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Factors influencing the uptake of culturally tailored diabetes self-management education and support programmes among ethnic minority patients with type 2 diabetes: A systematic review

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ABSTRACT

Purpose: This systematic review aimed to evaluate the factors influencing the uptake of culturally-tailored Diabetes Self-Management Education and Support (DSMES) programmes among ethnic minority patients diagnosed with type 2 diabetes mellitus (T2DM).

Methods: A systematic review, following PRISMA guidelines, was conducted, including quantitative research studies published in peer-reviewed journals from January 2013 to January 2023. Studies were extracted via the following databases, AMED, MEDLINE, CINAHL, EMBASE, EMCARE, PSYCHINFO, Ovid Nursing, and grey literature. Studies were selected based on eligibility criteria including the evaluation of DSMES programmes tailored for ethnic minorities and involving adult participants with T2DM. The factors affecting the uptake of these programs were mapped against the three categories of the Andersen's Behavioural Model of Health Services Use: predisposing, enabling, and need factors. The quality of the included studies was assessed using the Critical Appraisal Skills Program (CASP) checklist, and a narrative synthesis was conducted to analyse the findings.

Results: Nine studies met the inclusion criteria, demonstrating that culturally-tailored DSMES programmes significantly improve uptake among ethnic minorities. Key factors influencing participation included demographic characteristics, diabetes knowledge, emotional support, and cultural beliefs. Barriers such as language proficiency, cost, and diabetes fatalism were identified, while enablers included the use of local champions and culturally specific strategies.

Conclusions: This systematic review highlights the effectiveness of culturally-tailored DSMES programmes in improving health outcomes among ethnic minority groups. It suggests that more research is needed to explore these barriers and develop strategies to enhance the uptake of DSMES programmes among underserved populations.

1. Introduction

Type 2 Diabetes Mellitus (T2DM) is associated with a substantial disease burden, including increased mortality risk and significant long-term morbidity and, emerging as a public health epidemic [1]. Ethnic minority groups have a disproportionate risk and are twice as likely as white persons of similar ages to develop T2DM [2]. Management options for T2DM include pharmacological (include insulin and tablets use) and non-pharmacological (include lifestyle modification and Diabetes Self-Management Education and Support (DSMES) programmes which are crucial in the care of individuals with T2DM and aims to enhance patient's knowledge, skills, and confidence with managing their condition [3,4]. T2DM complications are the leading cause of blindness, renal failure, cardiovascular disease, and non-traumatic amputation in adults in the UK [5]; these can be prevented with improved patient education.

Evidence-based structured DSMES programmes have been implemented to support patient self-management in T2DM, such as the "Expert Education versus Routine Treatment"(X-PERT) and the "Diabetes Education and Self-Management for Ongoing and Newly Diagnosed" (DESMOND) in the United Kingdom [6]. Accreditation and

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reimbursement of DSMES programmes vary internationally. For example, in the United States, programmes must be accredited by the American Diabetes Association [7] or the Association of Diabetes Care & Education Specialists [8] to qualify for reimbursement, ensuring adherence to national standards. In the United Kingdom, there is no formal accreditation system; instead, implementation of DSMES programmes is guided by the National Institute for Health and Care Excellence (NICE) guidelines [9] and monitored through the National Diabetes Audit [10] and National Health Service commissioning, with programmes like X-PERT and DESMOND recognised for their evidence-based curricula. Australia similarly lacks formal accreditation for DSMES programmes, focusing instead on credentialing educators through the Australian Diabetes Educators Association [11], which requires completing an accredited postgraduate course, practical experience, and ongoing development.

Annual attendance at DSMES programmes is recommended to support patient self-management [5,12]. However, the uptake of education programmes amongst minority ethnic groups has been low [12,13]. A recent systematic review showed that structured DSMES for patients from low and middle income countries, particularly from sub-Saharan African, is associated with a reduction in glycated haemoglobin and improved diabetes control [14]. Several other studies have reported barriers which include socioeconomics, cultural factors, language barriers, misaligned work schedules, work commitments, perceived lack of need, or limited encouragement from healthcare professionals to engage in DSMES programmes [12,15–18]. Culturally adapted DSMES targeting minority ethnic groups would be beneficial in supporting self-management for patients with T2DM. The key question, therefore, is not whether people with diabetes need education, but rather which inclusive and accessible methods can best improve behaviour, self-management, and health outcomes for each individual, including those from minority groups.

1.1. Aim

The aim of this systematic review was to assess the factors affecting the uptake of tailored diabetes education programmes among ethnic minority patients with T2DM.

