JOURNAL MEDICAL INFORMATICS TECHNOLOGY
medinftech.org ISSN 2988-7003 (online)

Effect of Disease Acceptance on Glycemic Control in Type 2 Diabetes Mellitus Patients: A Systematic Review

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ARTICLE HISTORY
Received: 12 January 25
Final Revision: 19 March 25
Accepted: 23 March 25
Online Publication: 31 March 25

KEYWORDS
Disease Acceptance, Glycemic Control, HbA1c, Psychological Management, Type 2 Diabetes Mellitus

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DOI
10.37034/medinftech.v3i1.98

A B S T R A C T

This study aims to analyze the relationship between disease acceptance and glycemic control in patients with type 2 diabetes mellitus (T2DM). A narrative systematic review was conducted using the Preferred Reporting Items for Systematic Reviews method, identifying 929 articles from various scientific databases, including PubMed®, ScienceDirect®, Cochrane Library®, and Google Scholar®. The screening and selection process resulted in 19 relevant articles, consisting of a mix of experimental studies and observational studies, that were analyzed to evaluate the impact of disease acceptance on diabetes management and glycemic control in T2DM patients. The review findings show that higher disease acceptance is significantly associated with improved self-management, better glycemic control (with reduced HbA1c levels), and decreased levels of stress and depressive symptoms. Several acceptance-based psychological interventions, such as Acceptance and Commitment Therapy (ACT) and group education programs, were found effective in enhancing disease acceptance. These interventions also help patients achieve optimal glycemic control. These findings emphasize the importance of applying psychological approaches in the management of T2DM to support more comprehensive and sustainable disease care, ultimately improving the quality of life for T2DM patients.

1. Introduction

Diabetes Mellitus (DM) is a clinical syndrome characterized by metabolic disturbances, notably hyperglycemia, which refers to elevated blood glucose levels above normal thresholds. This condition may result from absolute insulin synthesis deficiency, reduced biological effectiveness of insulin, or a combination of both [1]. Based on its etiological factors, the Indonesian Endocrinology Association (Perkeni) classifies DM into four main types: Type 1 Diabetes Mellitus (T1DM), Type 2 Diabetes Mellitus (T2DM), other specific types of diabetes, and Gestational Diabetes Mellitus (GDM) [2].

The International Diabetes Federation (IDF) states that over 90% of diabetes cases worldwide fall under T2DM, making it a critical global health issue [3]. In 2021, IDF reported 536.6 million diabetes cases globally, projected to increase to 783.2 million by 2045, with 94% of the surge occurring in low- and middle-income countries. Southeast Asia, with a prevalence rate of 8.7%, ranks as the third-highest region, including Indonesia, which stands fifth globally with 19.5 million T2DM cases. This number is estimated to soar to 28.6 million by 2045. According to the Indonesian Health Survey (SKI), the national prevalence of T2DM across all age groups is recorded at 1.7% [4].

Various diagnostic tests for T2DM, such as random blood glucose tests (RBG) and HbA1c tests, are commonly used to confirm the diagnosis and/or as indicators of glycemic management [5]. Currently, HbA1c is recommended as the best indicator by American Diabetes Association (ADA) for measuring glycemic control in T2DM patients because it provides

a stable value reflecting the glycemic index over the lifespan of red blood cells, approximately three months. Glycemic management in T2DM is personalized and influenced by several factors, including age, disease duration, life expectancy, comorbidities, hypoglycemic history, medication availability, and patients' economic capabilities. Glycemic control serves as a critical reference for the comprehensive management of T2DM to prevent various complications [6].

Managing T2DM consistently is crucial as it is a chronic disease with a prolonged course. The chronic nature of T2DM significantly impacts various aspects of patients' lives—biological, psychological, and social. Upon receiving a T2DM diagnosis, patients often face psychological shifts as they adapt to this new reality. This psychological adaptation process involves the concept of disease acceptance (DA). DA is psychological process in which individuals acknowledge and embrace their chronic illness at cognitive, emotional, and behavioral levels. Acceptance does not imply resignation but rather an open stance toward unpleasant internal experiences, allowing individuals to focus on actions that align with their personal values. In the context of chronic illnesses such as T2DM, this approach facilitates a reduction in emotional resistance to the diagnosis and promotes constructive disease management, ultimately enhancing overall quality of life [7].

To further elaborate on DA, the theoretical framework of psychological adaptation in chronic illness can be linked to classic models such as the Transactional Model of Stress and Coping by Lazarus and Folkman (1984) and the Self-Regulation Model of Illness by Leventhal et al. (1980). These models explain how individuals assess stressors associated with chronic conditions and develop adaptive coping strategies. Integrating DA into these frameworks allows researchers to explore how acceptance mediates coping processes and impacts clinical outcomes such as glycemic control [8].

Several studies have demonstrated that psychological factors, including DA, play a critical role in the management of T2DM. Improvements in psychological well-being, particularly increased acceptance of the disease, were significantly correlated with better self-management behaviors and enhanced glycemic control in patients with T2DM [9], [10].

Despite numerous studies on psychosocial interventions in diabetes care, a notable gap exists concerning the specific impact of DA on glycemic control in T2DM patients. Many investigations have explored psychological factors within broader self-management strategies without isolating DA's direct influence on clinical outcomes such as HbA1c levels. To address this gap, we systematically reviewed studies focusing on DA's impact on T2DM management. This review aims to determine whether a significant relationship exists between DA and glycemic control, particularly in T2DM patients.

2. Research Method

The method used in this study is a Systematic Literature Review (SLR) following the guidelines of the Preferred Reporting Items for Systematic Reviews (PRIS). It is important to emphasize that this approach differs from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [11], [12] because this study does not include a meta-analysis stage. PRIS focuses on systematically reporting the steps of identifying, selecting, and analyzing studies but does not involve the quantitative synthesis (data pooling) that is central to meta-analysis.

