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Leveraging lived experience in rural settings: a systematic review protocol of digital healthcare environment

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ABSTRACT

Introduction Digital health interventions (DHIs) are changing the healthcare landscape. However, using these tools effectively for people with chronic conditions in rural areas comes with challenges, highlighting the need to understand their lived experiences. No systematic review was found that examines the inclusion of lived experience in DHI for individuals with chronic conditions in rural areas and how this impacts their acceptance of technology. A systematic review grounded by Technology Acceptance Model (TAM) will be conducted to examine the lived experiences of individuals in rural areas who use DHIs. Individuals with chronic conditions will be examined specifically and how their experiences influence the adoption, use and satisfaction with DHI for managing their health needs. This systematic literature review is significant because it will be used as a crucial starting point for a larger project aimed at creating digitally transformed primary healthcare in rural areas, particularly for Indigenous communities. The insights gained will inform the development of a digital transformation model for the larger project.

Methods and analysis Guided by the TAM and PRISMA to explore the lived experiences of patients and caregivers with digital health, a search will be conducted for peer-reviewed studies on DHIs, including qualitative, quantitative and mixed-method approaches, including systematic reviews. The studies must be published in English from 2019 to the present and will be sourced from databases such as PubMed, EBSCO, Cochrane Library, Scopus and Web of Science. MeSH will be utilised to identify terms like user experience, acceptability and engagement with DHIs. Eligibility will be based on relevance, population, intervention and outcomes. A standardised data extraction form will be developed and tested to capture important information from each study included in the review. Data extraction and quality appraisal will be performed independently by two reviewers, with a third reviewer addressing any discrepancies. Software will be used to manage extracted data, assess risk of bias and synthesise the data. Meta-analysis will be included to enhance our findings if sufficient quantitative data is available. Our findings will be reported in accordance with the PRISMA guidelines. This review protocol was refined in June 2025; commencement of the study will be in July 2025 and will be completed in 2026.

Ethics and dissemination This study used previously published literature and did not collect primary data from humans or animals. No ethical committee approval was required. Findings will be disseminated through peer-reviewed publication and will be presented at conferences related to the field.

Trial registration osf.io/jw5yp.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The study will be anchored in the established Technology Acceptance Model (TAM), which offers a solid theoretical framework for analysing rural users' acceptance and behaviour towards digital technologies.
⇒ The inclusion of various study designs enhances the breadth and applicability of the findings across different digital health intervention (DHI) platforms.
⇒ The review will be in accordance with systematic protocols which guarantee transparency, replicability and methodological rigour throughout the processes of study selection, data extraction and synthesis.
⇒ Limiting the review to post-2019 articles is a strength in capturing recent developments in digital health but also a limitation as it may exclude earlier foundational studies on TAM and DHIs.
⇒ Only studies published in English will be included, which may exclude important findings from non-English-speaking regions.

INTRODUCTION

Emerging digital health interventions (DHIs) are significantly transforming the healthcare landscape, offering a diverse array of technology-driven tools and solutions designed to enhance the quality and efficiency of healthcare delivery.[1] These interventions leverage digital platforms, mobile applications, wearable devices and interconnected technologies to facilitate improved communication between patients and healthcare providers, streamline operational processes and optimise health outcomes.[2] By harnessing such advanced technologies, DHIs hold the potential to strengthen healthcare systems through improved data management, enhanced workflow efficiency and the facilitation of personalised treatment plans tailored

to the unique needs of individual patients,[2] particularly those managing chronic conditions.

The adoption and sustained use of these digital innovations are critically important for individuals living with chronic conditions in regional, rural or remote communities. These patients often face unique challenges associated with geographical distance from healthcare providers, limited access to specialised services and the complexities of managing their conditions in resource-constrained environments.[3 4] The Technology Acceptance Model (TAM) offers a framework for understanding the factors influencing individuals' acceptance of technology.[5] TAM suggests that perceived usefulness, defined as the belief that technology improves one's quality of life, particularly in managing chronic conditions, and perceived ease of use, the belief in the user-friendliness of technology despite potential health-related challenges, are key determinants of behavioural intention to adopt technology.[6] Understanding these perspectives among diverse populations, including those with chronic conditions in rural regions, is crucial for successful DHI implementation and its capacity to mitigate the challenges of managing long-term illnesses in these contexts.

DHIs' novel approach to healthcare management promotes enhanced preventive care through remote patient monitoring capabilities, facilitating timely interventions and reducing the need for travel to distant healthcare facilities. They also offer the potential for tailored health education and resources that can empower patients to better manage their conditions.[7] As DHIs become a fundamental part of modern healthcare systems, generating evidence is necessary for informed decision-making, especially concerning their impact on the lives of individuals with chronic conditions in geographically isolated regions.[8] Consequently, studies illustrating DHIs' implementation and evaluating their impact and sustainability for this specific population are significant.