2. Methods

2.1. Information sources

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was used to design and report findings from this review [19]. The search was conducted for the period between January 2013 and December 2023 for peer-reviewed literature published in English via the AMED, MEDLINE, CINAHL, EMBASE, EMCARE, PSYCHINFO, and Ovid Nursing databases, supplemented by a grey search of the reference lists of key articles on the subject. Rayyan (https://www.rayyan.ai/), a software used to manage and collaborate on systematic reviews, was used to organize the results from each database, to remove duplicates, and to collaborate on blind-screening the review records.

2.2. Theoretical framework

The Behavioural Model of Health Services Use, a widely recognized framework for understanding health service utilization, was adopted to underpin this systematic review to identify the key factors that affect DSMES uptake among ethnic minority patients with T2DM. This model classifies factors influencing service use into three categories: predisposing, enabling, and need factors [20].

2.3. Search strategy

Search terms were hierarchically structured and combined with the Boolean operators (“AND”, “OR”) of the following group keywords and their respective synonyms and MeSH terms: (population) “Type 2 diabetes” AND “Ethnic minority” AND (exposure) “diabetes education” AND (outcome) “attendance”.

2.4. Study selection and data screening process

Records from the database search were exported onto Rayyan and duplicates were removed. Both reviewers independently and selected article. A two-stage screening process was employed [19]. The initial stage included screening the title and abstract of all records exported onto Rayyan; the second author blind-screened 50 % of the titles and abstracts for validation purposes. In the second stage, the retrieved full-text papers were scrutinized against the inclusion criteria in a blind review by both authors; any discrepancies in findings were resolved between the authors.

2.5. Eligibility criteria

2.5.1. Inclusion criteria

- Peer-reviewed primary research studies published in English between 2013 and 2023
- Study methodology: interventional studies (randomised or quasi-experimental studies) using a cross-sectional design to evaluate factors influencing DSMES programme uptake
- Studies exploring factors associated with the uptake of diabetes education services among adult individuals with T2DM from a minority ethnic background

2.5.2. Exclusion criteria

- Non-empirical publications (reviews, guidelines)
- Empirical studies using qualitative methodology
- Studies not involving adult individuals with T2DM from a minority ethnic background

2.6. Quality assessment and critical appraisal

The Critical Appraisal Skills programme (CASP) Checklist [21] assessed risk of bias for studies to judge the trustworthiness and relevance in their validity, results, and clinical relevance [19].

2.7. Method of data extraction and synthesis

A narrative synthesis and descriptive analysis were conducted using data from the included studies to assess whether culturally tailored educational interventions improved service uptake among ethnic minority patients with T2DM. Extracted data included study design, sample size, setting, participant demographics, ethnic group, type of diabetes education programme, and outcome variables (Table 1). Additionally, key findings on educational session uptake, barriers, enablers, and associated factors were identified (Table 2). Guided by Andersen’s Behavioural Model of Health Services Use [20], factors were categorized into themes and mapped as barriers and facilitators to promote the uptake of culturally tailored diabetes education programmes among ethnic minority groups.

3. Results

As depicted by the PRISMA flowchart (Figs. 1), 1376 records were extracted from the initial search, with 630 duplicates removed, resulting in 730 records. The first stage screening eliminated 531 records at title screening and 123 at abstract screening. A total of 76 full-text articles were retrieved for screening again the inclusion criteria, of which 64 were excluded, giving a final number of 9 studies which were included

Table 1
Overall study characteristics.