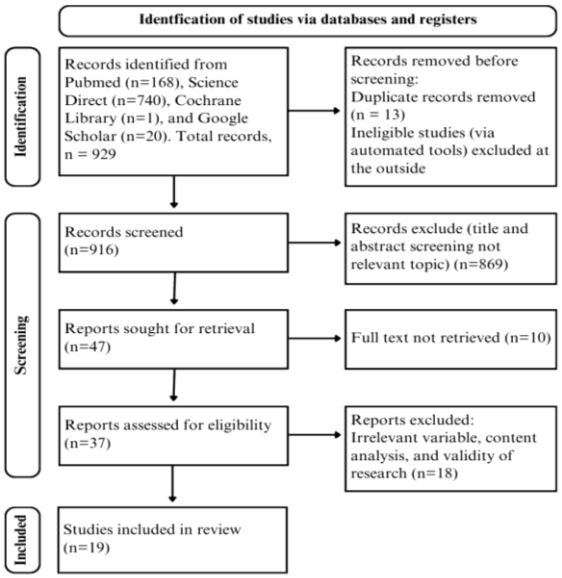

Figure 1. Literature Searching Flow Diagram

The flow diagram in this study (Figure 1) adapts PRIS principles to transparently illustrate the process of literature selection, from article identification to the final decision to include studies in the review. However, since this review involves only a narrative synthesis without statistical combination of research findings, it cannot be classified as PRISMA.

2.1. Eligibility Criteria

The inclusion criteria for article selection were defined to ensure the relevance and quality of the studies included. We did not formally assess the risk of bias or the methodological quality of the studies using specific tools. Instead, the selection was based on predefined criteria related to study relevance and focus on disease acceptance and glycemic control in T2DM patients. Studies were eligible if they were original research articles, available as free full text, and focused specifically on patients with T2DM. Exclusion criteria included articles addressing irrelevant variables, inadequate content analysis, or poor research validity.

2.1. Information Sources and Study Selection Process

The systematic review utilized multiple scientific databases to ensure comprehensive coverage of the literature. A total of 929 records were identified from four primary sources: PubMed® (n=168), ScienceDirect® (n=740), Cochrane Library® (n=1), and Google Scholar® (n=20). The keywords used in the four scientific databases to retrieve data were (("psychological adaptation") OR ("disease acceptance") OR ("acceptance")) AND "type 2 diabetes" AND "glycemic control". The search in the scientific database was conducted from November 2024 to January 2025.

Data extraction was independently performed by two reviewers and supported by two assistant reviewers. The data collected from four scientific databases were managed using Zotero® version 7.0.10, which facilitated the extraction, screening, and organization of relevant studies. Zotero® is a widely-used reference management tool that helped streamline the process of handling the bibliographic data.

A structured and systematic search strategy was implemented as shown in Figure 1. After removing 13 duplicate records, a total of 916 unique records were screened based on their titles and abstracts. During this phase, 869 records were excluded as they were unrelated to the topic of interest. Following the initial screening, 47 studies were selected for full-text retrieval. However, 10 of these articles could not be accessed in full text. A detailed assessment was conducted on the remaining 37 studies, during which 18 articles were excluded due to irrelevant variables, insufficient content analysis, or concerns regarding the validity of the research. Ultimately, 19 studies met the eligibility criteria and were included in the final systematic review. From the 19 included studies, data were extracted using a standardized data abstraction template. This process ensured consistency and accuracy in the synthesis of evidence.

3. Result and Discussion

The literature search process resulted in the acquisition of 19 relevant articles in accordance with the research objectives and methods. The analysis of these articles is summarized in Table 1.

3.1. Relationship between Disease Acceptance and Glycemic Control

Disease Acceptance (DA) is closely linked to the emotional reactions that arise when a chronic illness is diagnosed. It is understood as a psychological adaptation process in which patients learn to face the limitations caused by their disease with a positive, optimistic attitude, and increased self-care activity. Psychological adaptation to disease can be evaluated through measures of Quality of Life (QoL), well-being, self-esteem, social activity, and functional achievements [13]. In the context of T2DM, DA involves the interaction between disease symptoms, treatment, and the patient's ability to respond to these changes. If adaptation strategies are not properly managed, they may lead to ineffective outcomes. Glycemic control, often measured by HbA1c, is a crucial indicator of successful DA. Many factors, including DA, influence glycemic control, making it a key measure of overall adaptation [14].

DA has a significant relationship with glycemic control. Research consistently shows that higher DA is associated with better glycemic control. Several studies indicate that T2DM patients with higher DA tend to have better glycemic control, suggesting that DA plays a crucial role in motivating patients to manage their diabetes effectively [15]. Conversely, low DA is often associated with higher HbA1c levels, poor self-management, and inadequate glycemic control [16], [17]. Furthermore, low DA is linked to various acute complications of diabetes, such as hypoglycemia and ketoacidosis [18].

Additionally, the relationship between DA and glycemic control is influenced by factors such as lifestyle, medication patterns, stress, and coping strategies. Higher DA is associated with lower stress levels, which indirectly contributes to better glycemic control [14]. These findings highlight that DA not only affects patient behavior but also their emotional responses to the disease. The other study suggested that regular blood glucose monitoring strengthens the link between DA and glycemic control [19]. Therefore, measuring DA through tools like the Diabetes Acceptance Scale (DAS) is essential in clinical evaluations to better understand and address the specific needs of patients [18].

3.2. The Role of Disease Acceptance in Diabetes Self-Management

DA plays a crucial role in self-care for patients with T2DM, which includes adherence to diet, medication, and physical activity. Low levels of DA negatively impact adherence to dietary recommendations, significantly hindering patients' ability to effectively manage their diabetes. In contrast, patients with higher levels of DA tend to integrate diabetes management into their daily lives more successfully [19].

Optimal self-management depends on the patient's ability to accept their condition and confront the challenges associated with diabetes. Research indicates that DA is positively correlated with adaptive coping strategies, such as active planning and medication adherence. This acceptance also helps patients reduce diabetes-related distress that may otherwise hinder self-management. Furthermore, patients with strong social support and high DA report fewer difficulties with physical activity and medication adherence [16], [20].