Recent systematic reviews have emphasised the imperative for healthcare systems to adopt and integrate DHIs to enhance traditional care practices, prioritising improvements in accessibility for diverse patient populations, including those with chronic conditions, while simultaneously promoting greater engagement from users in their health management.[9–11] For example, Widmer *et al*[10] concluded that DHIs provide a scalable and effective solution for reducing the risk of cardiovascular diseases and improving overall cardiovascular health management; a particularly relevant finding for individuals managing chronic heart conditions in remote areas. Philippe *et al*[9] suggest that DHIs offer a flexible and cost-effective approach to delivering mental healthcare, especially in underserved areas. Howarth *et al*[12] emphasised their potential for cost-effective workplace health interventions, particularly in enhancing physical activity and mental well-being, which can be vital for managing various chronic conditions. Similarly, Gentili *et al*[11] highlighted the potential of DHIs to reduce waste and optimise resource utilisation in healthcare. Notably, these studies investigated whether DHIs effectively address identified health needs, analysing critical factors such as technical functionality, feasibility, user satisfaction and the overall value for money, but may not have specifically focused on the unique lived experiences of those with chronic conditions in rural settings.

Yet, successful implementation of DHIs for individuals with chronic conditions in rural and remote areas faces challenges, such as resistance from healthcare providers and patients alike. This resistance frequently arises from a lack of familiarity or trust in the technology.[13 14] Cresswell *et al*[14] mentioned that this reluctance to uptake is often due to concerns of potential disruptions to existing workflows, while Kruse *et al*[13] noted the absence of interoperability between digital tools and traditional health records inhibits seamless data integration and coordination across systems. This can lead to inefficiencies and potential gaps in patient care, which is particularly concerning for the integrated management of chronic illnesses. Meanwhile, inconsistencies in policy frameworks governing the implementation of DHIs have created significant uncertainty for stakeholders, particularly concerning data privacy and security.[15 16]

Compounding these challenges, many studies show that DHIs often fail to include patients with experience of chronic conditions during the design process.[17 18] This oversight is especially significant for people living in rural areas, as it disconnects their actual needs and lived experiences from the priorities of DHI developers. Voorheis *et al*[17] indicated that failing to engage in co-design partnerships may lead to a reduction in perceived usefulness. The authors[17] propose that insights from co-design partners can enhance the development of a DHI with a more engaging user experience, potentially creating significant value beyond simple product improvement.

Gudka *et al*,[18] in their review, highlighted that co-designed DHIs which integrate social support and use trusted sources, such as general practice physicians (GPs), can help bridge gaps in care for conditions like attention deficit hyperactivity disorder. While co-design represents an inclusive process that benefits both participants and the digital health solutions, a nuanced understanding of the challenges and benefits of DHIs through the authentic experiences of individuals managing chronic conditions in rural settings remains limited. This understanding is crucial for shaping perceptions of usefulness and ease of use.

These persistent challenges within the DHI landscape underscore the necessity for in-depth exploration, especially regarding the lived experiences of its end-users and those managing chronic conditions in rural settings. Lived experience refers to the real-life and unique understanding individuals gain through direct involvement in life events and situations,[19] especially for those navigating the complexities of long-term illness. Lived experience research focuses on comprehensively understanding individuals' personal and subjective experiences regarding

health, illness and healthcare interactions.[20] Previous studies have explored the intricate ways in which individuals navigate their chronic health journeys, highlighting how they interact with healthcare professionals, access services and manage their conditions in the context of their everyday lives.[21–23] In the realm of DHIs, exploring the lived experience of end users, particularly patients with chronic conditions in rural areas, is critical for several reasons. This approach facilitates a comprehensive exploration of clients' personal narratives regarding the specific challenges they encounter when utilising DHIs for managing their chronic conditions, potentially influencing their perceptions of usefulness (eg, does it actually help manage my specific symptoms and needs?) and ease of use (eg, can I use it despite my physical limitations or lack of technical support?). Furthermore, integrating lived experience in DHI goes beyond the exclusive reliance on clinical or biomedical data, encompassing factors such as socioeconomic status, access to technology, individual health literacy and the specific burdens of living with a chronic condition in a rural environment—all of which significantly influence health outcomes associated with DHI use and can impact both perceived usefulness and ease of use. A deeper understanding of lived experiences of these users holds the potential to yield invaluable insights for sustaining DHIs, emphasising adaptability, usability (ease of use for individuals with chronic conditions) and their impact on health equity (perceived usefulness in addressing disparities in chronic disease management).