Author	Country and study setting	Study Design & Data Collection Approach	Sample size, Mean age (SD), Gender, Duration of Diabetes (DD)	Ethnic group of patients with T2DM Type of education	DSMES accreditation and standardisation	Primary outcome	Clinical parameters: level (SD) (SD)
Brown et al. [23]	United States of America Community clinical setting	Quantitative study: A quasi-experimental design Pre & post intervention questionnaires.	N = 15 Mean age 55 (SD=8.6; range, 40–72years). Female: N = 13 Male: N = 2 Mean DD 10.5 year (SD=8.5; range, 1–20).	Hispanic/Latino of Mexico origin (93 %). Spanish speaking. Face-to-face education tailored for Mexican culture targeted the medically underserved	DSMES content design was based on the ADA guidelines, and delivered by nurse practitioners. Details on accreditation not provided.	Empowerment and knowledge scores improved from baseline intervention.	Improvement at 6-months post intervention: Total Cholesterol: 174.9(42.65) ($p < 0.05$) HbA1c improved: 8.63 (1.11) ($p < 0.05$) BMI 31.00 (5.66) ($p < 0.05$).
Chatterjee et al. [27]	United Kingdom Community clinical setting	Quantitative study: Cross-sectional study Face-to-face group education programme. Questionnaire completed post intervention.	N = 1678 of whom N = 471 (28 %) southeast Asians Mean age = 59.5 years Male N = 274 Female N = 197 DD not reported	Ethnic groups including Gujarati, Punjabi and Bengali Culturally adapted DESMOND programme for delivery to south Asian ethnic population using translated materials and culturally specific food models.	DSMES recommended by and adhering to the NICE Guidelines as a validated education programme for people with T2DM; accreditation not available in the UK.	N = 889/1678 (53 %) attended & returned survey, of whom 28 % southeast Asians 99 % of participants identified knowledge and skills necessary to self-manage diabetes.	Improvement post intervention: Reduction in HbA1c 0.96 % at six months and 0.70 % at 12 months (both $p < 0.005$) Weight reduction by 2.98 kg ($p = 0.027$)
Choi and Rush [25]	United States of America. Non-clinic affiliated community centre	Quantitative study: A quasi-experimental design Participants completed a pre and post educational intervention questionnaires	N = 41 Mean age 70.3 years (SD 8.4; 30 – 87) Male 46.3 % Mean DD 8.9 years (SD 8.6)	Korean migrants in the USA Two group sessions (1.5 hours and 2.5 hours respectively) led by an experienced bilingual family nurse practitioner.	DSMES based on content considered essential by the ADA; details on accreditation not provided.	High participant satisfaction with the education programme. Retention rate = 77 %	Improvement at 3-months post intervention: HbA1c from 7.3 % to 6.8 % (5.13) ($p < .001$) HDL 44.1–47.8 mg/dl (3.52) ($p < 01$)
Flores-Luevano et al. [26]	United States of America US Mexican Border	Quantitative study: Quasi-experimental Design. Pre-post intervention with survey and medical record review.	N = 209 Mean age 58.9 years (range 23–94, SD 11.2); Female - 68.4 %; 91.1 % were Hispanic Mean DD 8.3 years (SD 7.8)	Hispanic origin A multi-cultural and bilingual (English and Spanish) Diabetes Education and Empowerment Programme (DEEP) programme consisting of eight modules, delivered in 2-hour sessions over 4–8 weeks.	Accreditation and standardisation details not provided.	6–12 months post intervention: Diabetes knowledge scores increased 1.83, ($P < 0.001$, N = 141) PAID scores decreased from 51.4 % to 38.7 % ($P < 0.001$, n = 111). Diabetes fatalism decreased (−1.22, $P = 0.39$, n = 110). Benefits were observed with attendance rates as low as 50 %.	Improvement at 6-months post intervention: HbA1c (−1.1 %, $P < 0.001$, n = 79), Total cholesterol (−17.2 mg/dL, $P = 0.041$, n = 63) Glucose self-monitoring (+1.3 times a week, $P = 0.021$, n = 115)
Islam et al. [24]	United States of America. New York City, clinic- and community-based venues	Quantitative study: Randomised control trial. Surveys at baseline and 12 months post intervention followed by interviews.	N = 26 intervention group N = 21 control group Mean age 54.2 (range 55.7–55.8) Female (40.3 %) Mean DD 7.6 years (range 6.7–8.5)	Bangladeshi-American. Six-monthly Community Health Worker (CHW)-facilitated 2.5 hour group sessions, plus three one-on-one visits of 60–90 min each from CHWs at 3, 6, and 9 months post DSMES.	DSMES curriculum was adapted from various existing curricula materials validated in minority communities. Accreditation details were not provided.	Diabetes knowledge score improved from 10.9 to 7.4 (SD 1.3, $p < 0.001$) at 12 months post intervention. No change for control group	At 12-months post intervention HbA1c (no significant change) from 7.6 (SD 1.3)to 7.1 (0.8) $p = 0.141$ BMI (no significant change) from 29.1 (SD 6.8)to 28.6 (SD 6.6), $p = 0.125$
Kellow et al. [22]	Australia. Melbourne. Community health service facility.	Quantitative study: Cross-sectional study. Patient were invited to complete pre and post	N = 34 Mean age 69.1 (SD=9.1) Male – 35 % Mean DD 10 years (range 2.8–20.5)	Chinese – Cantonese-speaking people with T2DM based in Melbourne. Five classroom-like group sessions (2 hours each). Teaching style	DSMES designed in accordance with the ADCES 7 Self-Care Behaviours Framework, and delivered by diabetes educators;	Improvement 6 months post intervention in the mean frequency of selfcare behaviours from 30 (22–32.3) at baseline to 33	6-months post intervention: Total cholesterol ($p = .78$) LDL ($p = .27$) HDL ($p = .37$) Mean HbA1c - 51

(*continued on next page*)

Table 1 (*continued*)

