Review Article

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Effectiveness of a Diabetic Educational Module for the Management of Type 2 Diabetes Mellitus: A Systematic Review

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ABSTRACT

Background: Self-management is a cornerstone of effective type 2 diabetes mellitus (T2DM) care, yet many patients face challenges due to low health literacy, poor self-efficacy, and lack of psychosocial support. Several intervention models have emerged to address these barriers, including educational programs, digital platforms, family-based support, and community engagement strategies. **Objectives:** This study evaluates the effectiveness of a module with multidimensional self-management interventions to improve clinical and behavioral outcomes in patients with T2DM. **Methods:** This review identifies 13 studies from 2016-2025, using designs like RCTs, quasi-experimental, and participatory research. They were examined thematically to evaluate their influence on diabetes self-management, clinical outcomes, and patient empowerment. **Results:** The findings revealed that interventions targeting health literacy, peer support, and digital education platforms resulted in statistically significant self-care behaviors and psychological outcomes. Family involvement and nurse-led initiatives improved the long-term success and effectiveness of the intervention. However, low-intensity or entertainment-based strategies showed limited impact on knowledge acquisition. Digital tools demonstrated potential, but their success depended on user engagement and context relevance. **Conclusion:** Multidimensional, culturally sensitive interventions integrating education, emotional support, and social structures substantially improve diabetes self-management outcomes. The hypothesis that such interventions are effective was supported. Future studies should evaluate long-term sustainability, cost-effectiveness, and scalability across healthcare systems.

Keywords: Health Literacy; Patient Education; Self-Management; Type 2 Diabetes Mellitus

INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) is a common chronic condition affecting millions of adults worldwide, mainly caused by insulin resistance or inadequate insulin secretion, leading to high blood sugar and health risks if untreated (Zeliger, 2023). Rising T2DM rates are driven by poor diet, inactivity, and obesity (Tinajero & Malik, 2021). The WHO notes a global increase in diabetes, stressing the need for effective management (Sonmez *et al*., 2022).

Effective T2DM management requires a multifaceted approach, including medical treatment, self-

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monitoring, and lifestyle changes like diet and exercise (Chowdhury *et al.*, 2024). Traditionally, healthcare has focused on clinical settings, but barriers like high costs, transportation, and limited health literacy hinder access (Molenaar *et al*., 2023; Sugawara, 2022). To address this, community- and home-based education programs have emerged, empowering patients to manage their conditions more effectively in everyday settings (Marinello *et al*., 2022).

Community-based programs are health interventions in local settings outside traditional clinics, tailored to cultural and social contexts. They aim to enhance self-management by promoting balanced nutrition, physical activity, medication adherence, and blood glucose monitoring (Eshete *et al*., 2023). Hemoglobin A1c (HbA1c) is a key measure of glycemic control, indicating average blood sugar over two to three months.

Empirical evidence shows community-based self-management education improves health outcomes, reducing HbA1c, boosting self-efficacy, and enhancing life quality for T2DM patients (Doherty, 2022; Li, 2021). Its flexibility and cultural fit increase acceptance among diverse populations, supported by social networks and healthcare involvement, critical for sustaining behavioral changes (Zamanillo- campos *et al.*, 2025). However, literature lacks detailed analysis of scalability, long-term sustainability, cultural adaptability, and enduring effectiveness, limiting wider global implementation (Puoane & Tsolekile, 2021).

As healthcare shifts towards patient-centered care, evaluating educational models' effectiveness and scalability is crucial (Albahrani, 2024). This review synthesizes current findings on community- and home-based diabetes education to assess their broader application in managing T2DM (Fadli *et al*., 2024). It offers insights for practitioners, educators, and policymakers on the transformative potential of these interventions in managing T2DM (Izquierdo *et al.*, 2022).

METHODOLOGY

This review assesses how community- and home-based education interventions improve self-management and glycemic control in adults with T2DM. The review specifically seeks to answer the question, "How do community-based and home-based education programs impact self-management behaviors and HbA1c outcomes in adults living with T2DM?"

