

mHealth-Enabled Social Support Interventions for Diabetes Medication Adherence: A Scoping Review

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Research Article

Keywords: mHealth, social support, diabetes, medication adherence, digital health, conceptual model

Posted Date: May 20th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-8763584/v1>

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Additional Declarations: No competing interests reported.

Abstract

Background

Diabetes remains a major global health burden, and poor adherence to antidiabetic medicines undermines glycaemic control. Social support defined as emotional, informational, practical and motivational assistance from family members, peers, healthcare providers or wider social networks can strengthen medication-taking, particularly when delivered through mobile health (mHealth). However, evidence on which mHealth-enabled social support models are used, how support is integrated within digital interventions, and where the key evidence gaps lie remains dispersed.

Methods

We conducted a scoping review guided by Arksey and O'Malley's framework. Google Scholar, PubMed, IEEE Xplore and ScienceDirect were searched for peer-reviewed studies published between January 2013 and April 2025 that reported mHealth interventions incorporating social support to improve antidiabetic medication adherence. Data were charted and synthesized narratively to map the forms of digitally mediated social support, examine how support was integrated within mHealth tools, identify reported theoretical underpinnings, and summarize strengths, weaknesses and research gaps.

Results

Forty studies met inclusion. Five mHealth-enabled social support models were identified: (1) family/friend supporter models that involved nominated supporters receiving prompts to reinforce encouragement and accountability; (2) healthcare-provider support models implemented through messaging and feedback linked to care; (3) peer or online-community support models facilitated through group interaction and experience sharing; (4) automated digital support delivered through reminders, check-ins and educational feedback; and (5) hybrid approaches combining automated tools with structured human support. Common gaps included limited reporting of theoretical grounding, weak specification of social support roles beyond automated messaging, and a predominant focus on informational and reminder support with comparatively limited attention to emotional and practical support.

Conclusion

mHealth-enabled social support interventions can support diabetes medication adherence, but their impact likely depends on clear role design, theoretical grounding and contextual fit. The conceptual model derived from this review provides a foundation for designing and evaluating future mHealth-enabled social support interventions, particularly in low-resource settings.

1. Background

Diabetes mellitus is a major and rapidly growing global public health challenge. The International Diabetes Federation estimates that about 537 million adults aged 20–79 years were living with diabetes in 2021, a prevalence of 10.5%, projected to rise to 783 million by 2045 if current trends continue [1]. This report further indicates that over 90% of cases are type 2 diabetes mellitus (T2DM), driven by population ageing, urbanization and lifestyle changes, with the fastest growth occurring in low- and middle-income countries (LMICs). Diabetes is a leading cause of cardiovascular disease, kidney failure, blindness and lower-limb amputation, and it contributes substantially to premature mortality and health-system costs, especially in LMICs where health services are under-resourced [2].

Lifelong pharmacotherapy is a cornerstone of T2DM management, alongside diet, physical activity and regular monitoring [3]. However, suboptimal adherence to antidiabetic medication is common and undermines glycaemic control [4]. At least 45% of patients with T2DM fail to achieve adequate glycaemic targets, with poor medication adherence identified as a major contributor to inadequate control, increased morbidity, mortality and costs in routine clinical care globally [4]. Recent reviews similarly report high and variable rates of non-adherence across regions, including North African and Middle Eastern countries [5].

In sub-Saharan Africa (SSA), health-system and socioeconomic barriers further complicate long-term adherence. A cross-sectional study from eastern Uganda, for example, linked adherence to drug availability and prior diabetes education, highlighting how stock-outs and limited counselling constrain patients' capacity to take medicines consistently [6]. Across SSA, available evidence suggests that only about 40–60% of adults with type 2 diabetes achieve adequate adherence to antidiabetic medications, with substantial variation by setting, measurement method and health-system reliability [6, 7]. Together, this evidence emphasizes the need for strategies that can support sustained, real-time medication taking, particularly in resource-constrained settings [6].

Within this broader challenge, social support has emerged as a critical determinant of diabetes self-management and adherence [8]. Social support encompasses emotional encouragement, informational guidance, practical help and reminder support provided by family members, friends, peers, community health workers and healthcare professionals [9]. Empirical work in diabetes and other chronic conditions shows that stronger perceived social support is associated with better self-care, improved psychological adjustment and lower distress [10]. In diabetes specifically, social support has been linked to improved self-management behaviours and treatment adherence, partly by buffering stress and strengthening self-efficacy and problem-solving skills [10]. Yet, in many health systems, especially in LMICs, face-to-face social support around medication use is often inconsistent, informal and vulnerable to disruptions in family networks, work patterns and clinic schedules [11]. These limitations have created growing interest in mechanisms that can extend, structure and sustain social support beyond in-person encounters.

Mobile health (mHealth) technologies have expanded rapidly as tools to support chronic disease care [12]. The World Health Organization's Global Strategy on Digital Health 2020–2025 and its guideline on digital interventions for health system strengthening clearly highlight the potential of mobile phones, messaging and other digital tools to extend communication, support self-management and link clients with health workers, especially where access to services is constrained [13].

In T2DM, mHealth interventions such as SMS reminders, smartphone applications, interactive voice response systems and telemonitoring platforms have been used to deliver education, self-monitoring tools, behavioural prompts and feedback [14]. Systematic reviews and meta-analyses consistently report that these digital interventions yield small-to-moderate improvements in medication adherence and modest reductions in HbA1c.

For example a study by Nkhoma found that diabetes self-management education apps produced small to moderate improvements in adherence and HbA1c compared with usual care [15], SMS reminders significantly improve adherence among adults with T2DM despite heterogeneity across studies [16], and a range of digital tools (apps, SMS, telemonitoring) tend to improve adherence while also facing usability, literacy and sustainability challenges [17].

More recent reviews of mobile apps similarly suggest that app-based interventions can significantly enhance medication adherence and glycaemic control [18]. However, these interventions often differ substantially in how, and to what extent, they incorporate social support within their digital design.

Despite this growing evidence base, most digital-diabetes reviews are organised around technology type or clinical outcomes, rather than around social support as the central analytic lens [19].

Reviews typically classify interventions as “apps”, “SMS programmes” or “telemonitoring platforms” and focus on pooled HbA1c or adherence effects, but pay less systematic attention the specific forms of social support being delivered, the digital mechanisms through which that support operates, and the behavioural or theoretical assumptions underlying these designs. For example a study by Georgieva mapped digital solutions for medication adherence in diabetes and described their benefits and barriers, but did not explicitly classify interventions according to distinct social-support models or compare their relative strengths and weaknesses [17]. Likewise, meta-analyses of diabetes self-management education apps and SMS interventions emphasize effect sizes and technical features, with limited examination of how family, peer or provider support is embedded and sustained within mHealth interventions [15]. As a result, there is little consolidated guidance on which mHealth-enabled social support configurations are most promising for sustaining diabetes medication adherence, for which patients and contexts, and through which mechanisms.

This gap is particularly salient for SSA and other LMICs, where T2DM prevalence is rising rapidly, health systems are overstretched, and patients often navigate complex social and economic constraints [2]. In such settings, simple, scalable mHealth channels such as SMS reminders sent to family members, peer-support groups hosted on messaging platforms, or hybrid nurse–peer tele-coaching models could potentially harness existing social networks to reinforce medication taking, without requiring continuous clinic-based contact. Yet evidence on which digitally mediated social-support configurations are most effective, for whom, and under what conditions remains fragmented. Existing reviews rarely analyze social-support models’ strengths, limitations and context-specific barriers (such as digital literacy, privacy concerns and engagement fatigue) in a structured way [17].

Against this background, this scoping review focuses specifically on mHealth-enabled social support interventions for diabetes medication adherence, using social support rather than technology type as the organizing lens. The review aims to map and synthesize empirical studies to (i) identify the types of social support used, (ii) examine how social support is digitally integrated within mHealth interventions, (iii) assess the extent of theoretical grounding, and (iv) highlight key evidence gaps that can inform future intervention design and the development of an integrated mHealth-enabled social support conceptual model.

2. Methods

2.1 Scoping review methodology

This review was conducted as a scoping review to map the breadth and nature of mHealth-enabled social support interventions for diabetes medication adherence, rather than to estimate pooled effect sizes. The approach followed the framework proposed by Arksey and O’Malley, which comprises the following iterative stages: identifying the research question, identifying relevant studies, selecting studies, charting the data, and collating, summarizing and reporting the results [20]. Subsequent refinements to scoping review methodology were also considered, particularly the emphasis on clarifying the purpose of the review, using an iterative team-based selection and extraction process, and explicitly linking data charting to the review questions [21]. Reporting was guided by the PRISMA Extension for Scoping Reviews (PRISMA-ScR), especially for documenting search procedures, eligibility criteria and the flow of studies through the review [22]. A scoping approach was chosen because the literature on mHealth, social support and diabetes medication adherence is heterogeneous in design and focus, and because the aim was to characterize and compare digitally mediated social-support models, their integration within mHealth interventions, theoretical grounding and evidence gaps, rather than to assess effectiveness alone.

2.2 Identification of studies

This review was conducted in order to identify, screen and analyze all studies that reported mHealth interventions incorporating social-support components for diabetes medication adherence. Articles published between 2013 to 2025 were reviewed, covering the period in which modern mobile technologies such as SMS, smartphone applications and tele monitoring platforms have been increasingly used in diabetes care. The database searches, complemented by manual screening of reference lists and citations of relevant digital-diabetes and social-support reviews, yielded a broad set of records. After removal of duplicates and application of the eligibility criteria, 40 articles met the inclusion criteria and were retained for detailed analysis. The characteristics of these studies, including the type of digitally mediated social support, mode of mHealth delivery and reported outcomes, are summarized in Table 1, while Table 2 presents a synthesis of the strengths and weaknesses of the identified mHealth-enabled social support interventions.