Author	Country and study setting	Study Design & Data Collection Approach	Sample size, Mean age (SD), Gender, Duration of Diabetes (DD)	Ethnic group of patients with T2DM Type of education	DSMES accreditation and standardisation	Primary outcome	Clinical parameters: level (SD) (SD)
		intervention questionnaires.		aligned to the Confucian cultural process of learning and incorporated culturally specific strategies to promote healthy behaviour change.	accreditation not available in Australia	(29.8–35.0) ($p < .001$) Healthy eating ($p < .001$) Home blood glucose monitoring ($p < .05$) Adherence to medication ($p < .05$) Problem solving ($p < .05$)	(7.9) vs 50 (7.8) mmol/mol, ($p = .32$). BMI - 24.1(3.8) unchanged, but waist circumference reduced to 88.4 ($p < 0.05$) Diabetes related stress score improved 21.0 (11, 32.3) vs 18.5(9, 22.3) ($p < .05$)
Sukkarieh-Haraty et al. [28]	Lebanon Primary health centres in Beirut	Quantitative study: A quasi-experimental design Participants completed a validated questionnaire in Arabic	N = 27 Age = 61.9 (8.2) Male N = 16 (59 %) DD: ≤ 10 years N = 11 (40.7 %); > 10 years N = 16 (59.3 %)	Lebanese – Arabic speaking participants. Two face-to-face DSMES sessions (hours each) culturally tailored and delivered by Arabic speaking MDT team	DSMES design adhered to the ADA's national standards; accreditation not available in Lebanon.	Diabetes self-care knowledge improved significantly ($p < 0.05$) Diet score (5.00 vs. 2.38) SMBG (5.15 vs. 1.61) Foot care (5.48 vs 3.56)	Improvement at 6-months post intervention: HbA1c: 8.63 (1.11) ($p < 0.05$). Total Cholesterol: 175.96 (31.27) ($p < 0.05$) BMI 31.00(5.66)
Sun et al. [29]	United State of America In a medical office setting	Qualitative study: A quasi-experimental design. Single-group, pre & post-test design. Data were collected through clinical assessments and questionnaires.	N = 27 Age range: 60–89 Male – N = 15 Female -N = 12 DD: > 10 years N = 16 (59.3 %)	Chinese American. The education intervention consisted of twelve 90-minute diabetes education and support group sessions.	DSMES programme curriculum was based on the ADA standards, and delivered by multidisciplinary and bilingual program educators. Details on accreditation not provided.	High attendance: N = 17 (74 %) Diabetes knowledge improved N = 13 (56 %). Improvement in diabetes self-management behaviours at 6 months post intervention	Improvement at 6-months post intervention: HbA1c 7.11 % ($p < 0.05$)
Williams et al. [18]	United States of America. Rural Community centre	Quantitative study: A quasi-experimental design. Pre and post intervention questionnaires and focus groups.	N = 32 Mean age 61.92 (SD 10.85) Male – 20 % Mean DD 11 years (range 1–38)	Rural African Americans Eight weekly sessions of 2 hours each, in groups of 6–8 participants. The DSMES programme, using storytelling, was culturally tailored based on literature about Afro-centric culture.	DSMES programme curriculum adhered to ADA guidelines and delivered by trained personnel. Details on accreditation not provided.	Improvement in self-management from baseline to 3 & 12 months: Diabetes knowledge score from 0.61 (SD 0.15) to 0.70 (SD 0.10, $P < 0.001$) at 3 months and 0.76 (SD 0.14, $P < .001$) at 12 months Exercise 2.20 (SD 1.84) to 3.10 (2.19, $p = 0.007$) at 3 months and 2.91 (SD 2.47, $p = 0.094$) at 12 months Foot care score 4.15 (SD 1.94) to 4.89 (SD 1.77, $p = 0.013$) at 3 and 5.76 (SD 1.76, $p < 0.001$) 12 months	Baseline, 3 & 12 months post intervention: HbA1c (no significant improvement): 7.96 (SD 1.87) to 7.59 (SD 1.79, $p = 0.22$) at 3 & 7.40 (SD 1.32, $p = 0.26$) at 12 months Systolic BP 139.64 (SD 20.54) to 134.46 (SD 14.58, $p = 0.34$at 3 and 126.09 (SD 13.14, $p = 0.008$ at 12 months No other significant improvement in clinical parameters

Abbreviations: N = number of participants; SD=Standard Deviation; DD=duration of diabetes; T2DM=type 2 diabetes mellitus; DSMES=Diabetes self-management education and support; PAID=proportion with significant diabetes distress (PAID); SMBG= self-monitoring of blood glucose; MDT=multidisciplinary; LDL = low density lipoprotein; HDL=high density lipoprotein; DESMOND=Diabetes Education and Self-Management for Ongoing and Newly Diagnosed; NICE=National Institute for Health and Care Excellence ADA=American Diabetes Association; ADCES=Association of Diabetes Care & Education Specialists; NICE=National Institute for Health and Care Excellence

in the systematic review analysis.