Table 1. Summary of Analysis of Articles Obtained

No	Title, Author, and Year of Publication	Study Design	Samples	Results	Indicators/Measures	Suggestions
1	A Church-Based Diabetes Care Survey in St. Thomas, U.S. Virgin Islands (McDonald et al., 2017) [24].	Cross Sectional Study	48 diabetes patients	DA is negatively correlated with depression symptoms ($r = -0.287$, $p = 0.01$)[1]. DA is positively associated with the integration of diabetes into daily life ($r = 0.230$, $p = 0.05$)[1]. Depression symptoms are positively correlated with the number of mild hypoglycemia episodes ($r = 0.294$, $p = 0.05$)[1], while HbA1c is also positively correlated with mild hypoglycemia ($r = 0.261$, $p = 0.05$)[1].	1. Diabetes integration using The Diabetes Questionnaire (TDQ). 2. DA using Ideas About Diabetes-Revised (IAD-R). 3. Depressive symptoms using Center for Epidemiology Studies-Depression (CES-D). 4. Glycemic control (HbA1c testing). 5. Frequency of mild hypoglycemia episodes.	Better DA can enhance integration and reduce depressive symptoms, potentially lowering the risk of hypoglycemia. Optimal HbA1c levels can help prevent hypoglycemia risk in patients with T2DM within faith-based community settings.
2	A Randomized Controlled Trial of Acceptance and Commitment Therapy for Type 2 Diabetes Management: The Moderating Role of Coping Styles (Shayeghian et al., 2016) [22].	Randomized Control Trial	100 diabetes patients	HbA1c is negatively correlated with Self-Management (SM) ($r = -0.62$, $p < 0.01$)[2], effective Coping Styles (CS) ($r = -0.50$, $p < 0.01$)[2], and DA ($r = -0.48$, $p < 0.01$)[2]. Ineffective CS are positively correlated with HbA1c ($r = 0.24$, $p < 0.05$)[2]. Acceptance and Commitment Therapy (ACT) significantly reduces HbA1c ($F_{1,97} = 32.36$; $p < 0.001$; partial $\eta^2 = 0.25$)[3], improves SM ($F_{1,97} = 26.74$; $p < 0.001$; partial $\eta^2 = 0.22$)[3], and enhances DA ($F_{1,97} = 76.75$; $p < 0.001$; partial $\eta^2 = 0.44$)[3]. The effects of ACT remain stable up to 3 months post-therapy. CS significantly moderate the relationship between ACT and SM ($F_{1,93} = 3.69$; $p < 0.01$; partial $\eta^2 = 0.07$)[3] but show no significant moderation for HbA1c and only marginal significance for DA.	1. Intervention group treatment: Education based on Acceptance and Commitment Therapy (ACT). 2. Control group treatment: General diabetes education. 3. Glycemic control (HbA1c testing). 4. Self-management using the Summary of Diabetes Self-Care Activities (SDSCA). 5. DA using Acceptance and Action Diabetes Questionnaire (AADQ). 6. Coping style using The Brief COPE	The Acceptance and Commitment Therapy (ACT) intervention is more effective in improving diabetes management, including effective coping strategies, better diabetes self-management, higher DA, and optimal HbA1c levels.
3	Adherence to dietary recommendations in diabetes mellitus: disease acceptance as a potential mediator (Jaworski et al., 2018) [19].	Cross Sectional Study	91 diabetes patients	Low DA has a significant negative impact on diet adherence (βstd = -0.266; 95% CI: -0.469, -0.063; $p = 0.010$)[4]. Diet adherence is also significantly influenced by treatment types, including a combination of diet and oral drugs (βstd = 0.263; $p = 0.012$)[4] or a combination of diet and insulin (βstd = 0.211; $p = 0.045$)[4]. Regular blood glucose monitoring is associated with better diet adherence (βstd = 0.305; $p = 0.003$)[4]. However, blood glucose monitoring habits show a significant negative association with DA as a mediator (βstd = -0.455; $p = 0.001$)[4]. The mediating effect of DA in these relationships is small ($Z = 1.939$; $p = 0.054$)[5].	1. Frequency of routine blood glucose monitoring. 2. DA using modified version of the Acceptance and Action Diabetes Questionnaire (AADQ). 3. Diet therapy adherence using Patient Diet Adherence in Diabetes Scale (PDAD).	DA, combined therapy with oral medication or insulin, and regular blood glucose monitoring play a crucial role in improving adherence to dietary recommendations among patients with T2DM.
4	Psychological adaptation to and acceptance of type 2 diabetes mellitus (Bertolin et al., 2015) [14].	Quasi-Experimental Study	77 diabetes patients	The mean DA score before the intervention was 24.6 (T_0), and after the intervention, it increased to 26.2 (T_{12}). This difference was statistically significant ($p < 0.0001$)[6]. DA was significantly inversely correlated with stress levels at T_0 ($r = -0.47$, $p < 0.00$)[7] and T_{12} ($r = -0.49$, $p < 0.00$)[7], as well as with glycemic control at T_0 ($r = -0.23$, $p = 0.03$)[7] and T12 ($r = -0.36$, $p = 0.00$)[7].	1. Intervention group treatment: Diabetes Conversation Maps. 2. DA using Acceptance of Disease Scale. 3. Stress levels using Perceived Stress Scale. 4. Glycemic control (HbA1c testing).	DA among T2DM patients improved after receiving education interventions based on the cognitive-behavioral model (Diabetes Conversation Maps). Higher DA is associated with reduced stress levels and lower HbA1c levels.

[1] Kendall's Tau Correlation Test; [2] Pearson Correlation Test; [3] Repeated Measures ANOVA; [4] Linear Regression Analysis; [5] Goodman Mediation Test; [6] Wilcoxon Comparison Test; [7] Spearman Correlation Test; T_0 Month 0 (Pre-Intervention); T_{12} Month 12 (Post-Intervention).