Table 1
Characteristics of the included studies on mHealth-enabled social support for diabetes medication adherence

Author and year	Location, Sample size, Study design	Social support model	mHealth intervention	Objective	Key findings
Burner et al., 2024	USA; n = 166; randomized phase-III controlled trial.	Hybrid mHealth enabled family/friend supporter model involving automated reminders to patients combined with parallel digital prompts to nominated family or friends to reinforce encouragement and accountability	Family/friend supporters received daily SMS prompts and guidance layered onto a core automated text-messaging platform for diabetes self-management.	To compare mHealth-augmented social support versus standard support for diabetes management in safety-net emergency-department patients.	HbA1c improvements were similar overall; newly diagnosed patients benefited more from digitally mediated supporter involvement
Zhang et al., 2024	China; n = 189; mixed methods intervention study	mHealth-enabled peer and healthcare-provider support model, combining peer-to-peer encouragement and shared experiences with provider-delivered educational and motivational support	WeChat-based program enabling peer interaction combined with provider messaging	To test a trans theoretical model-based online intervention delivered via social media to improve medication adherence among adults newly diagnosed with type 2 diabetes.	Improved adherence and HbA1c; peer support digitally reinforced behaviour change stages
M. Mirzaei-Alavijeh et al., 2023	Iran; n = 70; quasi-experimental study	mHealth-enabled healthcare-provider support model, where providers delivered informational and motivational support grounded in Social Cognitive Theory	WhatsApp-based educational and motivational messaging guided by Social Cognitive Theory	To evaluate a theory-driven mHealth program based on Intervention Mapping to promote treatment adherence in adults with type 2 diabetes.	Significant improvement in adherence; explicit theoretical grounding strengthened digital message tailoring
Burner et al., 2021	USA; n = 166; randomized controlled trial	Hybrid mHealth-enabled social support model, integrating automated patient reminders with optional digital involvement of family or friends for encouragement	Tailored SMS platform with optional digitally mediated supporter messaging	To examine the long- To assess long-term effects of automated texting with social support	Automated system drove most effects; added digital supporter messaging showed limited incremental benefit

Author and year	Location, Sample size, Study design	Social support model	mHealth intervention	Objective	Key findings
Tan et al., 2024	Singapore; pilot study	mHealth-enabled family/friend supporter model, enabling caregivers to provide practical and emotional support when doses were missed	Twinned patient–caregiver mobile application generating alerts to caregivers when doses were missed	To pilot a patient–caregiver ‘twinned’ mobile phone application to promote medication adherence in adults with type 2 diabetes.	Feasible with modest HbA1c improvement; digital caregiver alerts enabled timely supportive action
Kleinman et al., 2017	India; multisite randomized clinical trial	Hybrid mHealth-enabled healthcare-provider support model.	mHealth platform enabling automated reminders with provider monitoring and feedback	To compare an mHealth platform with bidirectional messaging versus usual care on adherence and self-monitoring in adults with type 2 diabetes in India.	Intervention group achieved 39.0% improvement in adherence versus 12.8% in controls (p = 0.03).
Nkhoma et al., 2021	Multiple countries; n = 696 across trials; typical follow-up ~ 3 months; systematic review and meta-analysis.	Review of automated mHealth support models, focusing on reminder-based and app-supported informational support	DSMES apps and automated tools	To assess the impact of DSMES app interventions on medication adherence and clinical outcomes in adults with type 2 diabetes.	Pooled standardized mean difference in adherence was 0.393 (95% CI 0.17–0.61) and mean HbA1c reduction was 0.314%, with modest BMI reductions, indicating small-to-moderate improvements.
O. N. J., 2025	Not specified; review/scoping-type article.	Gamified peer/online-community support model for type 1 diabetes.	Digital self-monitoring apps incorporating gamification elements and virtual communities to support adherence among adults with type 1 diabetes.	To review mobile app–based self-monitoring versus traditional logs for improving medication adherence in adults with type 1 diabetes, focusing on gamification and virtual communities.	Suggests that gamified self-monitoring and virtual communities may enhance engagement and adherence in type 1 diabetes, but evidence remains preliminary.
Cheng Jun Chong et al., 2023	Multiple countries; n = 884; systematic	Various app-based models (predominantly	Smartphone apps offering medication	To evaluate the effects of mobile-app	Mobile-app interventions significantly

Author and year	Location, Sample size, Study design	Social support model	mHealth intervention	Objective	Key findings
	review and meta-analysis.	automated system support with some hybrid social features).	reminders, self-monitoring, education and sometimes social-support functions.	interventions on medication adherence and glycaemic control among adults with type 2 diabetes.	decreased HbA1c by about 0.36% and fasting plasma glucose by ~ 16.75 mg/dL, indicating modest but clinically relevant improvements.
Francesc Company-Bezares et al., 2022	Primarily European and international evidence; systematic review.	Multiple models (SMS reminders, calls, apps, hybrid digital–human support).	Strategies including SMS reminders, phone calls, mobile apps and hybrid digital–human interventions to support medication taking.	To review mHealth strategies aimed at improving pharmacologic adherence among adults with type 2 diabetes.	Found that most mHealth interventions improved adherence and often HbA1c, while noting that optimal combinations of features remain unclear.
Lyndsay A. Nelson et al., 2017	United States; n = 80; 4-week mixed-methods pilot study.	Automated system support (SMS + IVR) without explicit human supporter.	Daily text messages and weekly IVR calls providing reminders, education and motivational feedback to support daily diabetes self-care.	To examine how specific mHealth intervention elements and user characteristics influence perceived utility and engagement among adults with type 2 diabetes.	Identified that tailored, relevant messaging and appropriate frequency improved perceived utility and engagement with the intervention.
Adesokun et al., 2024	Nigeria; n = 121; 6 months; randomized controlled trial.	Automated system support via SMS reminders.	Twice-weekly SMS messages delivering reminders and brief educational content about diabetes medication and self-care.	To evaluate whether SMS messaging can improve medication adherence among adults with type 2 diabetes in Nigeria.	MMAS-8 scores improved from 3.43 to 6.86 in the intervention group versus 3.80 to 4.01 in controls ($p < 0.001$); HbA1c also improved significantly ($p = 0.01$).
Andriyana et al., 2023	Multiple countries; systematic review.	Healthcare-provider messaging model.	Direct communication between patients and healthcare providers via SMS, apps or telehealth, often integrating monitoring with	To assess the effectiveness of mHealth, particularly healthcare-provider messaging, for improving glycaemic control and	Concluded that provider-messaging interventions generally improve glycaemic control and adherence, especially

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			tailored feedback.	adherence in adults with type 2 diabetes.	when messages are regular and linked to clinical follow-up.
Mayberry et al., 2017	United States; n = 80; 3 months; pilot study.	Automated system support (tailored SMS + IVR).	Daily tailored SMS messages plus weekly IVR calls that provided adherence feedback, education and encouragement.	To test an automated, tailored text-messaging intervention (MEssaging for Diabetes) for reducing barriers to medication adherence among low-income, diverse adults with type 2 diabetes.	Adherence improved by about 14.3% ($p = 0.001$); days adherent to diet, healthy eating, footcare and exercise all increased significantly over three months.
Wungrath et al., 2021	Thailand; randomized controlled trial	Hybrid mHealth-enabled social support model	Line messaging used for reminders and communication, plus scheduled telephone counselling sessions to address adherence barriers.	To evaluate the effectiveness of the Line application combined with telephone-based counselling on medication adherence among uncontrolled adults with type 2 diabetes.	Intervention group achieved much higher adherence scores (≈ 49.3 vs 33.8 , $p < 0.01$), indicating strong short-term benefit of combining app messaging with counselling.
Tang et al., 2021	United States; conceptual and empirical synthesis	Hybrid mHealth-enabled peer support model	Smartphone diabetes-management app used in conjunction with lay health coaches who reviewed app data and provided tailored support.	To explore how digital health tools and peer/lay support complement each other in diabetes self-management.	HbA1c declined from about 9.93% to 8.86% ($p < 0.001$); qualitative data showed participants valued personalized coaching anchored in real-time app data.

Author and year	Location, Sample size, Study design	Social support model	mHealth intervention	Objective	Key findings
Chang et al., 2019	United States; n = 166; randomized trial.	mHealth enabled Family/friend supporter model integrated with automated texting (hybrid).	Family/friend supporters received text messages with education and prompts to encourage adherence, linked to patients' mobile-health support.	To test the effects of a mobile-health intervention with social supporters on emergency-department patients with diabetes.	Contributed to evidence that automated text-messaging can substantially improve disease control, while added supporter messaging provides at best modest incremental gains.
Kamat et al., 2021	Location not specified; n = 120; 6 months; randomized open-label controlled trial.	Automated system support with gamification and social comparison elements.	Smartphone app combining reminders, gamified point-scoring and financial incentives to reinforce regular medication taking.	To evaluate the impact of integrated medication reminders, gamification and financial rewards via smartphone app on adherence in uncomplicated type 2 diabetes.	Adherence increased from 65.7% to 86.8% in the intervention arm versus 65.3% to 67.7% in controls ($p < 0.001$); HbA1c was significantly lower in the intervention group ($\approx 7.3\%$ vs 8.2% , $p < 0.001$).
Chiaranai et al., 2023	Thailand; n = 63; 4 months; randomized controlled trial.	Healthcare-provider messaging via two-way SMS.	Interactive SMS system sending reminders and allowing patient replies, with follow-up by providers where needed.	To determine whether two-way SMS reminders improve medication adherence and quality of life in adults with type 2 diabetes.	Intervention group showed significant HbA1c decline ($p < 0.001$) and improved quality-of-life scores compared with controls.
Vaughan et al., 2025	United States; n = 258; randomized controlled trial.	Healthcare-provider messaging and CHW feedback loop (hybrid provider model).	Feedback loop in which patient data captured via mHealth tools were shared with community-health workers and clinicians who then provided tailored support and problem-solving.	To test an mHealth-driven feedback loop with community-health workers and clinicians to improve diabetes care in underserved communities.	Intervention arm experienced an HbA1c reduction of about 1.0% versus 0.1% in controls ($p = 0.002$).