This review adhered to internationally recognized methodological standards for systematic reviews to ensure transparency and reproducibility (Page *et al*., 2021; Aromataris *et al*., 2020). The PRISMA 2020 statement guided the reporting structure, while the Joanna Briggs Institute (JBI) Manual for Evidence Synthesis was used for data extraction and appraisal consistency.

Literature searches were conducted across five electronic databases: PubMed, Scopus, Google Scholar, ScienceDirect, and EBSCO. The Boolean search string used was: ("Type 2 Diabetes" OR "T2DM") AND ("community-based education" OR "home-based education") AND "self-management" AND "adult." Where applicable, Medical Subject Headings (MeSH) were used to enhance search sensitivity, especially in PubMed.

Inclusion criteria: articles published 2015-2025, in English, involving adults with T2DM, and conducted in community or home settings. Exclusion: systematic reviews, press releases, books, dissertations, children, or type 1 diabetes. The review followed four PRISMA stages: 1) Identification from databases, 2) Screening out duplicates and irrelevant titles, 3) Assessing full texts for relevance, and 4) Final selection for synthesis.

Data Extraction and Synthesis

Data was extracted by two independent reviewers using a predefined included author(s) template. Extracted elements included author(s), publication year, country, study title, objectives, design, sample and population, data collection tools, analysis methods, and key findings (Table 1). Discrepancies between reviewers were resolved through discussion, and if needed, a third reviewer was consulted. The findings were synthesized using a narrative synthesis approach, organizing results thematically by intervention characteristics and outcomes, including self-management behaviors and HbA1c reduction.

Table 1: Summary of Studies Included in the Systematic Literature Review Author, Year, Country, Title and Design

No	Author (Year), Country	Title	Design Type	Appraisal Tool	Score/Criteria Met	Quality Level
1	Khudhair & Ahmed (2022), Iraq	Effectiveness of an educational program on T2DM patients' knowledge regarding preventive measures of diabetic foot	Quasi-experimental	JBI	10/12 (83%)	High
2	Panagiotidis *et al.* (2025), Greece	Evaluation of a Family-Based, Health Literacy-Adapted Educational Intervention Program in Patients with T2DM	RCT	JBI	11/12 (92%)	High
3	Wang *et al.* (2025), China	Effect of Community-Based Integrated Care for Patients with Diabetes and Depression (CIC-PDD) in China	Cluster-RCT	JBI	12/12 (100%)	High
4	Xiong *et al.* (2024), China	Co-designing interventions to strengthen the primary health care system for the management of hypertension and T2DM in China	Participatory action research	MMAT	5/5 (100%)	Excellent
5	Godino *et al.* (2016), UK	Lifestyle Advice Combined with Personalized Estimates of Genetic or Phenotypic Risk of T2DM, and Objectively Measured Physical Activity	RCT	JBI	9/12 (75%)	Acceptable
6	Ghasemi *et al.* (2021), Iran	The effect of peer support on foot-care in patients with T2DM	Clinical trial	JBI	10/12 (83%)	High
7	Wieland *et al.* (2024), USA	Digital Storytelling Intervention for Hemoglobin A1cControl among Hispanic Adults with T2DM	RCT	JBI	12/12 (100%)	High
8	Zhu *et al.* (2025), China	Effectiveness of a Family-Based Self-Management Intervention for T2DM Patients Receiving Family Doctor Contract Services	RCT	JBI	11/12 (92%)	High
9	Kusumo *et al.* (2020), Indonesia	Theater Performing Arts (TPA): Community empowerment to improve blood glucose control behaviour in Yogyakarta	Quasi-experimental	JBI	9/12 (75%)	Acceptable
10	Abdulsalam *et al.* (2025), Thailand	Effectiveness of a Health Literacy and Diabetes Self-Management Education (DSME) Improvement Program for People with T2DM in Thailand	Quasi-experimental	JBI	10/12 (83%)	High
11	Pascale *et al.* (2017), UK	Study Protocol: The Norfolk Diabetes Prevention Study [NDPS]: a 46-month multi-center, randomized, controlled parallel group trial of a lifestyle intervention [with or without additional support from lay lifestyle mentors with T2DM] to prevent	Multi-center RCT	JBI	9/12 (75%)	Acceptable
12	Deverts *et al.* (2022), USA	Comparing the effectiveness of Family Support for Health Action (FAM-ACT) with traditional community health worker-led interventions to improve adult diabetes management and outcomes	RCT	MMAT	5/5 (100%)	Excellent
13	Chen *et al.* (2025), China	The effectiveness of a community-based online low-glycaemic index diet and lifestyle recommendations intervention for people with T2DM	RCT	JBI	12/12 (100%)	High