We conducted a preliminary search on key databases, including PubMed, EBSCOHost (CINAHL), Scopus, Cochrane, Joanna Briggs Institute (JBI) Evidence Synthesis and ProQuest. We also searched Prospero and the Open Science Framework (OSF) to ascertain the existence of any ongoing systematic reviews with similar aims. Our search specifically targeted systematic reviews focusing on the integration of lived experience in DHIs for individuals with chronic conditions in rural areas and how it relates to technology acceptance. However, the initial findings indicate a lack of such ongoing reviews, indicating a potential gap in the literature that this systematic review seeks to address.

In accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines,[24] we will systematically review the literature about DHIs, explicitly examining lived experience of end-users from rural areas, particularly patients with chronic conditions. Selçuk[25] mentioned that taking a systematic approach to conducting a review is crucial for minimising bias and ensuring that the findings contribute meaningfully to scientific knowledge. Accordingly, a methodical process ensures that the review is comprehensive, reproducible and transparent. Our review will primarily be conducted using a qualitative approach. If there exists enough data, and the studies use similar methodologies, a meta-analysis of our review will also be performed. Statistically synthesising data from multiple studies will significantly enhance our findings. This thorough and methodical approach will strengthen the overall conclusions drawn from our review.

Objective and research question

Our review study is aimed at examining the ways in which the lived experiences of individuals residing in rural areas influence the adoption, utilisation and satisfaction with DHIs for managing chronic health conditions. The focus will be on marginalised and underserved populations, including the elderly, Indigenous individuals and those with low socioeconomic status, such as individuals with limited educational backgrounds. To this end, our review will be answering the question: How does the lived experience of individuals residing in rural areas influence the design, adoption, usability and perceived effectiveness of DHIs? The following sub-questions will be considered:

a. How do the lived experiences of rural patients with chronic conditions shape their perceptions of the perceived usefulness and perceived ease of use of DHIs?
b. What specific barriers and facilitators, as experienced by diverse populations with chronic conditions (elderly, Indigenous, low socioeconomic status) in rural settings, influence their perceived ease of use of DHIs for managing their health?
c. How do the perceived benefits of DHIs influence their adoption and sustained usage of these technologies across different demographic groups with chronic illnesses?

METHODS

The refinement of this study protocol was completed in June 2025. Shortly thereafter, a pilot search of the PubMed and Scopus databases was conducted to assist in developing the search strategy. The initial search returned 716 articles published from 2019 to the present, which were screened by title across the identified databases. The study is set to commence in July 2025 and will be completed in 2026.

The entire process of this study will be in accordance with using the PRISMA guidance.[24] Software tools like EndNote, Covidence and Stata will be employed to support various stages of our systematic literature review, from management of citations and screening of studies to executing data extraction and synthesis. This study is registered with the Open Science Framework (OSF), https://osf.io/jw5yp, to promote transparency and prevent duplication by other researchers.

Inclusion criteria

A comprehensive and extensive scan for published peer-reviewed articles will be performed to address our specific research question using the following inclusion criteria.

Participants

All adults and children living in rural areas who have used or are currently using DHI will be included. A particular focus will be on individuals with chronic conditions (eg,

Table 1 Types of digital health technologies included in the review of patients with chronic conditions' lived experiences on DHI utilisation

DHI service	Technologies/devices/applications
Remote patient monitoring	► Wearable devices ► Sensors ► Smart devices
Platforms and tools that enable remote delivery of healthcare services and clinical consultations	► e-Prescribing ► mHealth ► Telehealth ► Telemedicine
Health management apps	► Medical adherence apps ► Fitness and wellness tracking apps ► Apps for managing chronic diseases
Digital therapeutics	► Apps for mental health ► Digital programmes for addiction management or smoking cessation ► Mobile apps for managing musculoskeletal pain or rehabilitation
Health behaviour change tools	► Fitness or diet apps ► Behaviour change programmes for smoking cessation or weight loss ► Apps using reminders or motivational messaging for adherence to health goals
Immersive technologies	► Virtual reality ► Augmented reality

DHI, digital health intervention.

cancer, chronic obstructive pulmonary disorder, chronic pain, diabetes, hypertension, heart problems and mental health) and their caregivers. In studies involving various populations, rural data will be used if it is reported separately. Researchers, practitioners and decision makers will not be considered.