Table 1. Summary of Analysis of Articles Obtained *(Continued)*

No	Title, Author, and Year of Publication	Study Design	Samples	Results	Indicators/Measures	Suggestions
5	Analysis of the Impact of Disease Acceptance, Demographic, and Clinical Variables on Adherence to Treatment Recommendations in Elderly T2DM Patients (Bonikowska et al., 2021) [25].	Cross Sectional Study	200 diabetes patients	DA significantly affects treatment adherence (p = 0.002, OR = 0.903, 95% CI = 0.846–0.963)[1]. DA is positively correlated with health control (r = 0.186, p = 0.009)[2] and glycemic control (r = 0.201, p = 0.004)[2]. Non-adherent patients tend to be older (Mdn = 69 years, p = 0.016)[3] and consume more diabetes tablets per day (Mdn = 2 tablets, p = 0.031)[3].	6. DA using adapted version of the Acceptance of Illness Scale (AIS). 7. Self-care using adapted version of the Self-Care of Diabetes Inventory (SCODI). 8. Treatment adherence using Adherence in Chronic Diseases Scale (ACDS). 9. Demographic and clinical factors.	Improving DA is essential to optimize treatment adherence, including health control and glycemic control. Older patients with T2DM are recommended to receive psychological and behavioral interventions to enhance their DA.
6	Assessment of diabetes acceptance can help identify patients with ineffective diabetes self-care and poor diabetes control (Schmitt et al., 2014) [16].	Cross Sectional Study	320 diabetes patients	Diabetes non-acceptance is positively correlated with Diabetes Distress (DD) (r = 0.53)[4], depression (r = 0.36)[4], HbA1c levels (r = 0.31)[4], and ineffective Coping Strategies (CS) such as depressive coping (r = 0.43)[4], distraction (r = 0.38)[4], and minimizing problems (r = 0.51)[4]. Conversely, diabetes non-acceptance is negatively correlated with effective CS such as active coping (r = -0.37)[4] and adherence (r = -0.29)[4], self-management (SM) (r = -0.43)[4], and treatment satisfaction (r = -0.38)[4]. DD and depression show a stronger association with QoL (Z = 2.519–7.061, p < 0.05–0.001)[5], whereas diabetes non-acceptance demonstrates a stronger relationship with SM (Z = 2.240–3.795, p < 0.05–0.01)[5] and HbA1c levels (Z = 3.500–3.931, p < 0.01–0.001)[5] compared to DD and depression.	1. DA using Acceptance and Action Diabetes Questionnaire (AADQ). 2. Self-management using Summary of Diabetes Self-Care Activities Measure. 3. Glycemic control (HbA1c testing). 4. Diabetes distress using Problem Areas in Diabetes Scale (PAID). 5. Depressive mood using Center for Epidemiologic Studies Depression Scale (CES-D). 6. Coping strategies using Freiburg Questionnaire of Coping with Illness. 7. Quality of life (QoL) using Short Form-36 Health Questionnaire.	Diabetes non-acceptance is strongly associated with suboptimal self-care and poor glycemic control. Diabetes distress and depressive symptoms are more closely linked to a decline in patients' quality of life. Enhanced screening for DA and tailored psychological interventions are essential for every patient with T2DM.
7	Improving diabetes self-management through acceptance, mindfulness, and values: A randomized controlled trial. (Gregg et al., 2007) [7].	Randomized Control Trial	81 diabetes patients	The Acceptance and Commitment Therapy (ACT) intervention group showed significant and moderate effects in improving diabetes control ($F(1,78) = 7.14$, $p = 0.009$, partial $\eta^2 = 0.08$)[6]; (U = 621, z = -2.61, p = 0.009)[3], and in improving self-management ($F(1,60) = 4.29$, $p = 0.043$, partial $\eta^2 = 0.07$)[6] compared to the control group. ACT didn't show significant and small effects in reducing the difference in HbA1c values after intervention compared to the control group ($F(1,78) = 3.13$, $p = 0.081$, partial $\eta^2 = 0.04$)[6]. ACT significantly and had a large effect in increasing AADQ ($F(1,52) = 23.87$, $p = 0.011$, partial $\eta^2 = 0.12$)[6]. There was no significant difference between the two groups regarding diabetes knowledge ($F(1,70) = 2.06$, $p = 0.16$, partial $\eta^2 = 0.03$)[6]. Both groups reported similar therapy satisfaction with the interventions received ($t(42) = 0.42$, $p = 0.68$)[7].	1. Intervention group treatment: Diabetes education and Acceptance and Commitment Therapy (ACT). 2. Control group treatment: Diabetes education. 3. Glycemic control (HbA1c testing). 4. Self-management using Summary of Diabetes Self-Care Activities-Revised Scale (SDSCA). 5. Understanding of diabetes and therapy satisfaction using Diabetes Care Profile (DCP). 6. DA using Acceptance and Action Diabetes Questionnaire (AADQ)	ACT is more effective in improving diabetes control, self-management, and emotional acceptance towards diabetes. The implementation of acceptance and mindfulness behaviors in diabetes management can enhance treatment outcomes through their impact on coping strategies and self-management.

[1] Logistic Regression Analysis; [2] Spearman Correlation Test; [3] Mann-Whitney U Test; [4] Pearson Correlation Test; [5] Steiger's Z-Test Correlation Analyses; [6] Analysis of Covariance (ANCOVA); [7] Independent Samples T-Test.

Table 1. Summary of Analysis of Articles Obtained *(Continued)*

No	Title, Author, and Year of Publication	Study Design	Samples	Results	Indicators/Measures	Suggestions
8	Coping with type-2 diabetes: the role of sense of coherence compared with active management. (Sandén-Eriksson, 2000) [17].	Cross Sectional Study	88 diabetes patients	No direct relationship was found between SOC-13 scores and HbA1c levels. However, self-assessed worries and self-assessed health were significantly associated with SOC-13 scores ($p < 0.001$)[1] and HbA1c levels ($p < 0.02$)[1]. Self-assessed health served as a mediator between higher SOC-13 scores and lower HbA1c levels. Active management and emotional DA were significantly positively associated with HbA1c control ($p < 0.001$)[2].	1. Sense of Coherence (SOC) using the SOC-13 Scale. 2. Active management, DA, and self-assessed health measured using a custom questionnaire developed by the authors. 3. Glycemic control (HbA1c testing).	Patients who self-assess their health as better have higher SOC scores and lower HbA1c levels. Patients with high active management and high emotional acceptance toward diabetes are associated with better glycemic control. Patients who are passive and have low DA levels require additional support and attention from healthcare centers.
9	The Effectiveness of Acceptance-based Emotion Regulation Group Therapy on Diabetes Control Scale in Patients with Type 2 Diabetes: A Simple Randomized Controlled Study (Hajati et al., 2021) [21].	Randomized Control Trial	33 diabetes patients	The intervention group showed a significant reduction in HbA1c compared to the control group ($P = 0.0001$, $F = 17.52$)[3]. The change in HbA1c was predicted to be 40% ($\eta^2 = 0.40$). The intervention group also showed significant improvement in self-care activities ($P = 0.009$, $F = 8.44$, $\eta^2 = 0.20$)[3] and quality of life ($P = 0.02$, $F = 2.81$, $\eta^2 = 0.23$)[3] compared to the control group. There was an immediate improvement in glycemic control, self-care, and quality of life following the therapy intervention ($P \leq 0.001$)[4]. Positive effects for all three indicators remained stable for up to 6 months with no significant decline in HbA1c ($P = 0.17$)[4] and quality of life ($P = 0.27$)[4].	1. Intervention group treatment: Acceptance-based Emotion Regulation Group Therapy, consisting of Acceptance and Commitment Therapy (ACT), dialectical behavior therapy, and emotion-centered therapy. 2. Control group treatment: No intervention. 3. Glycemic control (HbA1c testing). 4. Self-care using Summary of Diabetes Self-care Activities (SDSCA). 5. Quality of life using Diabetes Dependent Quality of Life. 6. Mental disorder screening using Structured Clinical Interview DSM-V for Mental Disorders.	Acceptance-based Emotion Regulation Group Therapy can improve self-care, quality of life, and glycemic control (HbA1c) in patients with T2DM, with effects that remain stable for up to 6 months after the intervention. This therapy serves as a complementary intervention alongside medical treatment, effectively enhancing glycemic control and emotional well-being in T2DM patients.
10	Self-care activities and glycated haemoglobin in Iranian patients with type 2 diabetes: can coping styles and social support have a buffering role? (Shayeghian et al., 2014) [26].	Cross Sectional Study	100 diabetes patients	HbA1c is negatively correlated with self-care ($r = -0.63$, $p < 0.01$)[5], effective coping ($r = -0.50$, $p < 0.01$)[5], and social support ($r = -0.48$, $p < 0.01$)[5]. HbA1c is positively correlated with ineffective coping ($r = 0.24$, $p < 0.05$)[5]. Self-care ($\beta = -0.61$, $p < 0.001$)[6] significantly predicts HbA1c at the initial stage, but the effect diminishes after adding coping style and social support ($\beta = -0.51$, $p < 0.05$)[6]. Effective coping ($\beta = -0.52$, $p = 0.05$)[6] and social support ($\beta = -0.28$, $p = 0.01$)[6] are negatively associated with HbA1c, while ineffective coping ($\beta = 0.30$, $p = 0.14$)[6] is positively associated, though not significant. The interaction between self-care and social support ($\beta = -0.41$, $p = 0.01$)[6] has a significant effect (the effect of self-care on HbA1c is stronger in patients with low to moderate social support).	1. Self-care using Summary of Diabetes Self-Care Activities (SDSCA). 2. Coping style using The Brief COPE questionnaire. 3. Social support using Multidimensional Scale of Perceived Social Support. 4. Glycemic control (HbA1c testing).	Psychosocial factors in patients with T2DM, such as coping styles (planning, positive reframing, and DA) and social support, require greater attention in the context of diabetes care (self-care and HbA1c control).

