Co-Designed Digital Health Interventions for Underserved Populations: A Systematic Review of Adoption, Engagement, and Clinical Outcomes

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Introduction

Digital health tools are frequently promoted as solutions to healthcare inequities, yet underserved populations often experience lower adoption, poorer engagement, and limited benefit. Co-design and participatory approaches—where patients, communities, and clinicians actively shape digital health solutions—may improve relevance and impact but have not been systematically evaluated. This systematic review examines how co-designed digital health interventions for underserved populations influence technology adoption, patient engagement, and clinical outcomes.

Objective

To evaluate whether co-designed digital health interventions improve adoption, engagement, and clinical outcomes among underserved populations.
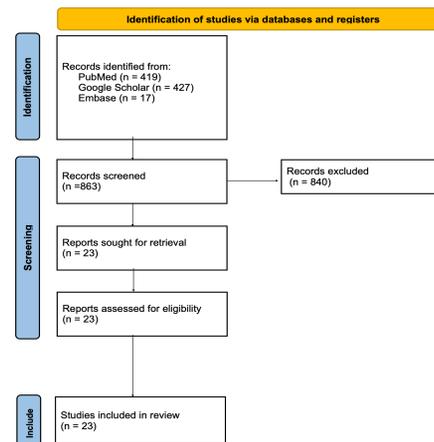
Methods

We systematically searched PubMed, Embase, CINAHL, PsycINFO, and IEEE Xplore for studies published between January 2010 and November 2025. Eligible studies: (1) involved digital health interventions (e.g., telehealth, mobile apps, patient portals, remote monitoring); (2) explicitly targeted underserved populations (e.g., racial/ethnic minorities, rural, low-income, limited English proficiency); and (3) used co-design, participatory design, or community-based approaches in development. Two reviewers independently screened studies, extracted data, and assessed quality following PRISMA guidelines. Outcomes included measures of adoption, engagement, satisfaction, and clinical or behavioral outcomes.

Methods cont.

Inclusion and Exclusion Criteria

Inclusion	Exclusion
• Digital health interventions • Underserved populations • Co-design/participatory methods	• Non-digital studies • No underserved focus • No co-design component • No relevant outcomes reported

Identification of studies via databases and registers

Identification

Records identified from:
PubMed (n = 419)
Google Scholar (n = 427)
Embase (n = 17)

Screening

Records screened (n = 863) → Records excluded (n = 840)

Reports sought for retrieval (n = 23)

Reports assessed for eligibility (n = 23)

Include

Studies included in review (n = 23)

Results

Of 863 records, 23 studies met the inclusion criteria. Co-designed interventions targeted chronic disease management, mental health, and maternal-child health. Studies reporting detailed co-design processes (e.g., iterative prototyping, community advisory boards, bilingual interfaces, culturally grounded content) demonstrated higher adoption and sustained engagement compared with top-down implementations in similar populations.

Results cont.

Several interventions showed clinically meaningful improvements in glycemic control, depressive symptoms, medication adherence, and appointment attendance. However, reporting of design methods and equity-related outcomes was highly variable, and few studies evaluated scalability or long-term sustainability.

Impact of Co-Designed Digital Health Interventions

Chronic Disease Management • Mental Health • Maternal-Child Health

Top-down interventions — Co-designed interventions

Lower adoption ↓ — Higher adoption ↑

Lower adoption ↓ Lower engagement ↓ — Sustained engagement ↑

Glycemic control • Depressive symptoms • Medication adherence • Appointment attendance

Variable reporting
Limited data on scalability
Limited long-term outcomes
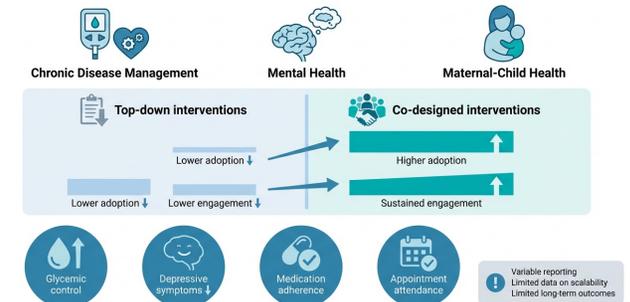
Future Perspectives

Standardized Co-Design Reporting
Establish consistent frameworks to document co-design processes and equity-focused methods.

Long-Term Impact & Scalability
Evaluate sustainability, scalability, and real-world implementation across diverse settings.

Equity-Centered Outcome Metrics
Develop standardized measures to assess adoption, engagement, and clinical outcomes in underserved populations.

Conclusions

Co-designed digital health interventions show promise for improving adoption, engagement, and selected clinical outcomes among underserved populations. Standardized reporting of co-design processes, explicit equity metrics, and rigorous evaluation of long-term implementation are needed to guide future digital health innovation that is genuinely patient-centered and inclusive.