Defining and Measuring Engagement and Adherence in Digital Mental Health Interventions: Protocol for an Umbrella Review

Lyen Krenz Yap, Edel Ennis, Maurice Mulvenna, Jorge Martinez-Carracedo

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Abstract

Background: Digital Mental Health Interventions (DMHIs) offer scalable solutions to address mental health needs, particularly among marginalized populations. However, engagement and adherence rates in DMHIs are often suboptimal, limiting their potential impact. Despite the growing body of literature on DMHI engagement, there is no consensus on how engagement and adherence are defined and measured across studies. Understanding these variations is crucial to improving DMHI intervention design, evaluation, and outcomes.

Objective: Using the PCC Framework to frame the objectives, this umbrella review aims to synthesize existing systematic reviews, meta-analyses, and scoping reviews to identify how engagement and adherence are defined and measured in DMHIs. Additionally, the review seeks to explore factors that may influence DMHI engagement and adherence.

Methods: A systematic search of peer-reviewed literature will be conducted across major electronic databases following PRISMA guidelines. Eligible studies will include systematic reviews, meta-analyses, and scoping reviews published in English for the past 10 years that examine engagement and/or adherence in DMHIs. Data will be extracted and synthesized to identify definitions, measurement methods, and influencing factors. Risk of bias will be assessed using the JBI Critical Appraisal Checklist for Systematic Reviews and Research Syntheses. Findings will be presented using a mixed-methods convergent integrated approach, identifying and synthesizing themes across the included quantitative and qualitative study results.

Results: The study is expected to be conducted over a 6-month period. The review will provide a comprehensive summary of how engagement and adherence are operationalized across existing literature. It will highlight commonalities, inconsistencies, and gaps in definitions and measurement methods. Additionally, the review will outline key factors that influence engagement and adherence, including individual, technological, and contextual elements.

Conclusions: This umbrella review will contribute to a more nuanced understanding of engagement and adherence in DMHIs, informing future intervention design and evaluation. The findings will support the development of standardized definitions and measurement frameworks, ultimately enhancing the effectiveness and inclusivity of DMHIs. Clinical Trial: PROSPERO International prospective register of systematic reviews CRD42025637603; https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42025637603

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Abstract:

Background: Digital Mental Health Interventions (DMHIs) offer scalable solutions to address mental health needs, particularly among marginalized populations. However, engagement and adherence rates in DMHIs are often suboptimal, limiting their potential impact. Despite the growing body of literature on DMHI engagement, there is no consensus on how engagement and adherence are defined and measured across studies. Understanding these variations is crucial to improving DMHI intervention design, evaluation, and outcomes.
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Conclusions: This umbrella review will contribute to a more nuanced understanding of engagement and adherence in DMHIs, informing future intervention design and evaluation. The findings will support the development of standardized definitions and measurement frameworks, ultimately enhancing the effectiveness and inclusivity of DMHIs.
Trial Registration: PROSPERO International prospective register of systematic reviews CRD42025637603; https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42025637603
Keywords: engagement; adherence; user retention; digital mental health interventions (DMHI);

umbrella review; systematic review; digital health; mHealth; eHealth

Introduction

Digital mental health interventions (DMHIs) offer numerous advantages, such as accessibility and scalability, but low engagement and adherence remain significant challenges that undermine their effectiveness. A major barrier to addressing this issue is the lack of consensus in the literature on how engagement and adherence are defined and measured. For instance, some studies focus on usage frequency or duration, while others consider broader metrics like uptake rates, levels of use, and intervention completion [7]. Moreover, metrics like download numbers alone are insufficient indicators of meaningful engagement [6]. A more nuanced understanding of engagement has also emerged, incorporating behavioural, cognitive, and affective dimensions [5, 10].

These inconsistencies hinder meaningful comparisons across studies, the development of standardized frameworks, and the creation of evidence-based strategies to improve user retention. It is crucial for research on DMHI engagement to address this heterogeneity, and adopt a clear and common definition and measurement for engagement and adherence [2].

This umbrella review aims to synthesize existing systematic reviews, meta-analysis, and scoping reviews to provide a comprehensive understanding of the definitions, measurement approaches, and factors that influence engagement and adherence in DMHIs. To frame the review's objectives, the Population, Concept, Context (PCC) Framework recommended by JBI is applied, as outlined in Table 1. With this in mind, this umbrella reviews aims to answer the following research questions:

1. How is engagement defined and measured in systematic reviews, meta-analysis, and scoping reviews of Digital Mental Health Interventions?

2. How is adherence defined and measured in systematic reviews, meta-analysis, and scoping reviews of Digital Mental Health Interventions?

3. Are there other factors that influence DMHI Engagement and Adherence?

Table 1. The umbrella review objectives.