[1] One-Way ANOVA; [2] Student's T-test; [3] Mixed-design ANOVA; [4] Bonferroni test; [5] Pearson Correlation Test; [6] Multiple Regression Analysis.

Table 1. Summary of Analysis of Articles Obtained *(Continued)*

No	Title, Author, and Year of Publication	Study Design	Samples	Results	Indicators/Measures	Suggestions
11	The Effect of a Diabetes-Specific Cognitive Behavioral Treatment Program (DIAMOS) for Patients with Diabetes and Subclinical Depression: Results of a Randomized Controlled Trial (Hermanns et al., 2015) [23].	Randomized Control Trial	214 diabetes patients	Depressive symptoms are significantly associated with diabetes distress (CES-D correlates with PAID (r = 0.43) and DDS (r = 0.38), and PHQ-9 correlates with PAID (r = 0.51) and DDS (r = 0.46))[1]. DIAMOS reduced CES-D scores more significantly (7.4 points) compared to standard education (2.7 points) (P = 0.021)[2] and reduced PHQ-9 scores more significantly (3.3 points) compared to standard education (1.2 points) (P = 0.023)[2]. The incidence of severe depression decreased by 37% in the DIAMOS group (10.8% vs. 22.7%, P = 0.030), with an adjusted OR of 0.63 (95% CI: 0.42–0.96, P = 0.028)[3]. DIAMOS increased WHO-5 scores by 4.5 points (P < 0.001)[2]. DA and treatment satisfaction increased after the intervention in both groups, but no significant difference was observed (P = 0.098)[2]. DIAMOS resulted in higher DA in T2DM patients compared to T1DM patients (P = 0.002)[2].	1. Intervention group treatment: Diabetes Motivation Strengthening (DIAMOS). 2. Control group treatment: Standard diabetes education. 3. Depressive symptoms using Center for Epidemiologic Studies Depression (CES-D) and Patient Health Questionnaire-9 (PHQ-9). 4. Diabetes distress using Diabetes Distress Scale (DDS) and Problem Areas in Diabetes (PAID). 5. Psychological well-being using WHO-5 Well-Being Index. 6. Self-care behavior using Summary of Diabetes Self-Care Activities Measure (SDSCA). 7. Quality of life using EuroQol (EQ-5D). 8. DA using Acceptance and Action Diabetes Questionnaire (AADQ). 9. Clinical data using medical records.	The DIAMOS program significantly reduced depressive symptoms and the incidence of severe depression, improved quality of life, and strengthened DA, particularly in patients with T2DM. DIAMOS is recommended as an adjunctive intervention to support mental health and quality of life in diabetes patients.
12	Relationship with Glycemic Control and Acceptance of Illness In Type 2 Diabetic Individuals (Yilmaz et al., 2019) [15].	Cross Sectional Study	156 diabetes patients	Patients with T2DM have a moderate level of DA (mean = 25.01 ± 6.20; range 8–40). DA was found to be a significant predictor of HbA1c levels (R = 0.25, R^2 = 0.06, F = 10.846, p = 0.001)[4], although its effect was relatively small (6%) of the total variance in HbA1c. Younger patients (aged 36–64 years), males, those with primary or secondary education, and those without other chronic diseases tend to have higher levels of DA.	1. DA using Disease acceptance scale. 2. Glycemic control (HbA1c testing).	DA has been shown to influence glycemic control (HbA1c) in patients with T2DM. Psychosocial interventions that support DA may be considered to help improve glycemic control.
13	A brief psychological intervention to improve adherence in type 2 diabetes (Fall et al., 2013) [27].	Randomized Control Trial	80 diabetes patients	The threat group had lower therapy adherence compared to the mastery group (P < 0.01)[5] and the negative emotion control group (P < 0.05)[5]. The mastery group had higher therapy adherence compared to the positive emotion control group (P = 0.087)[5]. The threat group exhibited less avoidance than the mastery group and the negative emotion group (P < 0.05)[5]. The mastery group had higher DA and a more positive attitude toward therapy. No significant differences in therapy motivation were observed among all groups.	1. Intervention group treatment: Activating diabetes-related experiences with mastery or threat perceptions. 2. Control group treatment: Activating non-diabetes-related experiences with positive and negative emotions. 3. Therapy adherence using Medication Adherence Questionnaire (MAQ). 4. DA using Acceptance and Action Diabetes Questionnaire (AADQ). 5. Therapy motivation: Treatment Self-Regulation Questionnaire (TSRQ).	Threat perception regarding diabetes reduces adherence and DA, while mastery perception enhances adherence and DA, providing a better sense of control. Psychological interventions based on perception are effective approaches to improve diabetes management.