JBI = Joanna Briggs Institute; MMAT = Mixed Methods Appraisal Tool; RCT = Randomized Controlled Trial; PAR = Participatory Action Research

Quality Appraisal

Quality assessment was performed by two independent reviewers using the Joanna Briggs Institute (JBI) tools for quantitative and qualitative studies and the Mixed Methods Appraisal Tool (MMAT) 2018 version for mixed-methods studies.Disagreements were resolved through consensus or third-party arbitration. Inclusion thresholds were ≥75% JBI criteria for quantitative studies, ≥80% for qualitative, and full MMAT compliance for mixed methods. All thirteen studies met the quality standards and were methodologically sound.

RESULTS

Research Outcome

The researcher refined the search to include only reliable, relevant articles and evaluated them against inclusion and exclusion criteria. A systematic review was conducted to assess the efficacy of module interventions, limited to full-text articles.

A PRISMA flow diagram showed 231 articles (Figure 1). Study data were evaluated using article details (author, title, year, design, sample method, population, data tools, and key finding) and research info. To minimize duplication, a search criterion was applied. The researcher screened titles and abstracts in four steps using a computerized search for the study's main purpose. Records were identified from five major databases: PubMed (n = 39), Google Scholar (n = 110), Scopus (n = 30), ScienceDirect (n = 2), and EBSCO (n = 50), totaling 231 initial records. The first phase eliminated seven duplicates, and 224 studies were screened based on titles and abstracts. For the second phase, 124 records were excluded for not meeting relevance criteria. Next step, full texts were sought for 100 studies, with one report not retrieved. In the last step, of the remaining 99 studies assessed for eligibility, 86 were excluded due to being conducted in English (n = 12) or not using an experimental design (n = 74). Ultimately, 13 studies met the inclusion criteria and were included in this review.

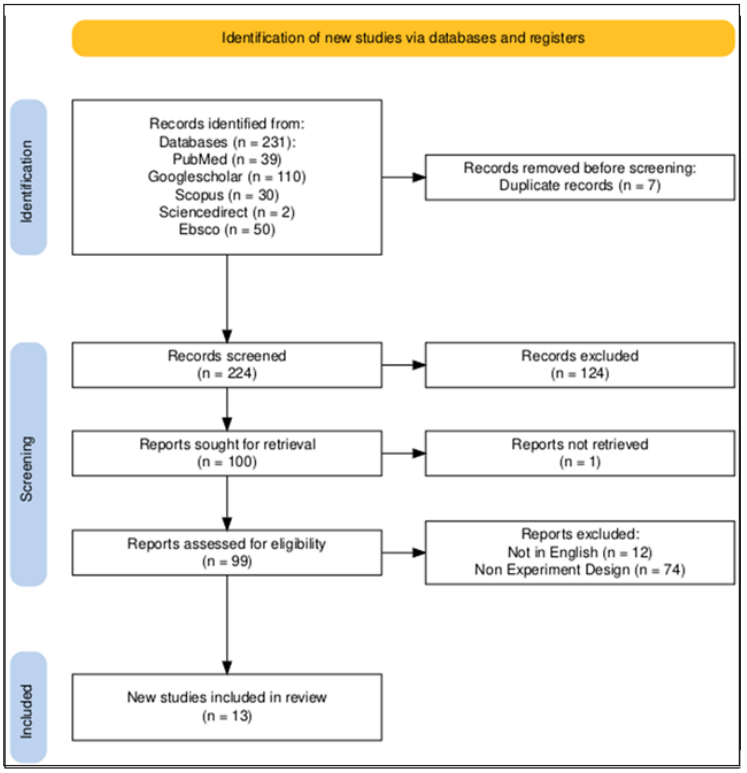

Figure 1: Identification of Studies Via Databases (PRISMA Model)