Author and year	Location, Sample size, Study design	Social support model	mHealth intervention	Objective	Key findings
A. Theuri et al., 2019	Kenya; n = 138; 6 months; longitudinal study with comparison group.	Healthcare-provider messaging via calls/SMS.	Regular mobile-phone calls and/or SMS reminders from healthcare staff encouraging timely medication taking and follow-up visits.	To assess the effect of using mobile-phone communication on adherence to oral hypoglycaemic drugs among adults with type 2 diabetes in Kenya.	Proportion of patients taking drugs at specific times rose from 58.2% to 74.6% in the intervention group versus 47.9% to 46.5% in controls, giving a net effect increase of 17.8% ($p < 0.05$).
Antoinette M. Schoenthaler et al., 2019	United States; n = 42; 3 months; pilot randomized controlled trial.	Hybrid automated app plus peer-support video testimonials.	Tailored app-based content combined with peer video testimonials and adherence-support features compared with an attention-control tablet intervention.	To develop and pilot-test a tailored mobile-health intervention to improve medication adherence among Black patients with uncontrolled hypertension and type 2 diabetes.	Both intervention and control groups showed significant adherence improvements (mean change ~ 1.4 on MMAS-8, $p < 0.001$), but there was no significant between-group difference ($p = 0.50$).
Georgieva et al., 2023	Scoping review	Review of digital adherence support models	Broad range of digital tools including reminder systems, apps with social features, monitoring platforms and telehealth solutions.	To scope digital solutions designed to improve medication adherence among people with diabetes.	Concluded that digital interventions generally facilitate improved adherence and self-management, but evidence remains fragmented and uneven by population and setting.
Yugo Susanto et al., 2019	Indonesia; n = 24; quasi-experimental study (short follow-up).	Peer/group-based social-media support with educational content.	WhatsApp-based intervention providing information and reminders about diabetes medication use.	To assess whether social-media-based education can improve medication adherence among outpatients with diabetes.	Adherence scores on the MARS questionnaire improved from 22.04 ± 1.57 to 24.83 ± 0.38 ($p = 0.000$).
Nikki Newhouse et	England; n = 43; qualitative	Automated SMS messaging with	SMS text-messaging	To qualitatively explore	Participants valued timely

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al., 2024	process evaluation.	supportive content (provider-designed).	program delivering reminders and supportive messages around medication taking.	experiences of using a digital text-messaging intervention to support oral medication adherence among people living with type 2 diabetes.	reminders and supportive tone but also reported message burden and the risk that novelty wears off over time.
Elisabeth Höld et al., 2025	European setting; n = 68; 14-month randomized controlled longitudinal trial.	Peer-support model via instant messaging.	Instant-messaging service enabling patient-to-patient peer support, experience sharing and encouragement around daily diabetes management.	To analyse the effects of a peer-support instant-messaging service on diabetes self-management and support over 14 months.	Intervention participants experienced increased adherence (e.g., + 3.31 points on adherence measure, $p < 0.01$) relative to controls.
S. Islam et al., 2021	Multiple countries; systematic review.	Multiple app-based models, mainly automated with some social-support components.	Smartphone apps offering reminder, tracking, educational and social-support components to support medication use.	To systematically review smartphone apps for diabetes medication adherence, including social-support features.	Concluded that many apps show promise for improving adherence, but rigorous evidence and clear identification of active components are still limited.
T. P. Shrivastava et al., 2021	Multiple countries; n = 649 across trials; systematic review.	Various mobile-app models (automated and hybrid).	Mobile apps incorporating reminders, education, tracking and in some cases social or community features.	To review clinical trials of mobile-app interventions aimed at improving medication adherence among adults with type 2 diabetes.	Found that most app-based interventions improved adherence and glycaemic control, but could not identify a single superior app design.
A. Farmer et al., 2015	Multiple countries; systematic review of randomized trials.	Automated system support with monitoring plus brief messaging.	Interventions combining monitoring of medication use with brief messaging, including SMS reminders and related prompts.	To evaluate interventions promoting monitoring of medication use and brief messaging on adherence among people with type 2 diabetes.	Reported a non-significant pooled standardized mean difference of about 0.22 (95% CI – 0.05 to 0.49), highlighting that brief messaging alone may

Author and year	Location, Sample size, Study design	Social support model	mHealth intervention	Objective	Key findings
					have limited additional impact in some contexts.
J. Aikens et al., 2015	United States; n = 301; 3–6 months; observational trial.	Hybrid model: automated IVR telemonitoring plus optional informal caregiver support.	Interactive voice-response (IVR) telemonitoring with automated calls assessing self-management, with alerts and summaries sent to informal caregivers and clinicians.	To examine associations between telemonitoring-based support, informal-caregiver involvement and illness self-management and psychological distress in adults with diabetes.	Associated with improved illness self-management and reduced psychological distress; adherence effect size around -0.30 (95% CI -0.42 to -0.18 , $p < 0.001$) reflecting reduced barriers and better self-management.
Tamanna Akter et al., 2023	Multiple settings; review of diverse studies.	Various models (automated apps, SMS, telehealth, some with social support).	mHealth interventions including apps, SMS, telemonitoring and web-based tools for diabetes self-management.	To evaluate the effectiveness of mobile-health interventions for self-management in diabetic patients.	Concluded that mHealth tools generally support improved self-management and clinical control, while emphasising heterogeneity and the need for more robust evaluation.
J. Lauffenburger et al., 2020	United States; n = 20; qualitative interview study.	Not applicable (preference study; no active intervention model tested).	Interviews about preferred mHealth and text-messaging features and communication styles.	To explore preferences for mHealth technology and text-messaging communication among patients with type 2 diabetes.	Patients expressed interest in tailored, non-burdensome messages and indicated that perceived relevance and simplicity are key for engagement with mHealth tools.

Author and year	Location, Sample size, Study design	Social support model	mHealth intervention	Objective	Key findings
Cheng Jun Chong et al., 2024	Country not specified; n = 25; qualitative study.	Not applicable (qualitative exploration; no single intervention model).	Exploratory qualitative work on existing or hypothetical use of mobile apps for adherence support.	To understand type 2 diabetes outpatients' readiness, acceptance and barriers to using mobile apps for medication adherence.	Showed that many patients saw potential value in apps but highlighted concerns about technical difficulty, privacy and disruption of routines.
Abebe Muche Belete et al., 2023	Multiple countries; n = 1,121 across RCTs; follow-up 3–24 months; systematic review and meta-analysis.	Automated system support via SMS reminders.	SMS reminder interventions, often with brief educational content, targeting medication-taking behaviour.	To estimate the pooled effect of mobile-phone SMS reminders on medication adherence among adults with type 2 diabetes.	Found a pooled SMD of 0.36 (95% CI 0.14–0.59) for adherence, with larger effects for self-report/refill measures (SMD 0.45), confirming small-to-moderate benefit of SMS reminders.
A. M. Hakami et al., 2024	Multiple countries; n = 527 across included studies; systematic review.	Various mobile-app models (mostly automated, some with social/communication features).	Mobile apps incorporating reminders, education, tracking and, in some cases, social-support or communication functions.	To review recent evidence on the effect of mobile apps on medication adherence among adults with type 2 diabetes.	Concluded that mobile apps generally improve adherence and glycaemic control but called for larger, longer, theory-driven trials with standardised outcomes.
M. Vervloet et al., 2014	Country not specified; RCT with short- and long-term follow-up phases.	Automated system support using real-time monitoring plus SMS alerts.	Real-time electronic monitoring linked to SMS reminders whenever a dose was missed, aimed at supporting consistent medication taking.	To evaluate short- and long-term effects of real-time medication monitoring with SMS reminders for missed doses on refill adherence in people with type 2 diabetes.	Showed that real-time monitoring with SMS reminders can improve refill adherence, although effect size varied over time.
D. Babaskin et al., 2022	Russia; n = 985 app users; survey research.	Various app-based self-monitoring models (primarily automated).	Survey of existing diabetes mobile apps used for medication-	To describe popular diabetes mobile applications for	Identified common design features and user-reported

Author and year	Location, Sample size, Study design	Social support model	mHealth intervention	Objective	Key findings
			intake monitoring, including reminder and tracking functions.	medication-intake monitoring and characterise their features.	advantages and limitations of medication-monitoring apps, informing future app development.
Chinmaya Choudhur et al., 2024	Location not specified; randomized controlled trial; sample size not detailed in the report excerpt.	Comprehensive mHealth model (primarily automated, possibly hybrid).	mHealth programme with multiple features (reminders, monitoring, education) to support diabetes management.	To evaluate the effectiveness of mobile-health interventions in managing type 2 diabetes, including effects on HbA1c.	Reported HbA1c reduction of about 0.8% ($p < 0.01$), supporting the value of mHealth interventions for glycaemic control.
C. Y. Osborn & S. A. Mulvaney, 2013	United States; n = 20; short-term single-arm feasibility study.	Automated system support via SMS and IVR.	Text messages and IVR calls delivering reminders, educational content and brief assessments of self-management.	To develop and assess the feasibility of a text-messaging and IVR intervention to support self-management in low-income, diverse adults with type 2 diabetes.	Participants reported that the system was useful and convenient, with usage data indicating regular engagement and supporting further larger-scale trials.
Lyndsay A. Nelson et al., 2018	United States; planned n = 512; protocol for RCT.	Planned family/friend supporter and mobile-phone support models.	Family-focused phone-coaching and mobile-phone support arms compared to usual care, including family engagement around self-care and medication use.	To describe the protocol for a three-arm randomized controlled trial of mobile-phone support for diabetes self-care among diverse adults.	Outlined how mobile-phone-supported, family-focused coaching could be rigorously evaluated, informing design of future large-scale adherence trials.

Table 2
Strengths and weaknesses of the identified mHealth-enabled social support interventions

Author and year	mHealth/social support intervention	Strength	Weakness
Burner et al., 2024	Automated SMS self-management messages to patients, with parallel SMS prompts and guidance sent to nominated family/friend supporters so they could encourage and reinforce day-to-day medication-taking	Rigorous RCT; clearly distinguishes automated effects from digitally mediated social support.	Overall outcomes were similar across arms, suggesting the supporter-messaging layer did not provide clear incremental benefit beyond the automated SMS programme.
Tan et al., 2024	Twinned patient–caregiver mobile app in which missed-dose alerts are sent to caregivers, enabling caregivers to provide timely reminders, encouragement, and practical help around medication-taking	Innovative design; real-time digital alerts enabled caregiver engagement.	Pilot study with n = 20; caregiver burden and long-term engagement remain unclear.
A. Chang et al., 2019	SMS-based programme in which family/friend supporters received adherence prompts and brief educational messages linked to the patient's mHealth support, enabling supporters to encourage and follow up on medication-taking	Extended mHealth intervention to social networks around high-risk patients; digitally mediated supporter messaging broadened reach.	In this U.S. ED trial (n = 166), the base automated texting accounted for most improvement, while adding supporter texts produced only modest incremental gains over the platform alone; reporting on supporter engagement (uptake/participation over time) was limited, making durability of the supporter effect unclear
A. Theuri et al., 2019	Healthcare-staff initiated phone calls and/or SMS reminders that provided follow-up and encouragement for medication-taking and clinic attendance (provider-to-patient digitally mediated support).	Conducted in Kenya (a low-resource setting); demonstrated feasibility of basic digitally mediated provider follow-up using calls/SMS.	Non-randomized design; adherence based on self-report questionnaires; limited detail on frequency and content of digital contacts.
Baolu Zhang et al., 2024	WeChat intervention combining moderated peer-group interaction (experience sharing and mutual encouragement) with healthcare-provider messaging delivering stage-matched education and adherence reminders.	TTM-based WeChat intervention in China that combined moderated peer-group interaction with provider messaging; adherence improvements were sustained at the 3- and 6-month follow-ups	Requires smartphone access and digital literacy, limiting transferability to lower-connectivity settings.
M. Mirzaei-Alavijeh et al., 2023	Provider-led WhatsApp messaging delivering tailored educational and motivational support to address individual adherence barriers, guided by Intervention Mapping and Social Cognitive Theory.	Grounded in explicit behaviour-change theory; theoretical constructs informed digital message tailoring; relatively large effect size on adherence.	Short follow-up (1 month); non-randomized design; long-term digitally mediated behaviour change not assessed.
E. Burner et al., 2021	Automated tailored SMS programme for patients, with an additional arm sending daily SMS prompts to informal supporters so supporters could encourage patients and reinforce medication routines.	Longitudinal RCT in the United States among an emergency-department population; enables comparison of a tailored automated SMS programme versus an	Augmented supporter messaging did not clearly outperform the base program; added digital social support may have been diluted by strong automated effects.