[1] Pearson Correlation Test; [2] Analysis of Covariance (ANCOVA); [3] Logistic Regression Analysis; [4] Linear Regression Analysis and Partial t-Test; [5] One-Way ANOVA.

Table 1. Summary of Analysis of Articles Obtained *(Continued)*

No	Title, Author, and Year of Publication	Study Design	Samples	Results	Indicators/Measures	Suggestions
14	Are We Doing It Right? Self-Care Support for Patients with Type 2 Diabetes In Urban Areas In Malaysia (Saidi et al., 2019) [28].	*Single Embedded Qualitative Case Study*	12 diabetes educators	Self-care support practices are still dominated by traditional paternalistic approaches focusing on information delivery, although the importance of psychological support and individual counseling is also recognized. Key challenges include low DA and patient interest in self-care, high workloads limiting educators' ability to provide optimal support, and a fragmented healthcare system leading to poor coordination between primary and secondary care. This issue is exacerbated by inadequate relevant training and resource shortages, making the role of diabetes educators less effective in improving patient diabetes management quality.	1. Clinical experience of respondents in managing DMT2 patients. 2. Current practices related to self-care support. 3. Perceptions and satisfaction with their role as diabetes educators	Challenges in self-care education for patients are related to the dominant paternalistic approach, low DA, and limitations in time and resources. DA plays a role in self-care. There is a need for diabetes educator training, a more humanistic approach, improved collaboration between primary and secondary care, and increased DA in DMT2 patients.
15	Common Sense Model of Self-Regulation for Understanding Adherence and Quality of Life In Type 2 Diabetes with Structural Equation Modeling (Fall et al., 2021) [29].	Cross Sectional Study	253 diabetes patients	The Common Sense Model (CSM) tested latent variables, including illness perceptions, divided into perceived control and threat perception ($\chi^2(8) = 10.18$; RMSEA = 0.03; CFI = 0.99)[1], coping strategies, including vigilant coping, avoidance, and seeking social support ($\chi^2(74) = 210$; RMSEA = 0.85; CFI = 0.66)[1]—with the social support seeking strategy excluded due to insignificance—and quality of life, based on general and specific quality of life ($\chi^2(2) = 3.52$; RMSEA = 0.055; CFI = 0.99)[1]. Model 1 (the indirect relationship from perceptions to health outcomes through coping strategies) showed adequate data fit ($\chi^2/df = 2.64$; RMSEA = 0.08)[1], but Model 2 (direct and indirect relationships) showed a better fit ($\chi^2/df = 2.55$; RMSEA = 0.08)[1]. This model holds identically for patients on oral therapy and insulin, both in factor configuration (configural invariance, $\chi^2/df = 2.26$; RMSEA = 0.057)[1] and the strength of relationships (metric invariance, $\chi^2/df = 2.21$; RMSEA = 0.055)[1].	1. Illness perception using Brief-Illness Perception Questionnaire (B-IPQ). 2. Coping using The Brief-COPE. 3. Therapy beliefs using Beliefs about Medicines Questionnaire (BMQ). 4. Adherence using French Scale Therapeutic Adherence. 5. Quality of life using SF-12 Health Survey and Diabetic Quality of Life (DQOL). 6. Glycemic control using (HbA1c testing).	Illness perception and coping strategies play a crucial role in influencing quality of life and medication adherence in patients with DMT2, both directly and indirectly. Positive perceptions contribute to adaptive coping strategies such as DA, which help patients confront DMT2 without avoiding disease-related thoughts and emotions. This model is relevant for patients undergoing various types of therapy.
16	Coping Skills and Glycaemic Control: The Mediating Role of Diabetes Distress (Lau et al., 2021) [30].	Cross Sectional Study	473 diabetes patients	HbA1c is positively correlated with maladaptive coping (MC) ($r = 0.12$)[2], diabetes distress (DD) ($r = 0.16$)[2], and disease duration ($r = 0.30$)[2]. Adaptive coping (AC) is negatively correlated with DD ($r = -0.11$)[2] and systolic blood pressure (SBP) ($r = -0.12$)[2], and positively correlated with MC ($r = 0.42$)[2]. MC is positively correlated with DD ($r = 0.26$)[2] and negatively with SBP ($r = 0.10$)[2]. Model 1 (AC) is negatively associated with DD ($b = -0.29$)[3]. DD is positively associated with HbA1c ($b = 0.03$), but AC is not directly related to HbA1c. Insulin therapy weakens the relationship between DD and HbA1c ($b = -0.04$)[3]. Model 2 (MC) is positively associated with DD ($b = 1.82$)[3]. DD and retinopathy are positively associated with HbA1c ($b = 0.04$ and $b = 0.36$)[3]. Insulin therapy weakens the relationship between DD and HbA1c ($b = -0.04$)[3] and the indirect effect of MC on HbA1c ($b = -0.07$)[3].	1. Coping strategies using The Brief-COPE. 2. Diabetes distress using Chinese version of the Diabetes Distress Scale (CDDS). 3. Demographic and clinical parameters. 4. Glycemic control (HbA1c testing).	Psychological factors (coping strategies) and disease duration influence glycemic control in patients with type 2 diabetes (T2D). Adaptive coping strategies, such as DA, play a crucial role in reducing distress and addressing blood pressure issues. Interventions aimed at reducing distress, enhancing DA, and promoting adaptive coping are essential to improving the quality of life and glycemic control in T2D patients.

[1] Structural Equation Modeling (SEM) Analysis; [2] Pearson Correlation Test; [3] PROCESS v3.4 Macro Mediation Moderation Analysis.