This review consolidates evidence on community- and home-based educational interventions for adults with T2DM, focusing on outcomes like improved HbA1c, self-management, increased knowledge and self-efficacy, better quality of life, and reduced healthcare use, such as fewer hospital admissions.

Quality Assessment Results

All articles in this study are quantitative. Studies meeting 75% of criteria are included; all 13 selected studies fulfill this.

Analytical Findings

Across thirteen studies, with 1,094 participants—870 (79.52%) nurses—two included other healthcare workers. Five studies used quantitative, six qualitative, and two mixed methods designs. This diversity enhanced the findings' credibility.

Table 2 below presents a summary of the 13 empirical studies included in this analysis, outlining their sample characteristics, data collection tools, analytical approaches, and major findings.

Table 2: Summary of Studies Included in the Systematic Literature Review Sample Methods and Population, Data Collection tools and Analysis, Key Finding

No	Sample Methods and Population	Data Collection Tools and Analysis	Key Finding
1	60 T2DM, control and intervention	FCCS-FCB questionnaire; Chi-square, t-test, ANOVA	Improved diabetic foot-care knowledge in the intervention group
2	120 T2DM, intervention and control	HbA1c, HL, SE scales; ANCOVA	Improved glycemic-control, health literacy, and self-efficacy in the intervention group
3	630 patients in 8 health centers	PHQ-9, HbA1c; multilevel modeling	Significant HbA1c and depression improvements; rural participants benefitted more
4	Stakeholders in PHC systems	Thematic analysis of workshops and interviews	Co-designed PHC interventions improved care coordination
5	569 healthy adults	Activity tracking, questionnaires, regression	Risk perception improved, and no significant behavior change
6	50 T2DM, intervention and control	Foot-care checklist, self-efficacy scale; t-test	Peer supports enhanced foot-care and self-efficacy
7	451 Hispanic T2DM	HbA1c; satisfaction survey; statistical analysis	Modest HbA1c improvement and high intervention acceptability
8	225 T2DM	Self-management behavior scales, FPG, HbA1c, SE scales	Improved self-efficacy, family-support, and behavioral outcomes
9	102 Prolanis members, T2DM in 4 PHC centers	KAP questionnaire; paired *t*-test	Improved behavior and attitude, no significant knowledge change
10	72 T2DM, 36 per group	HL and DSME tools; *t*-test, ANOVA	Improved health literacy and exercise-related self-management
11	High-risk adults identified in 135 practices	HbA1c, behavior logs; long-term observation	Ongoing; expected risk reduction through mentor-supported lifestyle change
12	268 T2DM dyads (patient + support person)	HbA1c, BP, behavior tracking; mixed modeling	Family-based approach improved self-management and glycemic-control
13	178 T2DM adults in 2 CHCs	HbA1c, BMI, lipid profile, QoL; ANCOVA	Improved glycemic control, lipid profile, BMI, and QoL

**Program Pengelolaan Penyakit Kronis (Chronic Disease Management Program); PHC = Primary Health Care; HL = Health Literacy; DSME = Diabetes Self-Management Education; QoL = Quality of Life*

Comprehensive Analysis of Diabetes Self-Management Interventions Based on 13 Empirical Studies

This review summarizes 13 studies on community and home-based education programs for adults with T2DM, highlighting their positive impact on self-management, HbA1c, and self-efficacy. Effective interventions often involve family or peer support, digital tools, and culturally tailored delivery. However, inconsistencies exist in outcome measures (HbA1c, self-efficacy, lifestyle), follow-up durations, and modes of delivery (in-person vs. digital). Few studies examine long-term sustainability or cost-effectiveness, and qualitative data is underutilized. These gaps indicate the necessity for standardized metrics, mixed-method research, and evaluation of scalability and cultural compatibility. A future systematic review with meta-analysis could better quantify effects on HbA1c, adherence, and outcomes. The articles come from diverse settings, including Iraq, China, the USA, and the UK, reflecting broad strategies to address T2DM management challenges in resource-limited settings, low health literacy, and fragmented care. Overall, this review offers a structured overview of common challenges, intervention adaptations, and their impacts on diabetes care worldwide.