Author and year	mHealth/social support intervention	Strength	Weakness
		added family/friend supporter SMS layer	
Kleinman et al., 2017	Two-way mHealth messaging platform where patients sent glucose readings/questions and received feedback from the care team, enabling ongoing provider support and problem-solving between clinic visits	Demonstrated feasibility of bidirectional provider–patient messaging in India (LMIC), strengthening accountability through ongoing digital feedback loops between clinic visits.	Substantial heterogeneity in app design and adherence measures; social-support mechanisms often poorly specified.
Dumisani Enricho Nkhoma et al., 2021	Systematic review of DSMES mobile apps where support was delivered digitally through education/feedback functions and, where included, interpersonal features such as messaging with providers or peer/community interaction.	Quantitative synthesis of RCTs; reported pooled effect sizes; highlights potential of digital education with optional social-support features.	Substantial heterogeneity in app design, adherence measures and study quality; many trials had unclear risk of bias.
O. N. J., 2025	Apps combining self-monitoring with gamification and virtual communities, using online-community interaction and encouragement alongside automated prompts to support adherence (Type 1 diabetes).	Highlights emerging role of gamification and online communities; focuses on type 1 diabetes, which is under-represented elsewhere.	Limited quantitative effect data; heterogeneity prevents strong conclusions.
Cheng Jun Chong et al., 2023	Systematic review/meta-analysis of smartphone app interventions that provided reminders and self-monitoring plus supportive components (e.g., education, feedback, and where present, provider/peer communication).	Provided pooled estimates for HbA1c and fasting glucose; focused specifically on mobile apps; synthesised data on a range of app features.	App heterogeneity and variable adherence measures; many short-term trials with moderate risk of bias.
Francesc Company-Bezares et al., 2022	Review of adherence-support strategies including SMS/phone follow-up and app-based programmes, ranging from automated reminder support to digitally mediated provider or other human support (hybrid approaches).	Comprehensive mapping of digital pharmacologic-adherence strategies; considers multiple modes of delivery.	Many studies were small and methodologically limited, increasing risk of bias. Because interventions and adherence measures differed substantially across studies, results were not directly comparable, so no single best strategy could be identified
Lyndsay A. Nelson et al., 2017	Text-messaging plus IVR programme delivering reminders and educational feedback, framed as supportive mobile communication that also provided motivational reinforcement for self-care and medication routines	Combined quantitative and qualitative data to understand which elements users valued; highlighted role of tailoring and frequency on engagement.	4-week pilot (n = 80); short follow-up and not powered for hard clinical endpoints
Oluwaseye O. Adesokun et al., 2024	Twice-weekly SMS reminders with brief educational/supportive content aimed at reinforcing medication-taking (automated informational support delivered digitally).	Low-cost and scalable intervention in a resource-constrained setting; produced large absolute improvements in adherence scores and HbA1c.	Limited information on post-trial sustainability and costs; scale-up may be constrained by reimbursement and infrastructure issues.

Author and year	mHealth/social support intervention	Strength	Weakness
Hani Andriyana et al., 2023	Systematic review of provider-linked mHealth interventions where patients communicated with healthcare providers via SMS/apps/telehealth and received tailored feedback and follow-up support.	Focused specifically on provider-involved mHealth; highlighted importance of integrating digital tools with clinical care pathways.	Heterogeneous designs and measurement tools; follow-up durations in the included trials were generally short (approximately 4 weeks to 12 months, with most interventions lasting 3–6 months); some risk of bias
L. Mayberry et al., 2017	Tailored daily SMS plus weekly IVR calls delivering reminders and barrier-focused feedback, providing supportive prompts and encouragement to strengthen adherence behaviours.	Dynamic tailoring to monthly reported barriers; demonstrated improvements across multiple self-care behaviours; high acceptability.	Pilot design with modest sample; attrition over time; reliance on self-report measures in some outcomes.
Jukkrit Wungrath et al., 2021	LINE app messaging for reminders and check-ins, combined with scheduled telephone counselling to provide interactive human support for adherence barriers (hybrid digital–human support).	Hybrid digital–human model; significantly higher adherence scores in the intervention group; practical use of a widely adopted messaging app.	Short follow-up; adherence measure not fully detailed in the review; long-term maintenance not assessed.
P. Tang et al., 2021	Mobile diabetes app used alongside lay health-coach support, where coaches reviewed app data and provided tailored encouragement, guidance, and problem-solving (hybrid coaching model).	Demonstrated clear complementarity of digital data and human coaching; coaches promoted uptake and sustained use of the app.	Resource-intensive coaching model; generalisability and scalability to low-resource health systems remain uncertain
T. Kamat et al., 2021	App delivering reminders with gamified reinforcement and financial incentives, providing automated motivational support to sustain regular medication-taking.	Demonstrated large increases in electronically monitored adherence; illustrated potential of gamification and incentives.	Open-label design; sustainability of behaviour once financial rewards end is unclear; generalizability to low-income patients uncertain.
C. Chiaranai et al., 2023	Interactive SMS reminders allowing patient replies, with provider follow-up when needed—enabling two-way supportive communication and problem-solving around adherence.	Bidirectional communication; relatively low-cost; improved both clinical and patient-reported outcomes.	Moderate sample (n = 63) and limited reporting on the provider follow-up component for example, what triggered follow-up, the content/type of feedback delivered, and how often/intensively providers responded to patient replies
Elizabeth M. Vaughan et al., 2025	mHealth feedback loop where patient data were shared with CHWs and clinicians who then provided follow-up, counselling/problem-solving, and care coordination support (digitally enabled human support).	Strong integration with clinical and community-health systems; targeted underserved populations; demonstrated meaningful HbA1c change.	Details of social-support content and intensity are limited in the summary; implementation demands additional staff.
Antoinette M. Schoenthaler et al., 2019	Tailored mobile app incorporating peer video testimonials (peer encouragement) alongside adherence-support features,	Focused on a high-risk, underserved population in the United States that is; Black patients with uncontrolled hypertension	Pilot RCT (n = 42), 3-month follow-up; both arms received substantial attention via the attention-control tablet

Author and year	mHealth/social support intervention	Strength	Weakness
	providing socially framed support delivered through app content.	and type 2 diabetes; incorporated culturally relevant peer video testimonials within a tailored app to deliver peer encouragement alongside adherence-support features.	condition, which likely reduced between-group contrasts
Nikol Georgieva et al., 2023	Scoping review of digital adherence solutions, including interventions with automated reminder support and those embedding interpersonal support (provider communication and peer/community features) within apps and platforms.	Mapped the breadth of digital-adherence approaches; highlighted emerging social-support and gamification features.	Did not provide pooled quantitative effects; heterogeneity limited direct comparison of interventions.
Yugo Susanto et al., 2019	WhatsApp-based messaging providing reminders and informational support, using a familiar communication platform to deliver supportive prompts around medication-taking.	Used a familiar social-media platform; demonstrated feasibility in a small outpatient sample.	Very small sample (n = 24); quasi-experimental (non-randomized) design; short follow-up.
Nikki Newhouse et al., 2024	SMS programme delivering reminders plus supportive messages intended to reinforce adherence through digitally delivered encouragement and prompts.	Provided rich insights into user experiences, perceived benefits and challenges; informed refinement of messaging content and timing.	No quantitative adherence outcomes; findings may not generalise beyond the specific UK programme.
Elisabeth Höld et al., 2025	Peer-support instant-messaging service enabling patients to share experiences, encourage each other, and provide mutual support for day-to-day self-management and medication routines.	Long follow-up; focused specifically on digital peer support; showed significant adherence gains.	Did not reach the planned sample size (recruited n = 68); recruitment and sustained engagement posed challenges; the 'dose' of actual peer interaction was difficult to quantify
S. Islam et al., 2021	Review of diabetes apps combining reminders/tracking with supportive components, including education/feedback and, where available, communication features enabling provider or peer support	Focused on app-based medication adherence; described common functional components and social-support mechanisms.	Heterogeneity and limited trial quality; few robust long-term RCTs available.
T. P. Shrivastava et al., 2021	Review of mobile apps for adherence/self-management that delivered automated reminders and educational support, and in some cases incorporated social/community or communication features	Synthesised evidence across clinical trials; examined clinical as well as adherence outcomes.	High heterogeneity across included trials (apps differed in features and intensity, and adherence was measured using different tools), making findings hard to compare. Most studies were short-term (often 1–6 months), limiting conclusions on sustained impact
A. Farmer et al., 2015	Monitoring plus SMS-based prompts providing automated reminder support, sometimes paired with feedback to	Early, influential review; provided pooled estimates for messaging plus monitoring approaches.	Pooled adherence difference was moderate and not statistically significant; studies often small with risk of bias.