Population	All Populations (No Restrictions)
Concept	Definition and Measurement of Engagement and Adherence
Context	Digital Mental Health Interventions

Methods

Database Selection

No ethical approval will be required as this review is based on already published and publicly available data. The databases utilized for this umbrella review include Web of Science, CINAHL via EBSCO, MEDLINE via Ovid, PsycINFO via Ovid, Cochrane via EBM Reviews, and ProQuest Complete. Full access to these databases is provided by the Ulster University library. An additional handsearching of the BMC Digital Health journal will also be conducted. These databases were selected for their comprehensive coverage of peer-reviewed literature in the relevant subject matters of psychology, healthcare, and digital health interventions [3, 4].

The gold standard reference set contained one article from BMC Digital Health. As this journal is relatively new and has not yet been indexed in major databases, there was a risk of missing additional relevant studies. After discussion with the review team, and to ensure the comprehensiveness of the search, it was decided to include BMC Digital Health through hand searching, a method where journals are manually browsed to identify potentially relevant articles that may not be captured through database searches [1].

In addition to this, CINAHL and Cochrane did not yield the expected relevant articles from the gold standard reference set. Therefore, precision testing and unique hits testing were conducted on

CINAHL to assess the database's contribution to the overall search strategy [9]. The results indicated that CINAHL provided unique relevant studies not captured by other databases, leading to the decision to ultimately include this database. Cochrane remained included given the recognition of Cochrane reviews.

Search Strategy

Database searches, with search strategies developed in assistance with the subject librarian, will include the following concepts: Engagement, Adherence, Digital (web-based, smartphone, app, computer), Mental Health (well-being, emotional health, anxiety, stress), and Interventions (promotion, prevention, treatment). The search will focus on identifying systematic reviews, meta-analysis, and scoping reviews that were peer-reviewed and published between 2015 and 2025 in English.

A combination of keyword searching and subject heading searching will be employed using the appropriate Boolean operators. Keyword searching identifies articles based on specific words appearing in titles, abstracts, or full texts, while subject heading searching uses controlled vocabulary to capture relevant studies regardless of terminology variations. Combining both approaches enhances search sensitivity and specificity. Gray literature will be excluded, but supplementary searching using forward citation-chaining will be utilized to ensure that reviews included are up to date. To ensure comprehensiveness and accuracy, searches will be re-run prior to the analysis stage.

To ensure the comprehensiveness of the search strategy, we conducted gold standard reference set checking, where a pre-identified set of key articles expected to be included in the review was used to assess the search strategy's sensitivity [8]. The gold standard reference set (five articles) was formed by the authors noting relevant reviews that they had recently read. Each article in the gold standard set was checked to confirm whether it was successfully retrieved by the search, allowing us to evaluate the search strategy's ability to capture relevant studies. Matters regarding databases are discussed above.

Eligibility Criteria

Search criteria already structure studies which are eligible for inclusion. Within the search results, the Population, Intervention, Comparator, Outcome, Study Design (PICOS) framework is applied to guide the inclusion and exclusion of studies. This will be added on the COVIDENCE Platform for reference when examining eligibility. This is elaborated on Table 2. The included studies focus on Digital Mental Health Interventions (DMHIs) that define or measure engagement and/or adherence. Eligible study designs include systematic reviews, meta-analyses, and scoping reviews that examine engagement and adherence in DMHIs. Studies will be excluded if they evaluate digital interventions without a mental health outcome, focus on non-digital mental health interventions, or discuss digital mental health without an intervention component. Additionally, reviews that do not sufficiently define or measure engagement and adherence, as well as non-eligible study designs such as integrative reviews, narrative reviews, primary studies, or research protocols, will be excluded. No restrictions are applied to comparators or populations.

Table 2. Inclusion and Exclusion criteria.

	Inclusion Criteria	Exclusion Criteria
Population	No restrictions applied.	No restrictions applied.
Intervention	Digital Mental Health Interventions	Digital Interventions without Mental Health Outcomes Mental Health Interventions

		delivered non-digitally Digital Mental Health papers without Interventions
Comparator	Not Applicable.	Not Applicable.
Outcome	Definition or Measurement of Engagement Definition or Measurement of Adherence	No sufficient details on definition or measurement of engagement or adherence.
Study Design	Systematic Reviews, Meta-Analysis, and Scoping Reviews.	Any other type of review (including but not limited to: integrative reviews, narrative reviews), independent studies, or research protocols.