Challenges in Providing Diabetes Care

Studies reveal challenges in diabetes care, like low patient knowledge of complications such as diabetic foot care and limited impact of awareness programs. Low health literacy in older or rural populations affects self-care, but family literacy programs can improve outcomes (Khudhair & Ahmed, 2022; Kusumo *et al*., Panagiotidis *et al*., 2025). Comorbidities like depression further complicate management and informing patients of genetic risks alone is ineffective. Overall, effective care requires ongoing, personalized education and increased patient engagement (Wang *et al*., 2025; Godino *et al*., 2016).

Adaptation Strategies and Intervention Models

Studies highlight strategies for better diabetes care. Family and community support boost motivation, reduce isolation, and improve blood sugar control and self-efficacy. Peer support especially aids low-resource

areas (Zhu *et al*., 2025; Deverts *et al*., 2022). Trained peers enhanced foot care in Iran (Ghasemi *et al*., 2021). Digital tools like WeChat and storytelling improved diet and behaviors when culturally adapted (Chen *et al*., 2025; Wieland *et al*., 2024). Participatory methods foster trust and better care design (Xiong *et al*., 2024). Education programs based on health literacy improved physical activity (Abdulsalam *et al.*, 2025). Combining social support, digital tools, and tailored education effectively promotes self-management.

Implications for Patient Behavior, Social Life, and System Engagement

Most studies focused on clinical outcomes like HbA1c and BMI, but many also showed social and emotional benefits. Family and peer programs, such as those by Zhu *et al*. (2025) and Ghasemi *et al*. (2021), helped patients feel supported and stay engaged. Some interventions, like Deverts *et al*. (2022) and Panagiotidis *et al*. (2025), encouraged shared decision-making, improving satisfaction. Digital tools, such as WeChat in China, also enabled reaching remote patients, demonstrating technology's role in reducing barriers and supporting self-management.

Impacts on Healthcare Roles and Future Directions

A key theme is the growing role of nurses and community health workers, who serve as caregivers, educators, and emotional support providers, as shown in Wang *et al*. (2025) and Abdulsalam *et al.* (2025). They promote health education and behavior change. Models like demonstrate a shift toward collaborative, locally designed care, enhancing outcomes and fostering an inclusive healthcare system, especially in primary care (Xiong *et al*., 2024).

DISCUSSION

This review analyzed 13 studies on T2DM self-management, covering various methods and settings. Findings reveal insights into educational, behavioral, digital, and community approaches, highlighting common themes and challenges.

A recurring theme was the gap in diabetes knowledge and health literacy, linked to poor glycemic control and complications (Singh *et al*., 2024; Bailey *et al*., 2015). Studies in Thailand and Greece showed literacy-focused education improved HbA1c and self-care, but knowledge alone didn't lead to sustained change. Godino *et al*. (2016) found personal risk data alone didn't significantly change behaviors, implying information needs to be combined with motivation and support (Bandura, 2018; Uly *et al*., 2024).

Not all interventions met goals. Kusumo *et al*. (2020) found that while attitudes improved with a performing arts-based intervention, knowledge gains were minimal, indicating engaging formats may lack necessary cognitive rigor for knowledge retention, possibly due to a disconnect between entertainment and instruction (Kanellopoulou *et al*., 2019). Similarly, digital storytelling in Wieland *et al*. (2024) increased engagement but only modest HbA1c improvements, possibly due to short duration or lack of follow-up, as also noted by Powers *et al*. (2020). Population-specific responsiveness varied, with rural participants in Wang *et al*. (2025) showing greater improvements, possibly due to baseline access disparities and receptiveness to support. Older adults may face digital literacy barriers affecting app-based interventions like in despite positive trends. Customization based on geographic and demographic factors is crucial in digital models (Chen *et al.*, 2021).