Author and year	mHealth/social support intervention	Strength	Weakness
	reinforce medication-taking behaviour.		
J. Aikens et al., 2015	IVR telemonitoring with automated calls assessing self-management, with alerts/summaries sent to informal caregivers and clinicians enabling caregiver and provider follow-up support.	Large sample; hybrid model linking patients, caregivers and clinicians; demonstrated psychosocial as well as behavioural benefits.	Observational, not randomized; caregiver-support components were not fully utilised by all participants (< 40% high engagement).
Tamanna Akter et al., 2023	Review of mHealth self-management interventions (apps, SMS, telemonitoring, and related tools), including those providing supportive messaging/feedback and interpersonal support features where present.	Broad overview of mHealth for diabetes; summarised multiple intervention types and outcomes.	Less specific focus on medication adherence; variable study quality and limited quantitative synthesis in the report.
J. Lauffenburger et al., 2020	Qualitative interviews exploring patient preferences for supportive mHealth/text-message communication (e.g., content, tone, timing) intended to facilitate adherence support.	Provided nuanced understanding of patient preferences for frequency, tone and type of messaging; identified factors influencing willingness to engage.	United States; qualitative interviews (n = 20); findings are context-specific and did not include measured adherence outcomes
Cheng Jun Chong et al., 2024	Qualitative study exploring how mobile apps are used or perceived for adherence support, including preferences and barriers to receiving supportive digital prompts or communication	Identified practical and psychological barriers (digital literacy, trust, workload) and facilitators (perceived usefulness, simplicity).	Qualitative study with n = 25 (country not specified); no direct adherence or clinical outcomes were measured
Abebe Muche Belete et al., 2023	Systematic review/meta-analysis of SMS reminder interventions delivering automated informational support (reminders and brief messages) to reinforce medication-taking.	Focused specifically on SMS reminders; distinguished between adherence measurement methods; provided pooled effect sizes.	Heterogeneity in intervention design and adherence measures; limited cost-effectiveness and long-term data.
A. M. Hakami et al., 2024	Review of mobile app interventions that combined reminders/tracking with supportive educational/feedback functions and, in some cases, communication features enabling provider or peer support.	Focused on up-to-date evidence; summarised diverse app features and outcomes; most studies reported significant adherence improvement.	Follow-up in included app trials was mostly short-term (typically 3–9 months), and adherence was measured using varied tools across studies, limiting direct comparability of effects; the review also reports that formal bias/risk-of-bias assessment was limited for some included trials
M. Vervloet et al., 2014	Real-time electronic monitoring triggering SMS reminders when a dose was missed, providing automated, timely reminder support to reinforce medication-taking.	Objective monitoring of dosing; tested impact of real-time SMS cues; provided data on both short- and longer-term adherence.g	Details of sample and exact effect size are not fully elaborated in the report; focused on refill adherence rather than direct clinical outcomes.

Author and year	mHealth/social support intervention	Strength	Weakness
D. Babaskin et al., 2022	Survey of diabetes apps used for medication monitoring, describing how apps provide reminder/feedback support and, where available, communication or social features.	Large survey sample (Russia; n = 985 app users); provides a broad landscape view of common app features and perceived usability	Observational; no direct linkage to measured adherence or clinical outcomes; potential selection bias of app users.
Chinmaya Choudhur et al., 2024	Multi-component mHealth programme delivering reminders, monitoring and educational feedback; supportive elements were provided primarily through digitally delivered prompts and guidance.	Demonstrated clinically significant HbA1c improvement; contributed to evidence for comprehensive mHealth interventions.	Limited detail on exact adherence measures and social-support components in the review; generalizability uncertain.
C. Y. Osborn & S. A. Mulvaney, 2013	SMS and IVR intervention delivering reminders, educational content, and automated check-ins—providing supportive prompts and feedback without routine human interaction.	Demonstrated feasibility and acceptability in a low-income, ethnically diverse sample; integrated messages into daily routines.	Very small single-arm feasibility study (United States; n = 20); short-term follow-up; no control group and not powered to detect definitive adherence or glycaemic effects
Lyndsay A. Nelson et al., 2018	Family-focused intervention protocol combining phone-coaching and mobile-phone support to actively involve family members in supporting self-care and medication routines.	Provided a detailed plan for evaluating family-focused mobile-phone support at scale; emphasized inclusion of diverse populations.	Protocol only; no outcome data yet in this report; implementation challenges and adherence impact not yet known.

The review addressed the following research questions: 1) What types of social support are delivered through mHealth interventions to support diabetes medication adherence? 2) How is social support digitally integrated within these mHealth interventions, and what strengths, limitations and gaps are reported in relation to adherence and glycaemic outcomes?

2.3 Search strategy

Google Scholar, PubMed, IEEE Xplore and ScienceDirect databases were searched between March and May 2025 because of their high indexing and integration capacity. The search aimed at identifying research articles that contained information about interventions that utilized any form of mHealth such as mobile applications, SMS, interactive voice response and telemonitoring to provide social support for medication adherence in adults with diabetes. To determine the eligibility of the studies, articles that were related to the following key terms were searched from the aforementioned databases: ‘mobile health’, ‘mHealth’, ‘text message’, ‘SMS’, ‘mobile app’, ‘smartphone’, ‘telehealth’, ‘telemonitoring’, ‘diabetes’, ‘type 2 diabetes’, ‘medication adherence’, ‘drug adherence’, ‘social support’, ‘family support’, ‘peer support’, ‘caregiver’ and ‘online community’. Each term and its close synonyms were entered as a key word in the databases to identify articles relevant to our study.

The Boolean search was used to capture articles related to each single main concept using union (OR) and the intersection (AND) of the key concepts in order to focus on the main objective of this review, for example (diabetes OR type 2 diabetes) AND (medication adherence OR drug adherence) AND (mHealth OR mobile health OR SMS OR mobile app) AND (social support OR family OR peer OR caregiver). The bibliography and reference lists of the included studies and related digital-diabetes and social-support reviews were also screened to obtain more studies for inclusion in the

review. The results from the search query from the four databases were uploaded into a reference manager and were independently assessed for inclusion based on title, abstract and full text.

2.4 Study selection criteria

Studies were included in the review if they met the following criteria:

1. Peer reviewed full research papers
2. Empirical research (quantitative, qualitative or mixed methods) or systematic/scoping reviews with primary data synthesis
3. Clearly explained research methods
4. Explicit description of mHealth technologies used to support diabetes care, with an identifiable social-support component related to medication use
5. Explicitly described outcomes related to diabetes medication adherence and/or glycaemic control (for example HbA1c)
6. Published between 1st January 2013 and 31st December 2025
7. Available in English

These criteria ensured that the review focused on original, well-reported research examining how social support is delivered and operationalized within mHealth interventions. In this review, mHealth refers to the use of mobile phones and related wireless technologies for health purposes, including basic functionalities such as SMS reminders and voice calls, as well as more advanced tools such as smartphone applications, interactive voice response systems, telemonitoring platforms and messaging services. Interventions delivered through any of these modalities were eligible provided they embedded social-support elements such as family or friend involvement, peer groups, online communities, healthcare-provider messaging or automated supportive communication.

2.5 Exclusion criteria

Studies were excluded if they did not provide sufficient empirical detail to support structured data extraction and comparative analysis. These included conference abstracts, opinion pieces, editorials and commentaries, as well as protocol papers without outcome data or detailed descriptions of the mHealth-enabled social support intervention, also purely formative or exploratory studies that focused on intervention development or acceptability without reporting implementation or outcome data. Non-English language publications were excluded where full English-language versions could not be obtained.

2.6 Data extraction and analysis

For each included study, data were charted using a structured extraction form aligned with the review questions. Extracted variables included: author and year, country and setting, study design, sample characteristics (including type of diabetes where reported), duration of follow-up, description of the mHealth intervention, type of social support and how it was digitally mediated, underlying theoretical or behavioural frameworks, adherence and glycaemic outcome measures, key results, and reported implementation facilitators, barriers, strengths and weaknesses. These data are summarized in Table 1 (characteristics of included studies) and Table 2 (strengths and weaknesses of the identified mHealth-enabled social support interventions).

Interventions were then grouped into five overarching mHealth enabled social-support models, based on the dominant mechanism through which support was delivered: (i) digitally mediated family/friend supporter models, (ii) healthcare-provider messaging models, (iii) peer or online-community support models, (iv) fully automated mHealth support models, and (v) hybrid models combining human and automated elements. A narrative synthesis was undertaken to compare how these models were implemented, how social support was integrated within mHealth tools, and which strengths, limitations and contextual constraints were repeatedly reported. Insights from this synthesis informed the development of an integrated mHealth-enabled social support conceptual model and the identification of design implications for future interventions.

2.7 Quality assessment

Although formal risk-of-bias assessment is not mandatory for scoping reviews, a structured appraisal was conducted to aid interpretation of the evidence. The mHealth Evidence Reporting and Assessment (mERA) checklist was applied to primary mHealth intervention studies to assess the completeness and transparency of reporting [23]. The checklist covers key domains, including infrastructure, technology platform, interoperability, content, user feedback, adaptability to context, scalability, data security and fidelity of implementation. This checklist was chosen because it offers specific guidance for evaluating whether mHealth interventions are described in sufficient detail to support interpretation, replication and scale-up.

Second, methodological quality was appraised using the tool developed by Sirriyeh and colleagues for studies with diverse designs [24]. Each eligible study was scored against the relevant items (14 for purely quantitative or qualitative studies, and 16 for mixed-methods studies), and percentage scores were calculated. For descriptive purposes, studies were categorized as low quality (< 50%), moderate quality (50–70%) or high quality (> 70%). Consistent with the aims of a scoping review, these appraisals were not used to exclude studies; instead, they informed the interpretation of strengths and weaknesses within each social-support model and highlighted priorities for strengthening future research design and reporting.

3. Results

3.1. Search results

Figure 1 shows the process of identification, screening and inclusion of studies in this review. A total of 383 records were identified through database searches in the databases. After removal of 36 duplicates, 347 records remained. Titles of these records were screened and irrelevant articles were excluded. Abstracts of 100 potentially relevant articles were then screened. At this stage, 40 records were excluded because they were review papers, editorials or commentaries, did not include mHealth or social support components. The full texts of the remaining 60 articles were retrieved and assessed for eligibility. Twenty full-text articles were excluded because they did not provide sufficient empirical detail to support comparative analysis of mHealth-enabled social support models. These included purely formative or exploratory studies that focused on intervention development or feasibility without reporting implementation outcomes, studies with limited description of the mHealth or social-support components, and protocol papers without results. In total, 40 studies met the inclusion criteria and were included in the review. The characteristics of these studies are presented in Table 1, and Table 2 summarizes the reported strengths and weaknesses of the identified mHealth-enabled social support interventions for diabetes medication adherence.

3.2. Description of the included studies

The 40 included studies were published between 2013 and 2025. Most were conducted in high-income and upper-middle-income countries such as the United States, countries in Europe and parts of Asia, with a smaller number from low- and middle-income settings including India, Iran, Russia, Kenya and Nigeria. The studies used a range of designs, including randomised controlled trials, quasi-experimental pre–post studies, single-arm pilots, mixed-methods evaluations, qualitative studies and systematic or scoping reviews. Sample sizes ranged from small feasibility studies with a few dozen participants to larger surveys and pooled analyses involving several hundred individuals. Follow-up periods in intervention trials were mostly short to medium term, from about one month to one year.

Across the studies, the mHealth tools used included SMS text messaging, smartphone applications, interactive voice-response systems, telemonitoring platforms and instant-messaging or social-media services such as WhatsApp and WeChat. These tools were used not only to deliver reminders or information, but also to mediate different forms of social support, including family involvement, peer interaction, healthcare-provider communication and combinations of automated and human support. For analytic purposes, interventions were grouped into five mHealth-enabled social support models: mHealth enabled family/friend supporter models, mHealth enabled healthcare-provider messaging models, mHealth enabled peer or online-community models, fully automated mHealth support models and hybrid mHealth enabled models that combined human and automated elements (Tables 1 and 2).

