 2024), functional roles (Löchner et al., 2025; Whitton et al., 2021), and contextual emphases (Bridge et al., 2025; Forane et al., 2025) identified in the reviewed literature. It offers a unified, coherent, and operationalizable framework that consolidates previously fragmented conceptualizations, aligns with emerging empirical evidence, and directly addresses persistent challenges in standardization, equity, and global implementation.

Key Measurement Tools and Conceptual Frameworks for DMH

The synthesis of the included studies revealed a diverse array of measurement tools and conceptual frameworks designed to evaluate the quality, effectiveness, and implementation of digital mental health (DMH) interventions. These tools address various aspects, from app evaluation to AI-based predictive models, and are grounded in interdisciplinary theories such as behavioral psychology, human-computer interaction, and health technology assessment. Below, each tool is presented in a bullet list with a brief description, including purpose, theoretical basis, key components (e.g., items, scoring), strengths, limitations, and evidence level based on a simple assessment (Level 1: High - systematic reviews/RCTs; Level 2: Moderate - empirical/validation studies; Level 3: Conceptual - theoretical/proof-of-concept).

- **APA App Evaluation Model:** A hierarchical guide for assessing mental health apps across accessibility, privacy, clinical foundation, and usability, adapted from traditional evaluation frameworks (American Psychological, 2023). Strengths: Adaptable for clinicians; Limitations: Resource-intensive. Evidence Level: 3 (Conceptual).
- **Enlight:** A comprehensive quality assessment tool for eHealth interventions, focusing on usability, visual design, and therapeutic alliance, with a multi-item scale (0-5) based on persuasive design principles (Baumel et al., 2017). Strengths: Predicts engagement; Limitations: Subjective. Evidence Level: 2 (Empirical).

- **One Mind PsyberGuide:** Expert rating system for apps based on credibility and evidence, with categorical rankings from reviews. Strengths: User-friendly; Limitations: Lacks depth. Evidence Level: 1 (Review).
- **TEQUILA Framework:** Focuses on trustworthy and equitable development, with qualitative guidelines across domains like usability (Hopkin et al., 2025). Strengths: Ethical focus; Limitations: Implementation challenges. Evidence Level: 3 (Conceptual).
- **Transformer-Based Clustering:** AI method for clustering social media data for mental health patterns, with algorithmic scoring using transformer models (Ibitoye et al., 2025). Strengths: Scalable; Limitations: Variable accuracy. Evidence Level: 2 (Empirical).
- **Early-Stage Health Technology Assessment (eHTA):** Iterative modeling for emerging technologies, with economic/clinical criteria to inform investment decisions and refinement in DMH (Kaló et al., 2025). Strengths: Informs investment; Limitations: Resource-intensive. Evidence Level: 2 (Empirical).
- **Quan Well-Being Index:** A digital self-report index for multifaceted well-being assessment in work and personal contexts, covering dimensions like physical health, mental health, social connections, and purpose to guide personalized improvements (Floridou et al., 2025). Strengths: Personalized; Limitations: Limited to self-report. Evidence Level: 2 (Empirical).
- **Happify for Teens:** A self-guided digital intervention customized for adolescents, using gamified cognitive-behavioral therapy and positive psychology activities to target stress, rumination, and loneliness, with evidence from trials showing symptom reduction (Boucher et al., 2024). Strengths: Trial evidence; Limitations: Retention issues. Evidence Level: 2 (Empirical).
- **Large Language Models (LLMs):** Advanced AI models, such as ChatGPT, applied in DMH for tasks like depression detection from text data, personalized counseling, and generative interventions, providing scalable support while requiring accuracy and ethical risk assessments (Shin et al., 2024). Strengths: Scalable; Limitations: Ethical risks. Evidence Level: 2 (Empirical).
- **RCTs:** Randomized controlled trials as the gold standard for measuring efficacy and effectiveness of DMH interventions, often used to test outcomes like symptom reduction in anxiety and depression across diverse populations, providing high-quality evidence despite challenges in retention (Linardon et al., 2025). Strengths: High-quality evidence; Limitations: Retention challenges. Evidence Level: 1 (Review).
- **Digital Clinic Model:** A hybrid care delivery model integrating clinician-guided therapy with digital tools like smartphone apps, digital phenotyping, and asynchronous support to enhance access, monitoring, and personalization in mental health services (Macrynikola et al., 2025). Strengths: Personalized; Limitations: Requires clinician adoption. Evidence Level: 3 (Conceptual).
- **NASSS Framework:** A theoretical framework for analyzing complexities in health technology adoption and sustainability, encompassing domains like condition, technology, value, adopters, organization, and context, applied to identify barriers in DMH implementation (Greenhalgh et al., 2017). Strengths: Identifies barriers; Limitations: Complex to apply. Evidence Level: 3 (Conceptual).
- **Digital Therapeutic Alliance (DTA):** An adapted conceptual and measurement framework from traditional therapeutic alliance, assessing user engagement, empathy, and goal alignment with digital interventions to enhance

adherence and outcomes in DMH (Malouin-Lachance et al., 2025). Strengths: Increases adherence; Limitations: Under validation. Evidence Level: 2 (Empirical).