Screening and Selection

The primary reviewer and a subject librarian will comprehensively search the relevant databases. After removing duplicates, the references will be imported into the COVIDENCE platform for screening. Two independent reviewers will assess the titles and abstracts against the eligibility criteria, resolving disagreements through discussion. If necessary, a third reviewer will be consulted to achieve consensus. Full-text articles of potentially eligible studies will then be extracted, where possible, and reviewed independently by two reviewers for relevance and eligibility, with disagreements addressed in consultation with the project team. Reasons for study exclusion at both the abstract and full-text stages will be documented. Each step of the process will be tracked and reported using a PRISMA flowchart.

Data Extraction

Once citations to be included in the umbrella review are identified, data extraction will be conducted using Covidence's Extraction 2 tool to ensure a structured and standardized approach. The following data will be extracted: references (authors, year of publication), study design (systematic review, meta-analysis, or scoping review), research aims, data synthesis approach, quality assessment indicators, type and number of studies included, demographic information, description of digital mental health interventions, outcome variables, and main findings. This information will be organized into data extraction tables on review characteristics, included study characteristics, participant characteristics, and study results. Covidence will facilitate consistency across reviewers and minimize data entry errors. For missing or unreported data, if deemed necessary, the original authors of the study will be contacted. All findings will be reported following the PRISMA 2020 guidelines and its extension for umbrella reviews.

Quality Assessment

The methodological quality of the included systematic reviews, meta-analysis, and scoping reviews will be evaluated using the JBI Critical Appraisal Checklist for Systematic Reviews and Research Syntheses. Utilizing the Covidence platform, two reviewers will independently assess the selected studies, resolving any disagreements through detailed discussions. If required, a third reviewer will be involved to reach a consensus.

Data Synthesis

Due to the presumed heterogeneity of the data, the data synthesis will follow a mixed-method convergent integrated approach. Quantitative data on engagement and adherence metrics (e.g., usage

frequency, completion rates, adherence duration) will be synthesized descriptively. Concurrently, qualitative data, such as narrative definitions, thematic insights, and contextual factors influencing engagement and adherence, will undergo thematic analysis to identify patterns and broader themes. Both data types will be synthesized and reported side by side, ensuring that the insights from each complement and enhance the understanding of how engagement and adherence are defined, measured, and influenced in Digital Mental Health Interventions. Study conclusions will also draw on the study's implications for co-production, patterns of engagement, and inclusivity in DMHIs.

Results

The preliminary search began on February 1, 2025, resulting in 5,029 articles before removing duplicates. The umbrella review is expected to be conducted over a 6-month period, with screening, quality assessment, and data extraction streamlined through the COVIDENCE platform. Screening and selection of studies will be carried out in Month 1, followed by data extraction and quality appraisal in Months 2 and 3. Data synthesis and integration will take place in Month 4 and 5, and writing conclusions and preparing the manuscript will occur in Month 6. Regular weekly meetings among the whole review team will be conducted to monitor progress and ensure timely completion of each phase.

The results will be presented in terms of the definitions of "engagement" and "adherence" within the context of digital health, along with the qualitative and quantitative methods and tools used to measure these concepts in digital mental health interventions. Additionally, the review will outline key factors that influence engagement and adherence, including individual elements such as age, gender, mental health status, and digital literacy; technological factors like intervention design features, usability, and personalization; and contextual aspects such as social support, accessibility, and the broader healthcare environment. The exploration of these factors will provide a comprehensive understanding of the complex and dynamic nature of engagement and adherence in digital mental health interventions.

Discussion

The main anticipated challenges will involve managing the large volume of search results and reviewing them thoroughly while working efficiently. Given the fast-paced nature at which research in the field advances, it will be crucial to balance comprehensive analysis with time sensitivity. Nonetheless, this review will provide a critical contribution by offering a consolidated view of current engagement and adherence practices in DMHIs. Given the inconsistencies in how engagement and adherence are defined and measured in DMHIs, this umbrella review is crucial in providing clarity and enabling meaningful comparisons across studies.

To maximize the review's impact, the findings will be disseminated through publication in a peer-reviewed journal and presentation at high-level international conferences involving key stakeholders in digital health and mental health research. The review's findings have important implications for both research and practice. For researchers, the synthesis will offer a foundational understanding of how engagement and adherence are conceptualized, informing future study designs and methodological approaches. For practitioners and app developers, the review will highlight key factors that promote sustained engagement, supporting the development of more user-centered interventions.

The discussion will consider the complexity of reliably defining and measuring engagement and adherence, as well as developing best practice guidelines to improve such efforts. The review will outline future research priorities and needs for effectively understanding engagement and retention, as these are fundamental to the successful design, monitoring, and evaluation of digital mental health

interventions (DMHIs). These insights will ultimately aid in enhancing user retention, improving mental health outcomes, and contributing to the overall quality of DMHI research. Any deviations from this protocol will be recorded and justified in the final version of the study.

Acknowledgments

Conflicts of Interest

Abbreviations

DMHI: Digital mental health interventions

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