3.3. Essential quality assessment of mHealth interventions

The mHealth Evidence Reporting and Assessment (mERA) checklist was applied to all the 40 included studies to assess the essential quality of reporting of the mHealth interventions. Figure 2 shows the percentage of studies that met each of the mERA criteria. Reporting of the basic technical aspects was good. All studies described the infrastructure and basic technology required for the intervention (40/40; 100%), and almost all specified the platform and mode of delivery, such as SMS, smartphone application, interactive voice response or telemonitoring system (38/40; 95%). Most studies also described the content and frequency of the messages or contacts used to support medication adherence (34/40; 85%) and the context and setting in which the intervention was implemented (32/40; 80%).

Other mERA items were less consistently reported. About half of the studies mentioned some form of user feedback or usability testing (18/40; 45%) or described how implementation was monitored and how fidelity to the intended intervention was maintained (16/40; 40%). Fewer studies discussed the potential for scalability or sustainability beyond the study period (14/40; 35%) or gave information on how data security and confidentiality were handled (12/40; 30%). Only a minority reported interoperability with existing health information systems (10/40; 25%) or presented data on costs or cost-effectiveness (8/40; 20%).

These findings show that, while the core mHealth modality and main social support functions were usually described in enough detail to understand what was done, important information needed for replication, integration into routine diabetes care and scale-up was often missing or incompletely reported.

3.4. mHealth-enabled social support models for diabetes medication adherence

Based on the synthesis of evidence presented in Tables 1 and 2, five main mHealth-enabled social support models for diabetes medication adherence were identified. These models were distinguished by the way mobile technologies were used to mediate social support, the actors involved in providing support, and the degree to which support was automated or involved direct human interaction.

3.4.1. mHealth-enabled family and friend supporter models

mHealth-enabled family and friend supporter models used mobile technologies to digitally involve informal caregivers in patients' medication routines. Across these studies, SMS platforms or mobile applications were used to send reminders, alerts, or brief guidance to both patients and nominated supporters, enabling shared awareness of medication-taking behaviour. Several studies implemented systems in which supporters were notified of missed doses or adherence challenges and could respond with encouragement or practical assistance [25–27].

Where reported, these interventions framed supporter involvement as a means of reinforcing adherence and providing emotional or practical support. Reported strengths included increased visibility of patients' medication routines and perceived emotional encouragement [25, 27]. However, engagement of supporters varied across studies, and concerns were raised about caregiver burden and the sustainability of supporter involvement. Evidence of additional benefit beyond well-designed automated reminders was mixed, and most studies were limited by short follow-up periods and small sample sizes [25, 26].

3.4.2. mHealth-enabled healthcare-provider support models

mHealth-enabled healthcare-provider support models relied on clinicians, nurses, diabetes educators, or community health workers to deliver support via SMS, mobile applications, or telehealth platforms. These tools were commonly used to provide medication reminders, educational content, feedback on self-monitoring data, and motivational messages. Several studies reported improvements in medication adherence and glycaemic outcomes, particularly when provider messaging was integrated into routine clinical care and allowed some level of interaction between patients and providers [28–30]

Strengths of this model included the credibility of provider-delivered information and opportunities for individualized problem-solving [28, 29]. However, studies also highlighted challenges related to provider workload, dependence on stable connectivity, and limited reporting on message content, frequency, and theoretical grounding. These factors were commonly noted as constraints to scalability and long-term sustainability, especially in resource-limited settings.

3.4.3. mHealth-enabled peer or online-community support models

mHealth-enabled peer or online-community support models used mobile messaging platforms, group chats, or online applications to connect people living with diabetes. These interventions facilitated peer interaction, experience sharing, and mutual encouragement around medication-taking and self-management. Studies using moderated online groups or instant-messaging platforms reported improvements in adherence and psychosocial outcomes compared with usual care, particularly among newly diagnosed patients [31, 32].

Reported strengths of peer and online-community models included normalization of adherence challenges, emotional support from individuals with shared experiences, and collective problem-solving [31]. However, sustained engagement was often difficult to maintain. Participation frequently declined over time, with a small proportion of participants contributing most actively. Additional challenges included the need for moderation to prevent misinformation and barriers related to smartphone access and digital literacy [32]

3.4.4. Fully automated mHealth support models

Fully automated mHealth support models delivered adherence support through SMS reminders, interactive voice-response calls, telemonitoring systems, or mobile applications without routine human involvement. These interventions typically provided scheduled reminders, alerts, or basic feedback triggered by predefined rules or monitoring data. Evidence from randomized trials and reviews indicated that such models were associated with modest improvements in medication adherence and small reductions in HbA1c compared with usual care [15–17].

The main strengths of automated models were their scalability, low marginal cost, and ability to deliver consistent, timely reminders to large numbers of patients. However, declining engagement over time was commonly reported [16, 17]. Limited personalization, minimal interaction, and weak integration of theory-based behaviour change strategies were also identified as key limitations, suggesting that automation alone may be insufficient to sustain long-term adherence [15, 17].

3.4.5. Hybrid mHealth-enabled social support models

Hybrid mHealth-enabled social support models combined automated digital functions with structured human support from family members, peers, health coaches, or healthcare providers. Examples included telemonitoring systems that generated automated alerts for clinicians, SMS platforms supplemented by counselling or coaching, and mobile applications supported by follow-up from healthcare workers [28, 33]

Across studies, hybrid models were associated with improvements in medication adherence, self-management behaviors, and glycaemic outcomes [28]. Strengths included greater flexibility, personalization, and the ability to escalate support when patients experienced difficulties. However, hybrid interventions were more complex and resource-intensive to implement. Coordinating digital tools with clinical workflows, defining supporter roles, and sustaining human input over time were commonly reported challenges, particularly in low-resource settings [33]

3.5. Cross-cutting strengths, challenges and implications for the conceptual model

Across the identified models, several recurring patterns were observed. Interventions tended to perform better when mHealth messages were tailored to individual needs, when two-way communication was supported, and when digital support was embedded within existing social networks or routine care pathways [28–31]. These features were associated with improved engagement and more sustained medication adherence across different settings.

At the same time, common implementation challenges were reported across models, including declining user engagement over time, barriers related to digital literacy and smartphone access, privacy and confidentiality concerns, and short intervention follow-up periods that limited assessment of long-term effects [15–17, 32, 34].

In addition to these challenges, several evidence gaps were apparent. Few studies reported intervention costs, equity considerations, or long-term sustainability, and explicit theoretical grounding was often absent or only briefly described [12, 14, 17]. These gaps limited comparison across studies and constrained understanding of how mHealth-enabled social support interventions might be adapted or scaled across contexts. These cross-cutting patterns informed the development of the integrated mHealth-enabled social support conceptual model (Fig. 3). Rather than drawing on strengths or gaps in isolation, the model synthesizes recurring design features associated with better performance, common implementation constraints, and persistent gaps in the evidence base.

The model illustrates how different sources of social support delivered through mHealth that is; family and friends, healthcare providers, peers and online communities, automated systems and hybrid human digital approaches interact within the implementation environment to influence medication adherence and glycaemic outcomes in adults with diabetes. The broken linkage between hybrid and fully automated support in the model shows the observation that, in resource-constrained settings, hybrid interventions may revert to more automated forms of support when sustained human input is difficult to maintain.

4. Discussion

4.1. Summary of evidence

This scoping review mapped how mHealth tools have been used to deliver social support for diabetes medication adherence and examined the strengths and weaknesses of the resulting intervention models. Forty studies were included, spanning a wide range of designs, populations and settings across high-, middle- and low-income countries. Overall, the evidence identified five main mHealth-enabled social support models namely; mHealth-enabled family and friend supporter models, mHealth-enabled healthcare-provider support models, mHealth-enabled peer or online-community support models, fully automated mHealth support models, and hybrid mHealth-enabled social support models combining automated and human elements.

Across these studies, interventions generally reported small to moderate improvements in medication adherence and modest reductions in HbA1c, consistent with previous reviews of mHealth-supported diabetes self-management [15, 16, 18]. However, a key contribution of this review is to show that these effects were closely linked to how social support was digitally configured and integrated within mHealth interventions, rather than to the technology used alone.

In family and friend supporter models, mobile technologies were used to extend emotional and practical support into patients' daily routines by sharing reminders, alerts or adherence information with nominated caregivers. Studies conducted in the United States and Singapore, for example, demonstrated that layering supporter messaging onto automated SMS platforms or using twinned patient-caregiver applications helped align medication-taking with household routines and provided encouragement around missed doses [25–27]. These approaches appeared particularly helpful for newly diagnosed patients and those requiring day-to-day motivation, highlighting the importance of digitally mediated accountability within familiar social networks.

mHealth-enabled Healthcare-provider support models used SMS, mobile applications and telehealth platforms to extend clinical contact beyond face-to-face visits. In studies from India, Kenya, Thailand and Indonesia, providers or community health workers used mobile tools to deliver tailored feedback, education and follow-up based on patient-reported data or clinic records [33, 35–37]. In these settings, social support was operationalized through timely problem-solving, reassurance and reinforcement of treatment plans, often within existing care pathways. While some interventions clearly drew on behavioural theories, such as Social Cognitive Theory, many did not clearly articulate the theoretical assumptions underpinning message content or provider patient interaction.

mHealth-enabled Peer and online-community models relied on mobile messaging platforms and social-media applications to facilitate shared experience and mutual encouragement among people living with diabetes. Studies from China and Austria, for instance, used WeChat groups or instant-messaging services to combine structured education with peer discussion, leading to improvements in adherence and psychosocial outcomes [31, 32]. In these models, social support was delivered primarily through normalization of challenges, emotional reassurance and practical advice exchanged among peers, though sustained engagement and moderation remained ongoing challenges.

Fully automated mHealth models, including one-way SMS reminders, interactive voice-response calls and app notifications, delivered consistent, low-cost prompts without routine human interaction. Evidence from studies conducted in both high-income and low- and middle-income countries indicated that these approaches could achieve measurable adherence gains, particularly among patients who were already relatively stable and comfortable with technology [16, 29, 38]. However, the limited incorporation of interactive social support and theory-driven behaviour change mechanisms constrained their long-term impact.