3.1. Critical appraisal

Seven out of nine the studies were of high quality, as they provided a clear explanation of their analytical strategies and relevant data to address the study question, as well as identified knowledge and research gaps in the delivery of diabetes education service to patients with T2DM from underserved/minority groups [18,22–27]. None of the studies were excluded based on the results of the quality assessment (see Supplementary Material).

Table 2
Key findings of selected studies regarding uptake of Diabetes Self-Management Education and Support (DSMES) programmes.

Author	Programme uptake	Barriers to uptake of diabetes education services	Facilitating factors to up take of diabetes education services	Factors associated with diabetes education uptake
Brown et al. [23]	N = 15 (99 %) completed the programme	Diabetes educators not available	Culturally tailored programme taught in Spanish by nurse practitioner with specialist diabetes knowledge	Level of education with primary school education or lower
Chatterjee et al. [27]	Attendance or uptake improved by 53 %	None reported	Availability of recruitment information in South Asian languages and engagement of clinicians to invite patients to attend	None reported
Choi and Rush [25]	N = 41/53 (77 %) completed the programme	Unable to contact participants Lack of motivation to attend follow-up sessions	Employing the native language, integrating cultural dietary preferences, encouraging family participation and support, and holding open discussions of cultural beliefs and treatment practices for diabetes	Education level (uptake: < High School 19.5 %, High School 34.1 %, 2-year College 9.8 %, 4-year College 31.7 %, Graduate School 4.9 %) English Proficiency > 2.0 (SD:0.8)
Flores-Luevano et al. [26]	N = 123/209 (75 %) completed the programme	Transportation, lack of quality health care and costs, emotional distress, language barriers	A culturally tailored and literacy level-appropriate diabetes education programme. Multiple phone reminders and permitted participants to attend missed sessions in other classes in order to improve follow-up	Gender: Female N = 143 (68.4 %) vs Male N = 66 (31.6 %) Level of education (high school N = 100; 57.1 % vs no high school diploma N = 75; 42.9 %)
Islam et al. [24]	N = 25/26 completed the programme.	Excluded if out of the country > 1 month. Lack of childcare for female participants. Irregular work schedule.	Flexibility to host sessions in both community and clinic locations. Communal concordance, trust, and leadership. Availability childcare for participants during sessions and other incentives offered for participation.	Gender: Male N = 11 (42.3 %) vs Female N = 15 (57.7 %) Employment: employed N = 8 (30.8 %), stay at home /housewife N = 12 (46.2 %), unemployed N = 6 (23.1 %) Education: secondary N = 5 (19.2 %), high school N = 6 (23.1 %), college N = 5 (19.2 %), graduate N = 10 (38.5 %)
Kellow et al. [22]	Programme attrition = 6 %	Diabetes related stress and stigma, Language barriers	Aligning programme delivery to match the Chinese cultural expectations for health education; Educators were trained on delivering the programme to target audience	Gender: Male 35 % Education: Primary= 32 %, Secondary= 50 %, Undergraduate= 14 %, Post-graduate: 4 %
Sukkarieh-Haraty et al. [28]	None reported	Diabetes related misconceptions / fatalism, Lack of social support	Culturally tailored diet education. Encouraging women engagement (to bring spouse along). Understanding, beliefs and systems values	Gender: Male N = 16 (59.3 %)Level of education above high school: (44.4 %) Employed N = 6 (22.2 %) vs unemployed N = 21 (77.8 %)
Sun et al. [29]	N = 23/27 (85.2 %) completed the programme	None reported	The educators had expertise in culturally tailored teaching styles, and dietary recommendations.	None reported
Williams et al. [18]	N = 25/32 completed the programme	None reported	Cultural factors and health beliefs, elicited expectations and tailor interventions to health beliefs, with skilful coaching	Gender: male 20 % Education: less than high school = 24 %, high school = 52 %, college = 24 %

3.2. Study characteristics

All the studies used quantitative designs to evaluate the uptake of tailored Diabetes Self-Management Education and Support (DSMES) programmes among ethnic minority groups. One study was a randomized trial [24], six employed quasi-experimental designs [18,23,25,26,28,29] and two were cross-sectional [22,27]. All studies used questionnaires to evaluate DSMES programme uptake. Five studies utilized trained interpreters to administer questionnaires in participants' native languages, later translating them into English for analysis[22,24–26,28]. Studies measured three outcome categories: physiological markers, diabetes management behaviours, and health and well-being scales. Four studies reported significant improvements in psychosocial outcomes following the DSMES programmes [22,25,26,28]. Patient sample sizes ranged from 15 [23] to 471 [27] participants (Table 1).