Table 1. Summary of Analysis of Articles Obtained *(Continued)*

No	Title, Author, and Year of Publication	Study Design	Samples	Results	Indicators/Measures	Suggestions
17	Ethnic and Gender Differences In Psychosocial Factors, Glycemic Control, and Quality of Life Among Adult Type 2 Diabetic Patients (Misra & Lager, 2009) [20].	Cross Sectional Study	180 diabetes patients	In terms of self-management behavior, Hispanic patients reported the greatest difficulty with blood glucose monitoring, Non-Hispanic White patients had the greatest difficulty with diet management, while African American patients struggled most with physical activity. Regarding quality of life, Hispanic patients felt more restricted by diet ($\eta^2 = 0.12$)[1] and more worried about the future ($P = 0.01$)[1]. Ethnic differences were also observed in disease knowledge and social support, with Non-Hispanic White patients having higher disease knowledge and Asian-Indian patients reporting higher social support. Furthermore, difficulties in self-management behaviors were associated with disease acceptance: patients with a more positive view of the disease reported less difficulty with physical activity ($r = -0.26$, $P < 0.01$)[2] and medical records ($r = -0.25$, $P < 0.01$)[2]. Gender differences were also noted, with women reporting more difficulty in self-monitoring blood glucose and diet ($P = 0.03$ and 0.05)[1], as well as more social support; however, glycemic control did not differ between men and women.	1. Ethnicity, gender, and diabetes knowledge. 2. DA using Ideas About Diabetes (IAD-R). 3. Social support using Personal Resource Questionnaire-Part II (PRQ85). 4. Self-management difficulties using Diabetes Quality of Life Impact Profile (DQIP) 5. Glycemic control (HbA1c testing). 6. Quality of life using Diabetes Specific Quality of Life Scale (DSQOL).	There is ethnic and gender variation in social support, DA, quality of life, and adherence behavior. Diabetes care outcomes can be improved if healthcare practitioners consider this diversity when tailoring diabetes education and supportive care to enhance glycemic control and quality of life in patients with DMT2.
18	Measurement of Psychological Adjustment to Diabetes with The Diabetes Acceptance Scale (Schmitt dkk., 2018) [18].	Cross Sectional Study	606 diabetes patients	The internal reliability of the DAS is very high (Cronbach's $\alpha = 0.96$ for the total sample, 0.97 for T1DM, and 0.95 for T2DM). Factor analysis results support the validity of this tool, with good fit for the data (SRMR = 0.02; TLI = 0.99; CFI > 0.99; RMSEA = 0.03)[3]. DA is positively correlated with coping style, quality of life, self-management adherence, and glycemic control ($P < 0.001$)[4]. DA is negatively correlated with diabetes distress and associated with fewer depression symptoms ($P < 0.001$)[4]. Low DA is associated with four times greater odds of having HbA1c >9.0% (OR = 4.3, 95% CI = 2.7 – 6.7)[4], twice the odds of chronic complications (OR = 2.4, 95% CI = 1.5 – 3.7)[4], and twice the likelihood of acute complications (OR = 2.3, 95% CI = 1.2 – 4.4)[4] for hypoglycemia and (OR = 2.6, 95% CI = 1.2 – 5.3)[4] for cardiovascular events. The correlation of DA with self-management activity, HbA1c, diabetes complications, and psychological variables was consistently higher and significant for DAS compared to AADQ (all $P \leq 0.044$)[5].	1. DA using Diabetes Acceptance Scale (DAS) and Acceptance and Action Diabetes Questionnaire (AADQ). 2. Coping with diabetes using Freiburg Questionnaire of Coping with Illness (FQCI). 3. Diabetes distress using Problem Areas in Diabetes Scale-5 (PAID-5). 4. Self-management using Diabetes Self-Management Questionnaire (DSMQ). 5. Emotional well-being using WHO Well-Being Index (WHO-5). 6. Quality of life using EuroQol five-dimension health questionnaire (EQ-5D). 7. Depression symptoms using Patient Health Questionnaire-9 (PHQ-9). 8. Glycemic control (HbA1c testing). 9. Diabetes complications	The DAS demonstrates very high internal reliability and good validity in measuring the level of disease acceptance in diabetes patients. Low DA is associated with poor glycemic control, chronic complications, and episodes of acute complications. The DAS is also superior to the AADQ in measuring diabetes acceptance.

[1] Analysis of Covariance (ANCOVA); [2] Pearson Correlation Test; [3] Confirmatory Factor Analysis (CFA); [4] Linear Regression Analysis; [5] Steiger's Z-Test.

Table 1. Summary of Analysis of Articles Obtained *(Continued)*

No	Title, Author, and Year of Publication	Study Design	Samples	Results	Indicators/Measures	Suggestions
19	Predictors of Quality of Life Among Adults With Type 2 Diabetes Mellitus (Misra & Lager, 2008) [31].	Cross Sectional Study	180 diabetes patients	High social support (ß = -0.28)[1] and higher DA (ß = -0.41)[1] predict lower perceptions of difficulty in self-management behaviors (SCBs). Diabetes knowledge does not directly affect DA or quality of life (P > 0.05)[1], but it helps reduce difficulties in SCBs. Quality of life is significantly related to DA, social support, and SCBs, but not to knowledge. In DA, the outlook subscale shows a negative correlation with difficulty in physical activity (r = -0.25, P < 0.01)[1], while the inhibitors subscale is positively correlated with medication adherence (r = 0.23, P < 0.01)[1]. SCBs affect quality of life (ß = 0.39)[1] and function as a mediator linking the relationship between DA, social support, and quality of life (TLI = 0.97, CFI = 0.97, NFI = 0.96, RMSEA = 0.08, v2 = 272, P < 0.001)[1].	1. Diabetes knowledge. 2. Social support using Personal Resource Questionnaire—Part II (PRQ85). 3. DA using Ideas About Diabetes—Revised (IAD-R). 4. Self-management difficulties using Diabetes Quality of Life Impact Profile (DQIP). 5. Quality of life using Diabetes Specific Quality of Life Scale (DSQOL).	Social support and DA play a crucial role in improving the quality of life in patients with T2DM by reducing difficulties in self-management behaviors (SCBs). Diabetes knowledge indirectly helps to reduce these difficulties. DA can be a target for interventions by enhancing motivation and creating a supportive environment for patients.

[1] Structural Equation Modeling (SEM) Analysis.

3.3. The Role of Psychological Interventions in Improving Disease Acceptance

Several studies suggest that psychological interventions can enhance DA, which ultimately improves glycemic control. Psychological interventions, such as Acceptance and Commitment Therapy (ACT), have been shown to increase DA, self-management, and glycemic control in patients with T2DM [7], [21]. ACT has proven effective in helping patients accept their condition, reduce distress, and improve HbA1c control, with the positive effects lasting for months after the intervention [22]. Patients who received ACT interventions demonstrated better coping strategies, self-management, and optimal glycemic control.