Hybrid mHealth-enabled social support models combined automated functions with human support from clinicians, caregivers, peers or health coaches. Examples from Thailand, Taiwan and the United States showed that linking automated reminders with counselling, coaching or clinician follow-up allowed support intensity to be adjusted in response to patient needs [30, 33, 39]. These models appeared particularly suitable for patients facing greater social or clinical complexity, although they required more resources and coordination.

Across models, interventions tended to perform better when several conditions were met. Tailoring of message content, timing and frequency to patients' needs was a recurring feature of more effective programmes, consistent with broader digital health literature emphasizing personalization [14, 40]. Opportunities for two-way communication whether between patients and providers, peers or caregivers were associated with higher acceptability and stronger adherence gains than purely one-way reminders [25, 28]. Embedding mHealth support within existing care pathways and social relationships, rather than delivering it as a stand-alone digital service, also appeared critical.

At the same time, this review highlights important implementation challenges, including declining engagement over time, barriers related to digital literacy and smartphone access, and concerns about privacy and message intrusion, particularly in lower-resource settings. In addition, clear evidence gaps remain. Few studies reported intervention costs, equity considerations or long-term sustainability, and theoretical underpinnings were often weakly described or absent [12, 14]. Evidence from sub-Saharan Africa and other low-income settings remains limited compared with that from high-income countries, constraining conclusions about scalability and transferability [17, 34].

4.2. Implications for the conceptual model and future intervention design

The findings informed the development of an integrated mHealth-enabled social support conceptual model that positions medication adherence and glycaemic outcomes at the centre, surrounded by five digitally mediated social-support streams operating within a broader implementation environment. The model emphasizes that no single form of support is sufficient in isolation. Instead, it points towards tailored combinations of automated messaging and human contact, multi-channel communication and close linkage with routine diabetes care.

From a design perspective, the review suggests several implications. First, intervention developers should begin by identifying which forms of social support are most needed for a given population, and then select mHealth tools that can effectively deliver and sustain those forms of support. Second, digital interventions should incorporate opportunities for interaction and adaptation over time, allowing support intensity to evolve as patients' needs change. Third, greater attention is needed to theoretical grounding, implementation reporting and evaluation of equity, costs and sustainability, particularly in low-resource settings. Together, these considerations provide practical guidance for translating the conceptual model into context-appropriate mHealth-enabled social support interventions.

4.3. Implications for practice and research

The findings of this review suggest that programmes aiming to improve diabetes medication adherence through mHealth should begin by deciding which forms of social support are most relevant in their context, rather than by starting from a specific technology. In practice, this means being clear about the role of family members, peers, community health workers and clinic teams, and then choosing mobile tools that can help these supporters to remind, encourage and problem-solve with patients on a regular basis. Simple SMS or call-based systems may be sufficient where face-to-face support is strong but irregular, while more complex app-based or hybrid models may be appropriate where there is capacity to review patient-generated data and respond. In all cases, attention needs to be paid to digital literacy, language, timing of messages and privacy so that mHealth-enabled support fits into people's everyday lives and clinic workflows.

For researchers and developers, the conceptual model points to several priorities. There is a need for more rigorous mixed-methods studies that examine how different configurations of digitally mediated social support influence medication adherence over time particularly in low resource settings. Future studies should move beyond short-term pilots and include longer follow-up, clearer reporting of implementation processes, and basic information on costs and equity of reach. It will also be important to test how the intensity and type of support can be adjusted over time as

patients' needs change, and how mHealth-enabled social support can be embedded into existing chronic-care platforms rather than running as parallel projects.

4.4. Limitations and strengths of the review

This review has several limitations that should be considered when interpreting the findings. First, although a comprehensive search strategy was applied, the review was restricted to peer-reviewed English-language articles published between 2013 and 2025. As a result, relevant interventions reported in other languages or in grey literature may have been missed, particularly from low- and middle-income settings.

Second, the included studies were highly heterogeneous in design, intervention components, duration, and outcome measurement. Many studies were small-scale pilots or short-term evaluations, and medication adherence was assessed using diverse methods, ranging from self-report to pharmacy refill data and electronic monitoring. This heterogeneity limited direct comparison across models and constrained interpretation of relative effectiveness.

Third, despite the application of structured appraisal tools, reporting on implementation processes, costs, equity considerations, sustainability, and theoretical underpinnings was often limited [23, 24]. In particular, many interventions focused primarily on informational and reminder-based support, with less detail on how emotional and practical social support roles were operationalized within mHealth systems, reflecting a key evidence gap identified in this review [12, 14, 17].

Finally, the categorization of interventions into five mHealth-enabled social-support models, while analytically useful, necessarily simplified complex interventions that often combined multiple forms of digital and human support. In such cases, the dominant model was assigned based on the primary mechanism of support reported, which may not fully capture how support was experienced by patients.

Despite these limitations, the review has several important strengths. To our knowledge, it is among the first scoping reviews to organize the mHealth and diabetes medication-adherence literature explicitly around digitally mediated social-support models, rather than technology type or clinical outcomes alone.

By synthesizing evidence from 40 studies, the review provides a structured understanding of how family, peer, healthcare-provider, automated, and hybrid forms of support are digitally configured and integrated within mHealth interventions. This approach directly shows the review's objective of examining how social support is delivered and embedded within digital systems, rather than focusing solely on effectiveness outcomes.

The use of a transparent scoping-review framework, systematic searching across major databases, and structured data charting strengthens the credibility of the synthesis [20–22]. Importantly, the review directly informed the development of an integrated conceptual model that brings together recurring design features, implementation constraints, and key evidence gaps identified across studies.

Together, these strengths provide a practical foundation for guiding the design and evaluation of theoretically grounded, role-explicit, and context-appropriate mHealth-enabled social support interventions for diabetes medication adherence.

5. Conclusion

This scoping review synthesized how mHealth tools have been used to deliver social support for antidiabetic medication adherence, grouping interventions into five digitally mediated social support models: digitally facilitated family/friend support, provider-delivered digital messaging support, peer/online-community support, automated digital support, and hybrid human–digital approaches. This synthesis is important to the digital health field because it reframes mHealth

adherence tools as structured social support systems and clarifies what must be designed (roles, support type, and integration) to achieve sustained use.

At the same time, the review highlights important limitations in the existing evidence. Many interventions were short term, implemented predominantly in high-income or upper-middle-income settings, and provided limited information on long-term engagement, costs, equity and sustainability. Although a small number of studies explicitly drew on behavioural theories such as Social Cognitive Theory or the Transtheoretical Model, most interventions did not clearly articulate how theory informed message content, supporter roles, or interaction design. Similarly, while social support was typically delivered through mechanisms such as SMS reminders, bidirectional messaging, caregiver alerts, peer group chats, or automated notifications, reporting on how these elements were intentionally integrated to provide emotional, practical, and motivational support was often limited or inconsistent.

Recurring challenges included declining user engagement, digital literacy barriers, privacy concerns and additional workload for healthcare providers and informal supporters. Evidence from sub-Saharan Africa and other low-resource settings remains relatively sparse.

The integrated mHealth-enabled social support conceptual model developed from this review brings together these findings by illustrating how different sources of social support; family and friends, healthcare providers, peers and online communities, automated systems and hybrid human-digital approaches can be digitally mediated and combined within a given implementation environment to support medication adherence. The model highlights that effective mHealth-enabled social support is unlikely to rely on a single channel; rather, it requires context-sensitive combinations of digital automation and human support, aligned with patients' needs and health-system capacity. In practice, this means future interventions should specify supporter roles and support functions explicitly, articulate theory to future links, and report implementation processes (including cost, equity and sustainability) to enable scale up. Future work should use this model to design and test context-appropriate interventions, with particular attention to low-resource settings, so that mHealth-enabled social support can be integrated into routine diabetes care in a sustainable and equitable way.

Abbreviations

HbA1c

Glycated haemoglobin

IEEE

Institute of Electrical and Electronics Engineers (IEEE Xplore database)

IVR

Interactive voice response

LMICs

Low- and middle-income countries

mHealth

Mobile health

PRISMA

Preferred Reporting Items for Systematic Reviews and Meta-Analyses

PRISMA

ScR-Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews

SMS

Short message service

SSA

Sub-Saharan Africa

T2DM
Type 2 diabetes mellitus
WHO
World Health Organization

Declarations

7.1 Ethics approval and consent to participate

Not applicable. This study is a scoping review of published literature and did not involve the collection of primary data from human participants; therefore, ethics approval and consent to participate were not required.

7.2 Consent for publication

Not Applicable

7.3. Availability of data and materials

All data used in this review were extracted from published articles. Summary tables and extraction sheets can be made available from the corresponding author on reasonable request.

7.4. Competing interests

The authors declare that they have no competing interests.

7.5. Funding

This review did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors. It forms part of ongoing doctoral work within the Faculty of Computing and Informatics at Mbarara University of Science and Technology under the supervision of Associate Professor Angella Musiimenta.

7.6. Authors' contributions

The lead author conceived the review, developed the research questions and search strategy, and coordinated the screening and data-charting process under the supervision of Associate Professor Angella Musiimenta. All authors contributed to refining the inclusion and exclusion criteria, interpreting the findings and developing the conceptual model. All authors reviewed the manuscript, provided critical feedback and approved the final version for submission.

7.7 Acknowledgements

This work is part of a PhD research approved by Mbarara University Research Ethics Committee and supervised by Associate Prof. Angella Musiimenta (PhD), Dr. Richard Kimera and Dr. William Wasswa in the Faculty of Computing and Informatics (FCI) at Mbarara University of Science and Technology, who guided the investigator throughout the entire process and reviewed the manuscript for correctness and validity.