The studies were conducted in the United Kingdom [27], Australia [22], Lebanon [28], and the United States of America (USA) [18,23–26,29]. The DSMES programmes in seven studies adhered to established guidelines for structured education for individuals with T2DM, although none of the authors provided details on whether these DSMES programmes were accredited by relevant bodies. Of these, five studies followed specific standards in designing the DSMES curricula: four from the USA [18,23,25,29] and one in Lebanon [28] adhered to the American Diabetes Association standards [7]. A DSMES programme in an Australian study [22] was designed in accordance with the Association of Diabetes Care & Education Specialists Self-Care Behaviours Framework [8], while a UK study delivered a culturally adapted DESMOND programme [27] that aligned with NICE guidelines [9]. In contrast, the DSMES programmes in two remaining studies from the USA, while not adhering to established standardisation guidelines, were informed by prior evidence on culturally adapted education interventions [24,26].

Participants' mean age ranged from 53 to 70, and diabetes duration between 8 and 20 years. All studies provided culturally tailored, face-to-face group DSMES programmes for specific ethnic groups. Two studies, one in a USA medical office [29] and another in Melbourne, Australia [22] targeted Chinese/Cantonese speaking patients. In the USA, two studies conducted in community clinics catered to Hispanic or Latino Spanish-speaking Americans of Mexican origin [23,26], while another study used an Afro-centric approach for African-American patients, incorporating storytelling [18]. Similarly, the DSMES in two other studies in the USA and UK were adapted for South Asian populations, using translated materials and culturally relevant food models for Bangladeshi or Gujarati participants [24,27]. Additionally, a USA study focused on Korean patients, integrating language instruction, cultural dietary preferences, and discussions of cultural beliefs and traditional medicine [25].

3.3. Factors associated with uptake of culturally tailored DSMES programmes

The factors influencing DSMES uptake were defined as either barriers or enablers and were categorized into two overarching groups: 1) patient-level factors, 2) healthcare-related factors. Barriers and facilitators to DSMES programme uptake were mapped to the Behavioural Model of Health Services Use [20], which categorizes factors influencing health service use into *predisposing*, *enabling*, and *need* factors.

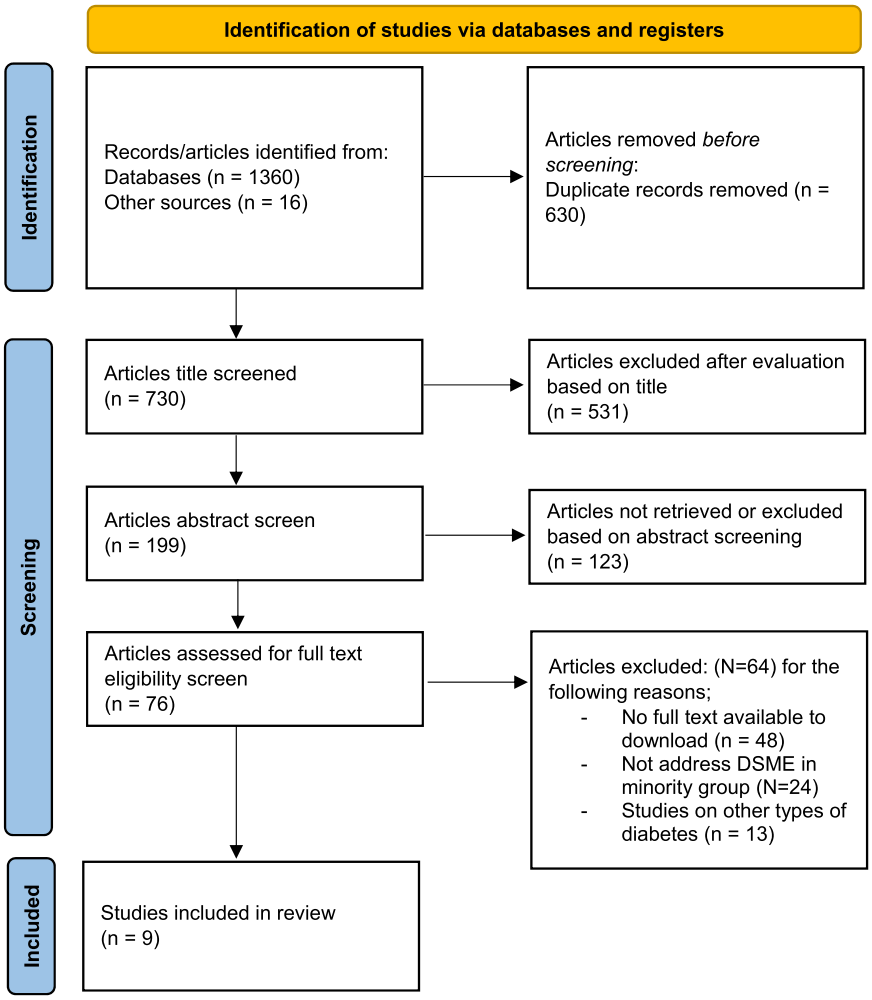

Fig. 1. PRISMA Flow Chart of studies screening and selection.