Interventions

We will consider a wide range of DHIs (table 1) in our review study, including:

Comparators

DHIs will be benchmarked using comparators relative to the standard of care, usual care, or other DHIs. Standard care refers to the intervention that is widely accepted as the best available option based on evidence, clinical guidelines and expert consensus.[26 27] Usual care refers to the interventions that patients typically receive in a specific setting, which may vary depending on local practices, available resources or provider preferences.[28]

Outcomes

Experiential outcome will be based on participant perspective on perceived benefits, perceived challenges, perceived accessibility and inclusivity of DHIs in rural settings, satisfaction with DHIs and emotional responses. Other outcomes to be considered are digital engagement and social-related and health-related outcomes experienced by included participants. Any other outcome with no patient experience component will be excluded.

Types of sources

The types of studies that will be included are peer-reviewed randomised controlled trials, controlled clinical trials, cohort studies, case-control studies, qualitative studies, quantitative studies, mixed-methods studies and systematic reviews. Editorials, opinion pieces, commentaries, position papers, conference abstracts and posters and research protocols will be excluded.

Search strategy

The search strategy for this systematic review will be carefully developed to ensure a comprehensive and unbiased identification of relevant peer-reviewed studies published in English from January 2019 to present. A 5-year time frame will be considered to ensure the most relevant, up-to-date and technologically current evidence. Due to continuous innovations and significant uptake since the COVID-19 pandemic,[29–31] DHIs are developing quickly.

The search will be grounded in the research questions and guided by the PICO (Population, Intervention, Comparator, Outcome) framework to identify essential search terms and concepts.[32]

A combination of controlled vocabulary, such as MeSH terms, and free-text keywords will be employed to account for variations in terminology across various studies and databases. Keywords will include *terms for DHIs* (eg, "digital health", "eHealth", "mHealth", "telehealth", "telemedicine", "mobile health app", "online therapy", "virtual care", "wearable devices"; *for lived experience* (eg, "lived experience", "patient experience", "user experience", "user involvement", "patient perspective", "patient-centred care", "participatory research"; and terms like "health outcome", "quality of life", "patient satisfaction", "adherence", "cost-effectiveness"; *for location* (eg, "rural", "regionals areas"); *for conditions* (eg, "chronic disease", "long-term", "heart disease", "diabetes", "asthma", "cancer", "COPD"); *and other terms such as* "Technology Acceptance Model", "technology adoption", "perceived usefulness", "perceived ease of use" and "behavioural intention to use". Boolean operators (AND, OR and NOT) to refine the search results to optimise the retrieval of relevant studies without adding unnecessary information[33] will be utilised. Online supplemental file 1 illustrates the pilot search strategy.

Multiple electronic databases, including PubMed, EBSCO (CINAHL, PsycINFO), Cochrane Library, Scopus and Web of Science, will be covered in this study. Grey literature sources (eg, reports and conference proceedings) will be excluded from this review. Filters for study design (eg, randomised controlled trials and cohort studies), language and year of publication restrictions will be applied as appropriate.

Data extraction and management

A standardised data extraction form will be meticulously developed and piloted to capture essential information from each study included in the review. The extraction form will include various categories of information, including study characteristics (eg, author(s), publication year and country of origin), population information (sample size, demographic characteristics), DHIs being assessed, comparators employed, outcomes measured and key findings derived from each study. Additional fields will document the study design (eg, randomised controlled trial, cohort study), risk of bias assessment, sources of funding and duration of follow-up as applicable.

The data extraction will be performed concurrently by two independent reviewers. This approach is designed to uphold the integrity of the process while minimising biases.[32] In instances of discrepancies, the reviewers will engage in thorough discussions or consult a third reviewer to reach a consensus.

EPPI-Reviewer[34] will be utilised to manage the extracted data, ensuring secure storage, systematic organisation of the data, tracking included studies, performing data cleaning and preparing the data for synthesis and analysis.

Risk of bias assessment

A risk of bias assessment will be performed to evaluate the internal validity of the included studies and ensure the reliability of the synthesised findings.[32] Appropriate tools based on the study design will be utilised. For randomised controlled trials (RCTs), the Cochrane Risk of Bias (RoB 2) tool will be employed, assessing key domains such as randomisation, allocation concealment, blinding, incomplete outcome data and selective reporting.[35] For observational studies, the Newcastle-Ottawa Scale (NOS) will be applied to evaluate the selection of study groups, comparability of groups and outcomes.[36] For qualitative studies, the Critical Appraisal Skills Programme (CASP) checklist will be utilised to guide our review in critically appraising studies across key domains, such as the clarity of research aims, appropriateness of the methodology, study design, recruitment strategy, data collection, analysis, results and ethical considerations.[37] For systematic reviews, AMSTAR-2 (A Measurement Tool to Assess Systematic Reviews) will be employed.