7.8 Authors' information

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Figures

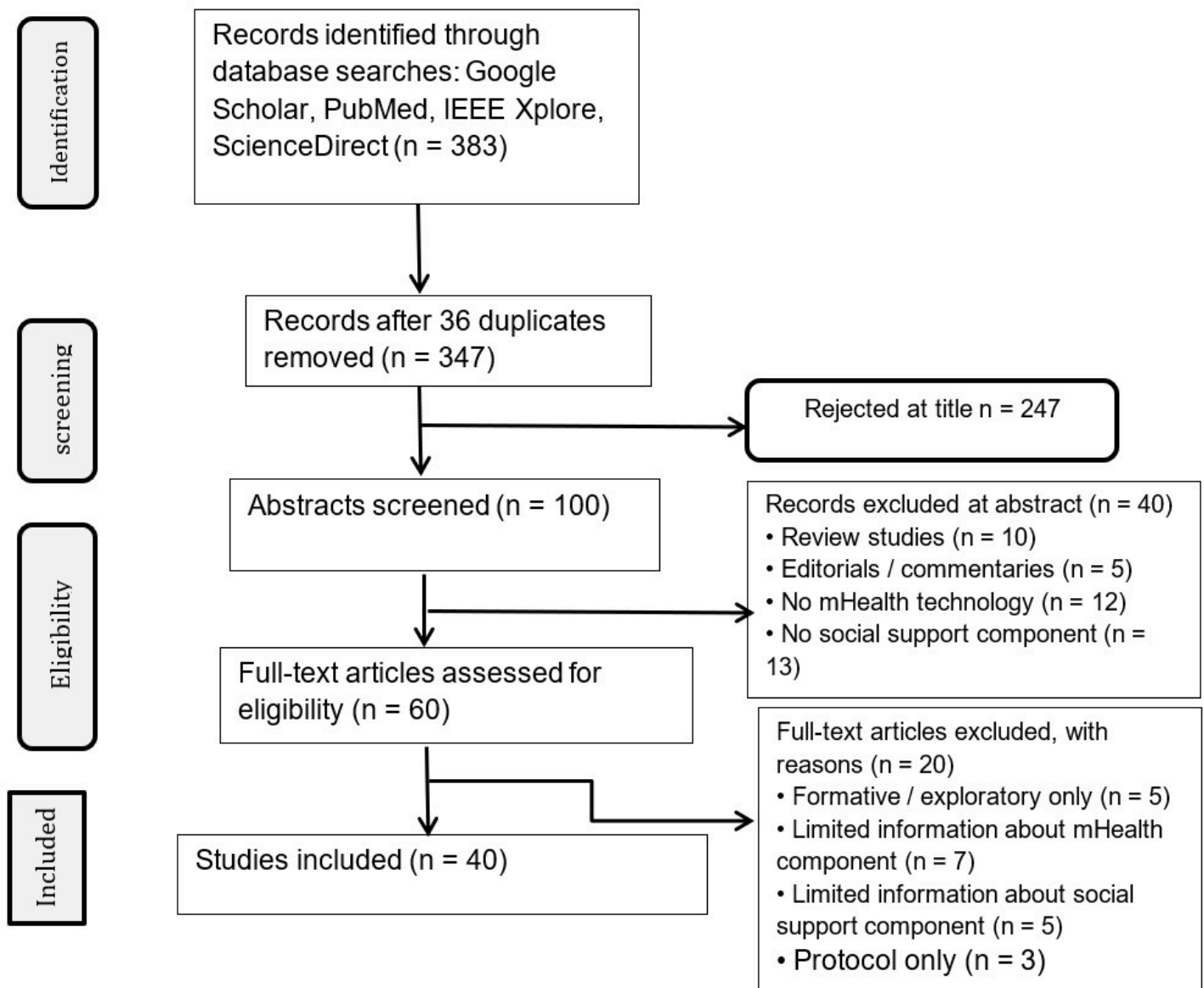


Figure 1

Flow diagram for the selected studies

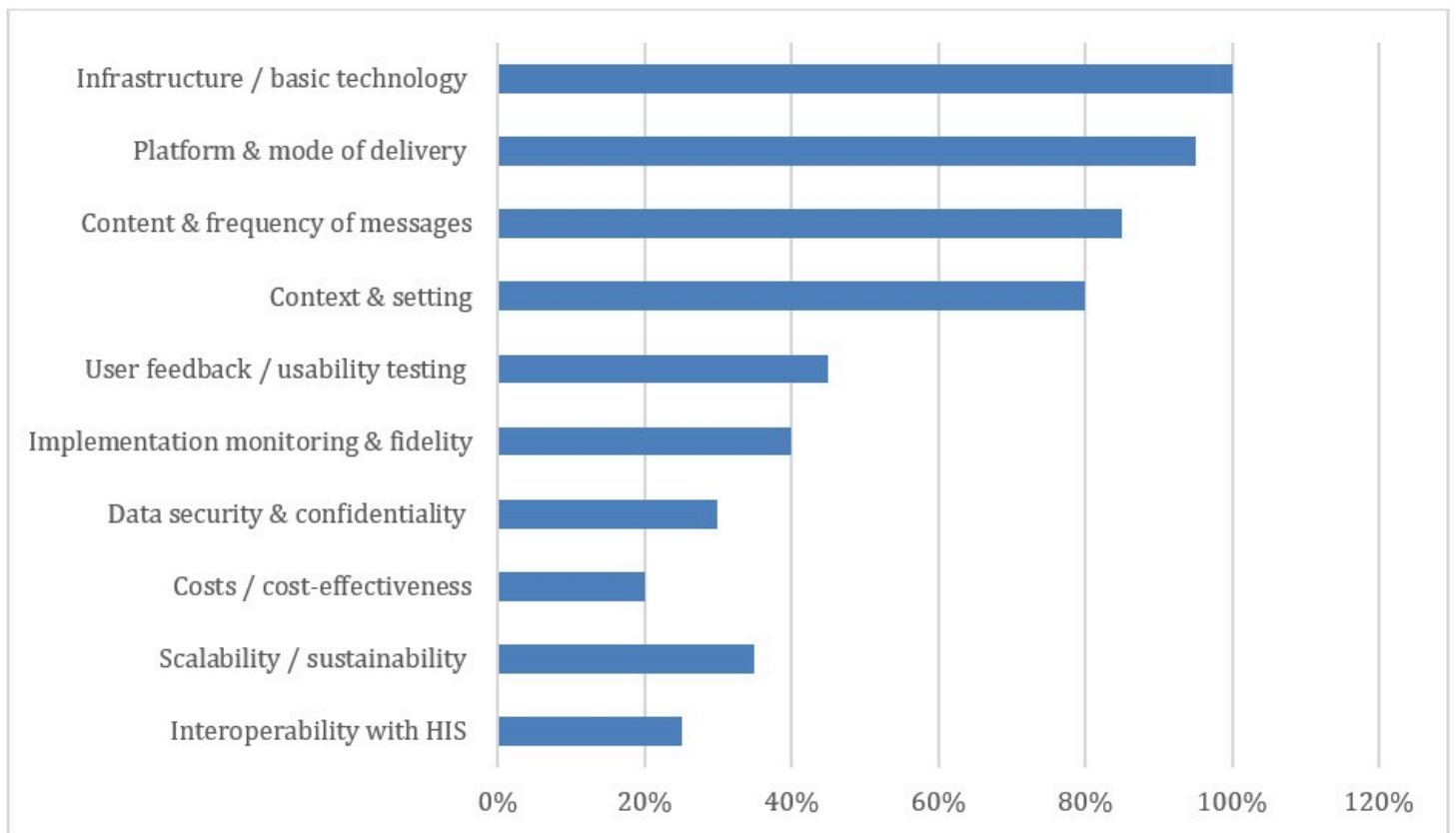


Figure 2

The percentage of studies meeting the mERA criteria.

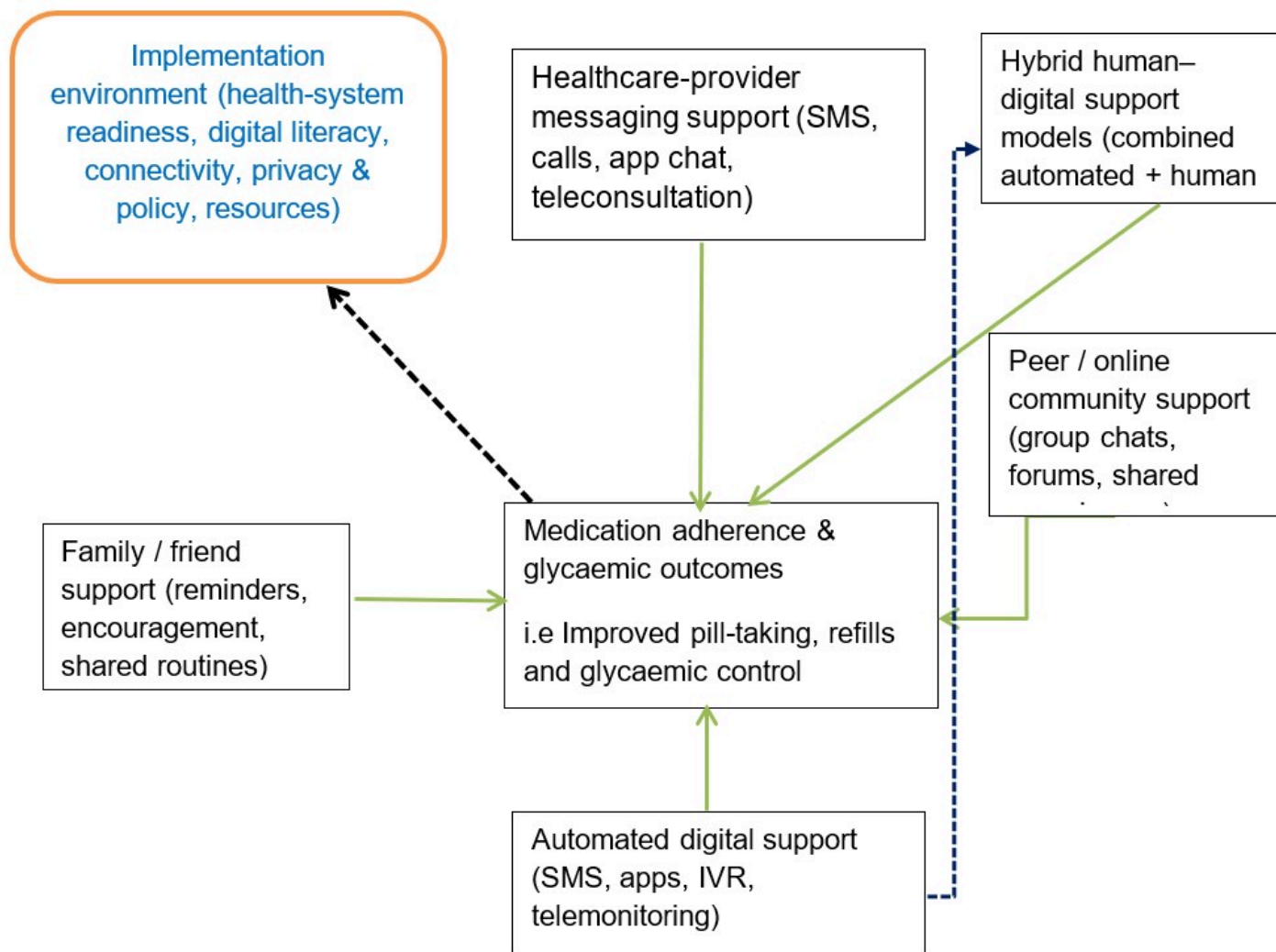


Figure 3

Integrated mHealth-enabled social support conceptual model for diabetes medication adherence