Duration and intensity of interventions greatly influenced outcomes. Longer follow-up periods or higher interaction frequency led to better, more lasting improvements in glycemic control and self-efficacy (Pascale *et al.*, 2017). In contrast, short-term or one-off sessions, even if innovative, often failed to produce lasting change. This observation highlights the importance of ongoing engagement, reinforcement, and behavior tracking in successful chronic disease interventions (Zhu *et al*., 2025). Family and peer support emerged as critical facilitators. Involving family members led to improved treatment adherence and satisfaction (Zhu *et al.*, 2025; Deverts *et al.*, 2022), echoing findings from Rosland *et al.* (2022). Peer-led models also enhanced engagement and self-management, particularly in resource-limited settings (Fisher *et al*., 2017; Ghasemi *et al.*, 2021).

Digital tools showed significant promise. Chen *et al.* (2025) and Wieland *et al*. (2024) reported improved glycemic control and health behaviors through mobile applications and digital storytelling. These results support earlier findings by Kitsiou *et al*. (2017) and Jin *et al*. (2023) on digital interventions improving accessibility. Nevertheless, as Greenhalgh *et al*. (2017) caution, long-term success depends on sustained user engagement and technical infrastructure, which is often uneven across settings.

Participatory approaches boosted intervention acceptance by involving patients and providers, enhancing relevance and trust, unlike top-down methods (Xiong *et al*., 2024; Shirvani *et al*., 2021). Mental health integration was key; combining mental health with diabetes care helped depressed patients, supporting the Chronic Care Model and emphasizing psychological support in chronic disease management. Nurses and community health workers took on evolving roles as educators, support providers, and coordinators (Wang *et al.*, 2025; Gonzalez *et al*., 2015; Grover & Joshi, 2014). Nurses and community health workers played evolving roles. As educators and coordinators, they became central to intervention delivery (Wang *et al*., 2025; Abdulsalam *et al*., 2025), supported by Ong *et al*. (2018) and Lukewich *et al*. (2022), who recommended that participants receive training in health coaching and digital tools.

The review confirms that tailored, multidimensional interventions improve diabetes self-management by combining education, psychosocial support, and ongoing engagement. Effectiveness depends on context, so future research should examine long-term impacts, responsiveness among populations, and scalability, particularly for digital and community models. Meta-analyses on intervention duration, intensity, and delivery can help define best practices. Unlike prior systematic reviews that primarily catalog interventions, this review integrates evidence from both traditional and digital as well as family-based and community-led approaches, providing a multidimensional understanding of diabetes self-management. The analysis highlights underexplored aspects such as the integration of mental health support, digital engagement sustainability, and the evolving role of nurses and community health workers. These insights reveal critical gaps for future studies—particularly regarding long-term cost-effectiveness, context-specific adaptation, and cross-sector collaboration—thereby offering practical contributions for global diabetes management policy and nursing education reform.

Limitations

This review was limited to studies published in English between 2015 and 2025, which may exclude relevant research in other languages. Additionally, the heterogeneity in study designs, intervention types, and outcome measures limited direct comparisons across studies. The focus on short-term outcomes also restricts the understanding of long-term sustainability. Finally, publication bias may exist, as only published articles were included in the analysis.

CONCLUSION

This review analyzed 13 studies on interventions supporting self-management in T2DM. Strategies like education, family involvement, peer support, and digital tools are more effective than standard care, improving blood sugar, health knowledge, emotional well-being, and habits. Recommendations include empowering nurses as educators, involving families, using culturally adapted digital tools, and supporting peer-led programs. Future research should address long-term effects, cost-effectiveness, and compare nurse- and peer-led models and explore the roles of mental health and culture in diabetes management.

Conflict of Interest

The authors declare that they have no competing interests.

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