Each study will be independently evaluated by two reviewers to minimise subjectivity and discrepancies, which will be addressed through consultation with a third reviewer. The results of the risk of bias assessments will be presented in a tabular format and visualised using tools such as risk-of-bias summary plots. These assessments will enhance the interpretation of the findings by identifying areas where the quality of the studies may influence the strength and credibility of the evidence, ultimately contributing to the transparency and rigour of the review.[32]

Data synthesis

The results from the studies included will be integrated and analysed using a structured method. The type of data—whether qualitative, quantitative or mixed methods—will be used to determine the initial synthesis strategy. For qualitative data, a narrative synthesis approach will be utilised to identify themes, patterns and relationships across the studies. Subgroup analysis will be conducted to explore heterogeneity in effects across different interventions, populations and study designs.

When adequate quantitative data are available, and the studies included are methodologically comparable, a meta-analysis to produce pooled estimates will be performed. Quantitative data, which includes (but is not limited to) effectiveness outcomes such as changes in health metrics, adherence rates or user engagement, a meta-analysis may be utilised, employing statistical software Stata or R.

The conventions of TAM will be employed to evaluate outcomes. Specifically, the focus will be on the dimensions of perceived usefulness, perceived ease of use, intention of use and actual use of DHIs. These outcomes will be prioritised because they are crucial for understanding how people accept and adopt DHIs, especially in rural areas. Secondary outcomes, such as patient satisfaction, engagement levels, health outcomes related to managing chronic diseases and the barriers or facilitators that affect DHI use will also be considered. While we focus on the primary outcomes for analysis, the secondary outcomes will help provide a clearer picture of user experiences and the factors involved in implementing these interventions.

All steps taken, from data extraction and management to synthesis, will be documented in detail to ensure transparency, ensuring a replicable methodology of this review. This comprehensive approach will significantly enhance the validity and reliability of the findings derived from the systematic review.

Reporting

Our findings will be reported in accordance with using the PRISMA guidelines,[24] including the implementation of a comprehensive checklist and a detailed flow diagram to accurately document the entire review process.

Patient and public involvement

No patient will be involved.

Ethics and dissemination plan

This study used previously published literature and did not collect primary data from humans or animals. No Ethical Committee approval was required. Findings will be disseminated through peer-reviewed publication and will be presented at conferences related to the field.

DISCUSSION

This study launches a larger project aimed at creating a digitally transformed primary healthcare model for rural

areas, focusing on indigenous communities. Our systematic review of DHIs aims to provide a thorough examination of DHIs, including their potentials and existing challenges faced by individuals living with chronic conditions in rural areas. Synthesised evidence from multiple studies will be conducted, assessing the lived experiences related to DHIs across various populations and chronic health conditions from rural areas. By aggregating this information, we and other researchers will gain a clearer understanding of how DHIs influence health outcomes. Our findings could further identify the challenges that may hinder successful adoption and integration into healthcare systems, potentially highlighting areas where improvements are needed to enhance their impact in everyday healthcare practice. More importantly, insights from this study will be utilised in the development of a digital transformation model for the larger project.

Strengths and limitations

The findings of this review could have implications that go beyond just technological improvements in DHIs. The integration of insights from real-world experience could significantly inform policy decisions, guide funding priorities and shape the regulatory frameworks that govern digital health technologies, ensuring that DHIs are not only effective but also ethical and sustainable in the long run.

The study is grounded in the well-established TAM, providing a robust theoretical framework to analyse user acceptance and behaviour toward digital technologies. Its comprehensive synthesis of existing research will clarify critical gaps within the literature, thereby strengthening the foundation for future inquiries and applications in the field. Limiting the review to post-2019 articles is a strength in capturing recent developments in digital health, but also a limitation as it may exclude earlier foundational studies on TAM and DHIs. Also, a limitation of this study is its inclusivity in the English language, which may not capture valuable lived experience insights from studies conducted in other languages. This limitation could result in an incomplete understanding of global trends and challenges within DHIs.

The findings of this systematic review will be disseminated through presentations at conferences, webinars and publications in peer-reviewed journals. If modifications to the protocol are made after its publication, we will provide a detailed account of the changes along with the rationale for these adjustments, including the relevant dates.

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Contributors KA developed the paper's concept. LL and KA conducted the initial search, created the search strategy and drafted the protocol. PM and BFN verified the articles and reviewed the manuscript. All authors contributed to revising and finalising the manuscript and have approved the final version. LL is responsible for the overall content as the guarantor.

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