Another intervention, the Diabetes Motivation Strengthening (DIAMOS) program, has also been found to improve DA, reduce major depression risk, and lower HbA1c levels. DIAMOS helped patients develop more adaptive coping strategies, which led to an enhanced quality of life [23]. Furthermore, cognitive-behavioral educational programs, such as Diabetes Conversation Maps, were shown to improve DA and reduce stress, which in turn was linked to lower HbA1c levels [14]. These findings emphasize that community-based strategies can be cost-effective approaches to improving glycemic control through DA.

The implementation of psychological interventions requires an integrated approach, addressing both the medical and psychological aspects of the patient simultaneously. Acceptance-based education can be incorporated into diabetes education programs in primary and secondary healthcare settings to achieve more effective outcomes in increasing DA.

3.4. Psychosocial Factors as Moderation of the Relationship between Disease Acceptance and Glycemic Control

Psychosocial factors such as coping styles, stress levels, social support, and depression significantly influence the relationship between DA and treatment adherence, ultimately affecting glycemic control. Unregulated psychological responses like denial, anger, guilt, depression, and distress can undermine glycemic control, reduce therapy adherence, and increase the risk of complications [9].

Adaptive coping strategies enhance the positive effects of DA on glycemic control. Emotional acceptance as an adaptive coping mechanism strengthens disease management, while avoidance—a maladaptive coping style—can diminish its effectiveness [22], [30]. Higher DA correlates with fewer depressive symptoms and better integration of diabetes management into daily life [24].

Social support plays a critical role in moderating the relationship between self-care and glycemic control. Strong social networks improve self-care adherence and glycemic outcomes even among patients with low DA [20]. Coordinated support from healthcare providers further amplifies these benefits [26]. The integration of primary and secondary care services is essential to effectively support patients with diabetes [28]. These findings underline the importance of addressing psychosocial factors in diabetes care to optimize DA and improve treatment outcomes.

The interplay between psychosocial factors is crucial in understanding how DA influences clinical outcomes. Research indicates that other psychosocial factors such as social support and coping styles are tightly interrelated with DA, as described in the behavioral models introduced in the background. Adaptive coping strategies, when combined with robust social support, can enhance a patient's acceptance of their condition, leading to reduced stress levels and improved overall well-being. These positive psychological changes, in turn, contribute to better glycemic control and improved quality of life among patients with T2DM.

3.5. Variability Based on Demographic Factors

Demographic factors such as age, gender, and education level significantly influence DA. Patients with higher DA are more likely to adhere to medical recommendations. Older adults with low acceptance levels often struggle with treatment adherence, especially when managing a higher number of daily medications required for glycemic control [25].

Education level also plays a critical role in the relationship between DA and diabetes management. Patients with lower educational attainment tend to have reduced DA, which negatively impacts their treatment adherence. This highlights the importance of tailoring educational approaches to match the patient's comprehension level [15].

Age is another important variable in diabetes care. Younger patients generally demonstrate higher DA and are more proactive in self-management. This finding aligns with the challenges faced by geriatric patients with lower acceptance levels, indicating the need for age-specific strategies to enhance DA among patients with T2DM [23], [25].

3.6. The Role of Social Support and Health System Dynamics

Social support from family, friends, and the community significantly influences DA and self-management in patients with T2DM. Strong social support has been linked to improved quality of life and greater motivation to adhere to care routines [20], [31].

However, challenges within the healthcare system often hinder optimal DA. A paternalistic approach in diabetes education can reduce patient engagement in self-management. Additionally, poor coordination between primary and secondary healthcare services

creates inconsistencies in patient support [28]. To address these barriers, healthcare providers must adopt a more empathetic and patient-centered approach. Enhanced collaboration across healthcare levels is essential to fostering an environment conducive to better DA and self-management. Individualized care, particularly for elderly patients, has been shown to improve acceptance and adherence to treatment [25].

3.7. Study Limitations and Clinical Implications

Most of the studies reviewed utilize cross-sectional designs, which limit their ability to establish causal relationships between DA and glycemic control. Additionally, small sample sizes in some studies further restrict the generalizability of their findings. For example, there is study with only 33 T2DM patients, which may not represent the broader population [21]. Similarly, the other study included merely 12 diabetes educators in their study, which further restricts the generalizability of the findings [28]. Future research should consider more rigorous methodologies, such as randomized controlled trials (RCTs), which offer greater objectivity and reduce potential biases through an experimental design. In addition, increasing sample sizes and implementing longer follow-up periods would further validate the observed associations. These improvements in study design will help build more robust evidence for the role of DA in T2DM management and ultimately support the development of effective psychosocial interventions.

Another limitation is the lack of longitudinal analyses to assess the long-term effects of DA on clinical outcomes. While some studies have shown the potential benefits of acceptance-based psychological therapies, further research is needed to uncover the underlying mechanisms. From a clinical perspective, integrating psychological interventions into T2DM management is crucial. Tools such as the Diabetes Acceptance Scale (DAS) can help identify patients requiring additional support. Tailored programs based on acceptance, psychological education, and approaches that consider cultural, gender, and individual differences can improve glycemic control and quality of life.

Furthermore, collaboration between primary and secondary healthcare services is essential to create an environment that supports DA and effective self-management, ultimately enhancing the overall quality of diabetes care.

4. Conclusion

The results of this systematic review indicate that DA is significantly associated with glycemic control in patients with T2DM. Higher levels of DA are linked to better self-management, optimal glycemic control, and reduced psychosocial symptoms such as stress and depression. Psychological interventions, including Acceptance and Commitment Therapy (ACT), Diabetes Conversational Maps, Diabetes Motivation Strengthening (DIAMOS), and acceptance-based group education programs, have been shown to effectively enhance DA and support holistic diabetes management. However, demographic factors such as age, education level, and social support also influence the effectiveness of glycemic control, and the predominance of cross-sectional studies limits the ability to draw deeper causal conclusions.

To support more holistic T2DM management, future research should prioritize longitudinal studies with larger samples and experimental designs, such as randomized controlled trials (RCTs), to evaluate the long-term impact of DA on glycemic control and quality of life. In clinical practice, integrating acceptance-based psychological interventions into primary healthcare services, along with community-based educational programs that involve family members, is crucial—especially for older patients and those with lower educational levels. These targeted interventions not only have the potential to enhance patient outcomes but also offer significant implications for healthcare providers and policymakers, particularly in low-income regions with high T2DM prevalence. Strengthening healthcare provider training and improving access to culturally tailored psychological and community-based programs are essential steps to ensure these interventions are effectively implemented and sustained across diverse settings.

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