Predisposing factors include social and demographic characteristics, enabling factors include parameters such as income, health insurance, and service availability, and need factors drive individuals to seek health services (Table 2).

3.3.1. *Patient Level Barriers and Facilitators*

3.3.1.1. Predisposing and Enabling factors. **Demographic characteristics:** Two studies identified demographic factors, such as age, gender, income, language proficiency, and educational attainment, as key determinants of DSMES uptake [18,25]. In the first study, the mean participant age was 70 years (N = 41), with 53.7 % being female. The study found that older age often led to forgetfulness, resulting in non-adherence to DSMES. Additionally, despite an average of 27 years of residence in the USA, participants had low English proficiency, creating a significant barrier since most DSMES programmes are conducted in English. Over 75 % of participants had an annual income of less than $20,000, although 83 % had health insurance, primarily through Medicare which is provided to individuals over 65 years old [25]. In contrast, the second study reported that a younger mean age of 62 years (N = 25), higher educational attainment (with nearly 80 % having completed high school), and more than 70 % having health insurance acted as facilitators to DSMES uptake [18].

Diabetes knowledge: All nine studies identified participants' inadequate knowledge of diabetes and its management as a barrier to DSMES uptake. However, the use of well-trained local champions to deliver culturally tailored diabetes education significantly increased DSMES participation and improved both diabetes knowledge and clinical outcomes [26]. Similarly, Islam et al. observed enhanced diabetes knowledge and self-management, improved self-efficacy, and reductions in weight and HbA1c levels [24].

Emotional support: A study of 23 T2DM patients found that 74 % (N = 17) completed all 12 DSMES sessions, and 82 % (N = 19) showed improved diabetes management six months later. Participants valued the emotional support and connecting with others with diabetes [29]. Other studies also found that culturally tailored diabetes education facilitated social and family support, leading to improved psychosocial outcomes [24,26,28].

Diabetes fatalism: Diabetes fatalism was found to be prevalent among patients with T2DM in a study conducted in Lebanon. This was closely associated with poor glycaemic control, and despite the DSMES intervention, no improvement was observed from the baseline findings [28].

Diabetes distress: A study conducted in USA involving 27 participants of Chinese origin, found that 45 % of them experienced moderate to severe diabetes distress, with factors such as living alone, managing a complex treatment regimen, and reduced general self-efficacy, all of which contributed to the low DSMES uptake [29]. Similarly, Kellow et al. demonstrated a reduction in diabetes distress in their study of a culturally specific structured diabetes group education programme for Chinese Australians, titled "Not Scared of Sugar" [22].

3.3.1.2. Need factors. **Comorbidities and glycaemic control:** Three studies indicated that chronic conditions like dyslipidaemia, poor

glycaemic control, high BMI, and hypertension increased DSMES programme uptake [18,22,28]. A study of 28 adult Lebanese patients with T2DM found better uptake of DSMES when education targeted improvement in lipid, glucose, and anthropometric measures; uptake by patients with normal clinical variables was lower as they felt no need for education [28]. Kellow et al. reported modest improvements among participants with already well-controlled diabetes, suggesting that future programmes place more emphasis on those with suboptimal control [22]. Williams et al. similarly found that uncontrolled hypertension and obesity motivated attendance, as these conditions likely increased adherence and engagement with DSMES [18].

3.3.2. Healthcare related barriers and facilitators

3.3.2.1. Predisposing and enabling factors. **Cost:** One study identified cost as a significant barrier to DSMES uptake. Even though an improvement was seen in knowledge, psychosocial outcomes, clinical measures, and self-management among participants, the authors reported that barriers such as transportation challenges, limited healthcare access, poor quality healthcare, and high costs impeded diabetes self-management. Specifically, participants struggled to meet the recommended frequency of blood glucose monitoring due to the associated costs [26].

4. Discussion

This systematic review demonstrates that culturally tailored DSMES is more effective than standard diabetes education, resulting in better glycaemic control, enhanced diabetes knowledge, and increased access and uptake of DSMES. It highlights that culturally sensitive education can effectively address barriers to DSMES uptake among 'hard-to-reach' ethnic minority groups. Importantly, the DSMES programmes in seven of the nine studies included in our systematic review adhered to established guidelines for structured education for individuals with T2DM, while the remaining two were informed by prior evidence on culturally adapted education interventions. This highlights the critical role of standardisation in DSMES, ensuring that interventions are evidence-based, consistent, and capable of delivering improved self-management outcomes across diverse populations.