- **E-XAI Framework:** An AI framework integrating explainable models with digital twin technology for EEG-based mental health state classification, enabling real-time monitoring, adaptive interventions, and transparent decision-making (Wang, Zhou, et al., 2025). Strengths: Transparent decision-making; Limitations: Technical needs. Evidence Level: 2 (Empirical).

Table 4. Overview of Key Tools and Frameworks for Digital Mental Health

Tool/Framework	Purpose/Context	Theoretical Basis/Items/Scoring	Strengths/Limitations	Evidence Level
APA App Evaluation Model	Guides app assessment in accessibility, privacy, etc.	Hierarchical criteria; qualitative scoring.	Adaptable; resource-intensive.	Level 3 (Conceptual).
Enlight	Evaluates eHealth intervention quality in usability and alliance.	Persuasive design; multi-item scale (0-5).	Predicts engagement; subjective.	Level 2 (Empirical).
One Mind PsyberGuide	Expert rating of apps on credibility and evidence.	Review-based; categorical rankings.	User-friendly; lacks depth.	Level 1 (Review).
TEQUILA Framework	Responsible development focusing on trustworthiness and equity.	Domains like usability; qualitative guidelines.	Ethical focus; implementation challenges.	Level 3 (Conceptual).
Transformer-Based Clustering	AI method for clustering social media data for mental health patterns.	Transformer models; algorithmic scoring.	Scalable; variable accuracy.	Level 2 (Empirical).
eHTA	Assesses value of emerging technologies early on.	Iterative modeling; economic/clinical criteria.	Informs investment; resource-intensive.	Level 2 (Empirical).
Quan Well-Being Index	Assesses multifaceted well-being in work environments.	Self-report dimensions; aggregated scores.	Personalized; self-report limited.	Level 2 (Empirical).
Happify for Teens	CBT gamified for adolescents targeting stress.	Positive psychology; pre-post outcomes.	Trial evidence; retention issues.	Level 2 (Empirical).
LLMs	AI for depression detection and counseling (e.g., ChatGPT).	Generative models; accuracy criteria.	Scalable; ethical risks.	Level 2 (Empirical).
RCTs	Gold standard for efficacy testing.	Randomized design; statistical outcomes.	High-quality evidence; retention challenges.	Level 1 (Review).
Digital Clinic Model	Hybrid therapy with digital tools for access.	Phenotyping; integration criteria.	Personalized; clinician adoption needed.	Level 3 (Conceptual).
NASSS Framework	Analyzes adoption complexities.	Domains like technology/value; qualitative.	Identifies barriers; complex.	Level 3 (Conceptual).
DTA	Assesses engagement with digital interventions.	Adapted alliance; scale-based scoring.	Increases adherence; validating.	Level 2 (Empirical).
E-XAI Framework	Explainable AI for EEG-based mental health classification.	Digital twin technology; real-time criteria.	Transparent decisions; technical needs.	Level 2 (Empirical).

Discussion and Conclusion

Evolutionary Trends in DMH Definitions

The findings of this scoping review synthesize a multifaceted and evolutionary conceptual landscape of digital mental health (DMH), drawing from over 33 recent sources to map definitions, dimensions, indicators, and measurement frameworks. DMH definitions have progressed from broad and foundational descriptions emphasizing general technology integration and remote delivery—particularly accelerated by the COVID-19 pandemic (Bunyi et al., 2021; Sorkin et al., 2021)—to more complex AI-based models featuring big data, machine learning, and personalized interventions (Qian et al., 2025; Stein & Prost, 2024). Core dimensions such as accessibility, equity and inclusion, co-design and user-centeredness, effectiveness and efficacy, engagement, usability and user experience, data privacy and security, implementation and integration, youth involvement, cultural relevance, and refugee-specific considerations provide a comprehensive framework for evaluating DMH scope and quality, supported by indicators like behavioral criteria (e.g., adherence rates) and subjective measures (e.g., satisfaction surveys) (Bridge et al., 2025; Cross et al., 2025). The diversity of measurement tools, including the APA App Evaluation Model, NASSS framework, Digital Therapeutic Alliance (DTA), and E-XAI for EEG-based classification, highlights varied approaches to assessment with strengths in adaptability and evidence-based design (Greenhalgh et al., 2017;