4.1. Patient-level barriers and facilitators

The review highlights the importance of a person-centred approach in health education, recognising the need to address the linguistic, cultural, and religious needs of ethnic groups to improve DSMES uptake. It identified predisposing factors such as age, education, and employment status, along with enabling factors like income, insurance, and living location. Chronic conditions, including hypertension, high cholesterol, high HbA1c, and perceived health status, were noted as need factors. Kim et al. highlighted the ineffectiveness of standard DSMES programmes for ethnic minorities, stressing the importance of culturally tailored education [30].

Older age was identified as a predisposing factor to low DSMES uptake in this review, with the mean age ranging from 53 to 70 years. While global life expectancy has increased, standing at 73 years in 2017 [31], the current review could not establish a direct relationship between age and DSMES programme uptake, although the decline in physical and cognitive ability associated with older age may contribute to participant attrition in DSMES programmes. On the other hand, access to free Medicare or insurance for participants over 65 years of age was reported as a facilitator to increased DSMES attendance. Diabetes fatalism, a mindset of hopelessness and resignation about managing diabetes that leads to poorer self-management and health outcomes [32], was also identified as a significant barrier to DSMES uptake [28]. Strategies such as involving healthcare workers who understand participants' characteristics, utilizing religious leaders in delivering DSMES, and providing counselling on adherence to diabetes management interventions can overcome this barrier.

4.2. Healthcare related barriers and facilitators

This review demonstrated that DSMES programmes targeted at specific ethnic groups and delivered by a "local champion" in the group's native language significantly improve uptake. This was evidenced by the low attrition rate of 6 % in the Brown et al. study, in which participants embraced DSMES with pride, viewing it as a recognition and representation of their ethnicity and culture [23]. Local champions are respected individuals from an ethnic group who are selected and trained to transfer the acquired knowledge and skills to their community. Health interventions that are developed with an understanding of the socio-cultural dynamics of a particular ethnic group and delivered by local champions in the local language are more likely to succeed [33]. Similarly, the community healthcare worker model is well-accepted and fosters social support and self-efficacy, both crucial for promoting self-management and DSMES uptake [24].

Most studies in this review reported a participant retention rate above 75 %, which contrasts finding from other studies noting low uptake of DSMES programmes [6]. This can be attributed to the use of culturally tailored DSMES programmes which incorporate dietary aspects and socio-cultural norms and beliefs into their development which improves understanding and increases programme participation [28]. However, barriers to DSMES uptake, such as diabetes-related myths and misconceptions, lack of social support, diabetes-related stress, distance, low motivation, and the need for translators, align with evidence from wider patient education interventions [15–17,34].

The Behavioural Model of Health Services Use [20], was crucial in this review to understand the potentially modifiable factors that influence DSMES uptake. For example, demographic characteristics like age and race cannot be changed, as opposed to enabling resources, which can be improved in a partnership with communities, individuals, or healthcare policies. Cost of healthcare service was identified as a significant barrier to DSMES uptake [26]. Healthcare funding for patient education programmes could enhance DSMES uptake minority ethnic groups [35], but the cost-effectiveness of DSMES interventions warrants further evaluation.

4.3. Strength and limitations

This review employed a rigorous search strategy, making it unlikely that any structured diabetes education programmes targeting ethnic minority groups of patients with T2DM were missed. The review included studies published within the last ten years which may have excluded some crucial studies, however, the strength of this approach was that it synthesized the most current evidence. However, the review was limited to English-language publications, potentially excluding other relevant studies. Most included studies lacked a comparison group, as they were quasi-experimental designs without randomization, leading to potential internal validity issues due to unaccounted confounding variables. High attrition rates and loss to follow-up were also noted in some studies, with incomplete data from participants who did not finish all DSMES sessions, leaving reasons for non-attendance unexplored [22,24,26].

5. Conclusion

This systematic review highlights the importance of culturally tailored DSMES programmes in improving uptake among minority ethnic populations. Despite their availability, DSMES access remains challenging due to language and financial barriers, with traditional Western protocols often seen as culturally insensitive and ineffective [30]. Studies analysed in this review demonstrated that

community-based, culturally tailored education programmes can effectively enhance diabetes self-management and health outcomes. While global health strategies increasingly focus on prevention and personalized care, few DSMES protocols are specifically designed for ethnic minorities, and factors such as the use of local champions, language, social support, and diabetes-related myths, influence their uptake are under-researched. Further research is recommended to explore these complex, individualized factors in greater depth.

Authors' contributions

SA and SL conceived the idea and designed the methodology for this systematic review; SA conducted the search, screened the articles and extracted the data for write up; SL blind-screened abstracts and full text records; SL provided strategic guidance for conducting the review; SL contributed to the data analysis and revised the manuscript; SA and SL approved the final manuscript.

Declarations

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.pcd.2025.01.010.

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