Wang, Zhou, et al., 2025). In the present study, relying on synthesized literature, a comprehensive definition is proposed by the current researchers, with its advantages argued in eight key aspects based on the literature:

1. **Inclusion of Technology Scope:** By enumerating tools like AI and virtual reality, this definition encompasses innovations from Kaló et al. (2023) and Wang et al. (2025) and ensures adaptability to future advancements (Kaló et al., 2025; Wang, Zhou, et al., 2025) (e.g., foundation models; (Qian et al., 2025)). This extends applicability beyond basic apps (Borghouts et al., 2021)to hybrid systems (Macrynikola et al., 2025), making it future-oriented.
2. **Comprehensive Functional Coverage:** Encompassing prevention to well-being promotion, it reflects the spectrum in Löchner et al. (2025) and Floridou et al. (2025) (Floridou et al., 2025; Löchner et al., 2025), going beyond treatment level (Linardon et al., 2025) to comprehensive applications, such as refugee trauma reduction (Ng et al., 2025). This enhances applicability in public health contexts.
3. **Emphasis on Accessibility and Equity:** Incorporating these as core elements reflects disparities noted in Robinson et al. (2024) and Huberty et al. (2025) (Huberty et al., 2025; Robinson et al., 2024), addressing digital gaps (Wang, Zhou, et al., 2025) and treatment gaps in LMICs (Rodriguez-Villa et al., 2020). This supports policy-making for inclusive deployment, as seen in Bridge et al. (2025) (Bridge et al., 2025).
4. **Focus on User-Centered and Co-Design:** Citing Cross et al. (2025) and De Thurah et al. (2025) (Cross et al., 2025; De Thurah et al., 2025), this ensures relevance, enhancing engagement (Lipschitz et al., 2023) and acceptance, especially for youth (Potts et al., 2023).
5. **Integration of Ethical Considerations:** Prioritizing privacy aligns with Stein & Prost (2024) and Kennedy et al. (2025) (Kennedy et al., 2025; Stein & Prost, 2024). It strengthens essential trust for vulnerable populations (Huberty et al., 2025) and long-term use.
6. **Scalability and Systemic Integration:** Reflecting the NASSS framework (Greenhalgh et al., 2017) and (Strudwick et al., 2025), this promotes sustainable implementation, addressing clinician barriers (Gorban et al., 2025) and infrastructural needs (Nowels et al., 2024).
7. **Population Diversity:** Explicit inclusion of groups like refugees (Bridge et al., 2025) and youth (Cross et al., 2025) ensures global relevance, aligning with UN Sustainable Development Goals (Wani et al., 2024) and cultural frameworks (Forane et al., 2025).
8. **Evidence-Based and Forward-Looking:** Grounded in RCTs (Linardon et al., 2025) and AI paradigms (Wang, Zhou, et al., 2025), this definition anticipates trends like real-time personalization (Qian et al., 2025) and provides a basis for research standardization.

This definition, by offering a coherent and practical framework, addresses fragmentation, empirically supported and pragmatic. It advances digital mental health by guiding developers, clinicians, and policymakers toward equitable and effective interventions. Limitations of this review, such as reliance on English-language sources, suggest avenues for broader inclusion in future syntheses. Overall, these findings highlight the transformative potential of DMH in bridging global treatment gaps through scalable, equitable, and personalized support, but persistent challenges—such as lack of standardized terminology and measurement approaches, user engagement and retention barriers, and implementation obstacles in underserved contexts—emphasize the need for targeted advancements to fully realize this potential (Lipschitz et al., 2023; Strudwick et al., 2025).

Implications for Research, Policy, and Practice

The findings of this scoping review provide practical insights for advancing digital mental health (DMH) across key stakeholder groups. By examining evolutionary definitions, core dimensions, and measurement frameworks, these implications can be summarized as fostering standardization, equity, and integration in the digital mental health domain.

Implications for Research

Heterogeneity in DMH definitions and measurement approaches highlights the critical need for consensus-driven terminology and validated tools to enable robust comparative studies and meta-analyses (Bunyi et al., 2021; Stein & Prost, 2024). Inconsistent use of terms like "digital health," "eHealth," and "telehealth" can lead to miscommunication and fragmented evidence synthesis, as highlighted in studies reviewing terminology in telehealth and digital interventions (Kaur et al., 2025; (Lupton, 2017). Researchers should prioritize developing consensus glossaries and validated scales for DMH literacy, inclusion, and outcomes, using ethical frameworks to guide responsible AI integration (Torous et al., 2020). This standardization can facilitate longitudinal research on long-term impacts, such as AI-based personalization on secondary outcomes like burnout and well-being, especially in diverse populations including youth and refugees (Cross et al., 2025; Qian et al., 2025). Future studies can employ mixed-methods designs to test these standards, enhancing high-quality evidence accumulation and complementing methodological gaps in the topic.

Implications for Policy

Policymakers should prioritize initiatives that bridge digital access gaps and protect data privacy and security, ensuring equitable access to DMH for marginalized groups such as refugees and individuals in low- and middle-income countries (LMICs) (Bridge et al., 2025; Ng et al., 2025). This approach includes funding infrastructure improvements, enacting regulations for secure data management in AI and telemedicine platforms, and integrating DMH into national health strategies aligned with global goals like the UN Sustainable Development Goals (Kennedy et al., 2025; Wani et al., 2024). Policies should address systemic barriers, such as limited internet access and cultural mismatches, to prevent exacerbating health inequalities during crises like pandemics or displacement (González-Spinoglio et al., 2024). Collaborative efforts with international organizations can support scalable implementations, emphasizing monitoring and evaluation to adapt policies based on real-world outcomes in underserved populations.

Implications for Clinical Practice

Clinicians face attitudinal barriers and integration challenges that hinder DMH adoption, necessitating targeted training programs on hybrid models like the digital clinic to promote buy-in and improve patient outcomes (Macrynikola et al., 2025; Strudwick et al., 2025). Such training should focus on building familiarity with AI-supported tools, addressing concerns about therapeutic alliance and efficacy, and fostering skills in hybrid care delivery (Malouin-Lachance et al., 2025; Zhang et al., 2025). By incorporating user-centered co-design and evidence from RCTs, clinicians can better navigate issues like engagement and user retention, especially for vulnerable populations (Lipschitz et al., 2023; Starvaggi & Lorenzo-Luaces, 2025). This approach enhances personalized care, reduces stigma, and supports sustainable integration into routine practice, ultimately bridging gaps in mental health service delivery.

Limitations and Future Directions

This scoping review, conducted based on PRISMA-ScR guidelines (Tricco et al., 2018), provides a comprehensive mapping of conceptual frameworks, definitions, dimensions, and measurement tools in the digital mental health (DMH) domain. However, the study's focus on English-language sources may have excluded valuable perspectives from non-Western or non-English-speaking regions, potentially leading to cultural bias and limiting the generalizability of synthesized definitions and frameworks, especially for culturally diverse communities such as LMICs or refugee populations (Arksey & O'Malley, 2005; Levac et al., 2010). This limitation emphasizes the need for indigenous conceptualization in DMH, as cultural values, norms, and contexts significantly influence the adoption and effectiveness of digital interventions (Forane et al., 2025; Ng et al., 2025). For instance, tools and frameworks developed in Western contexts may not align with the needs and lifestyles of non-Western societies, such as Iranian communities or other Middle Eastern countries, highlighting the necessity for localized tool design.

Consistent with PRISMA-ScR guidelines, no formal quality assessment of included studies was performed, as the primary goal was broad charting of the conceptual landscape rather than critically appraising evidence strength (Tricco et al., 2018). This approach, while suitable for conceptual scoping studies, may affect the reliability of the synthesized framework, as variations in methodological rigor across sources were not systematically evaluated, potentially leading to overemphasis on appealing but empirically unvalidated conceptual models. Future directions should focus on addressing these gaps. First, developing and validating standardized localized scales for assessing DMH literacy, inclusion, and effectiveness in specific cultural contexts, such as Iran or other regional countries, should be prioritized. These tools should align with cultural values, such as the importance of social norms or religious beliefs, and lifestyles, such as limited internet access in rural areas (Naslund et al., 2019; Yeo et al., 2024). Second, longitudinal studies to examine long-term impacts of localized DMH interventions on mental health outcomes, such as stress reduction or improved resilience in underserved populations, are essential (Ng et al., 2025; Qian et al., 2025). Third, interdisciplinary collaborations between psychologists, technology experts, and policymakers should be strengthened to design hybrid interventions (e.g., combining digital tools with human support) that respond to cultural and attitudinal barriers (Greenhalgh et al., 2017; Macrynikola et al., 2025). This study, by identifying these needs, provides a foundation for developing indigenous DMH tools that can bridge treatment gaps in local contexts, improve equitable access, and sustainably enhance mental health outcomes.

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Authors' Contributions

Authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

AI use statement

Artificial intelligence tools were used only to support language editing, translation refinement, formatting, and consistency checks. The authors take full responsibility for the accuracy of the data, analyses, interpretations, citations, and final content of the manuscript.

Ethical Considerations

This study was conducted using interview and questionnaire data. Participation was voluntary, and the confidentiality of participants' responses was preserved. The research procedure was designed to avoid harm to participants and to respect the principles of informed participation and academic integrity.

Transparency of Data

Reasonable requests for research materials should be directed to the corresponding author, subject to university policies and participant confidentiality.

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