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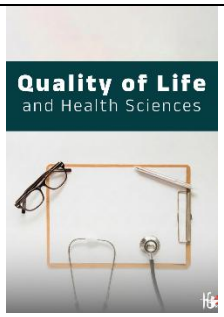

Illness Perception and Health-Related Quality of Life Among Patients With Type 2 Diabetes: The Mediating Role of Diabetes Distress and the Moderating Role of Perceived Social Support

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A B S T R A C T

Objective: This study aimed to examine the relationship between illness perception and health-related quality of life among patients with type 2 diabetes, with diabetes distress as a mediator and perceived social support as a moderator.

Methods and Materials: This cross-sectional descriptive-correlational study was conducted among 384 adult patients with type 2 diabetes receiving outpatient care in Georgia. Participants were selected through convenience sampling from diabetes and endocrinology clinics in Tbilisi, Kutaisi, and Batumi. Data were collected using a demographic and clinical information form, the Brief Illness Perception Questionnaire, the Diabetes Distress Scale, the Multidimensional Scale of Perceived Social Support, and the 12-Item Short Form Health Survey. Data were analyzed using SPSS version 27 and AMOS version 24. Descriptive statistics, Pearson correlation coefficients, mediation analysis, moderation analysis, and moderated mediation modeling with 5,000 bootstrap samples were used. Age, gender, duration of diabetes, and diabetes-related complications were entered as control variables.

Findings: Illness perception was positively associated with diabetes distress and negatively associated with health-related quality of life. Diabetes distress was negatively associated with health-related quality of life, while perceived social support was positively associated with health-related quality of life and negatively associated with diabetes distress. Mediation analysis showed that diabetes distress partially mediated the relationship between illness perception and health-related quality of life. Moderation analysis showed that perceived social support weakened the relationship between illness perception and diabetes distress and also reduced the negative effect of diabetes distress on health-related quality of life. The conditional indirect effect was strongest among patients with low perceived social support and weakest among those with high perceived social support.

Conclusion: The findings indicate that threatening illness perceptions reduce health-related quality of life partly by increasing diabetes distress, while perceived social support buffers this adverse psychological pathway. Integrating distress screening, illness perception modification, and social support enhancement into diabetes care may improve patients' quality of life.

Keywords: *Type 2 diabetes; illness perception; diabetes distress; health-related quality of life; perceived social support; moderated mediation.*

1. Introduction

Type 2 diabetes mellitus is a chronic metabolic condition whose consequences extend beyond glycemic indices and biomedical complications to include emotional burden, social functioning, self-management capacity, and health-related quality of life. Although contemporary diabetes care continues to emphasize glycemic control, cardiovascular risk reduction, lifestyle intervention, and prevention of complications, a growing body of evidence indicates that patient-reported outcomes are indispensable for understanding how individuals actually live with diabetes in everyday contexts. Recent clinical and behavioral literature has increasingly argued that diabetes outcomes should not be evaluated only through biochemical markers such as HbA1c, because the lived burden of diabetes includes hypoglycemia concerns, treatment complexity, fear of deterioration, limitations in daily functioning, emotional distress, and reduced life satisfaction (Powell et al., 2026). This position is consistent with recent clinical guidelines and lifestyle-focused approaches that emphasize the role of long-term behavioral change, patient engagement, and sustained self-management in the treatment and possible remission of type 2 diabetes and prediabetes (Rosenfeld et al., 2025). Therefore, understanding the psychological and social determinants of health-related quality of life among patients with type 2 diabetes is a critical priority for patient-centered diabetes care.

Health-related quality of life is a multidimensional construct reflecting perceived physical health, psychological well-being, social functioning, vitality, role performance, and the capacity to participate in meaningful daily activities. In type 2 diabetes, health-related quality of life may be affected by symptom burden, comorbid disease, complications, treatment demands, self-care behaviors, emotional distress, sleep problems, and the patient's subjective interpretation of the illness. Studies of patients with type 2 diabetes and multimorbidity have shown that poorer health-related quality of life is associated with clinical complexity, functional limitations, and chronic disease burden (Kintzoglanakis et al., 2023). Similarly, evidence from patients with obesity, hypertension, and type 2 diabetes demonstrates that multimorbidity is closely connected with diminished quality of life and broader impairment in health status (Shah et al., 2023). In older adults with type 1 and type 2 diabetes, health-related quality of life assessment has also been emphasized as a necessary component of comprehensive diabetes evaluation, particularly because aging, complications, and functional decline may interact with the burden of diabetes management (Volčanšek et al., 2023). Recent findings among older Italian outpatients with type 2 diabetes further indicate that impaired quality of life is shaped by a combination of demographic, clinical, and functional determinants, reinforcing the need to study quality of life as a complex outcome rather than a secondary clinical concern (Lamedica et al., 2025).

The importance of patient-reported outcomes in diabetes has also been reflected in methodological debates about what should be measured and how. A systematic review of patient-reported outcome measures for health-related quality of life in type 2 diabetes showed that the assessment of quality of life is heterogeneous and requires careful selection of instruments that capture both generic health status and diabetes-specific burden (Langendoen-Gort et al., 2022). A narrative review on patient-reported outcomes in diabetes similarly highlighted the need for conceptually valid, reliable, and patient-relevant measurement approaches that reflect outcomes meaningful to people living with diabetes, including emotional well-being, treatment burden, self-management challenges, and daily functioning (Terwee et al., 2023). This is especially important because patients' perceived quality of life may not always correspond directly to clinical indicators. For example, patient-reported outcomes may capture the burden of hypoglycemia, fear, and day-to-day disruption more fully than biomedical markers alone (Carlton et al., 2022). In addition, studies of metabolic medicine, metabolic surgery, dietary interventions, and pharmacological innovation show that clinical improvements should be interpreted alongside patient-reported outcomes, because interventions may affect both biological parameters and subjective functioning (Jensen et al., 2022; Kheniser et al., 2022; Kintzoglanakis et al., 2024).

Among the psychological determinants of diabetes-related adjustment, illness perception has received particular attention. Illness perception refers to the beliefs and emotional representations that individuals hold regarding the identity, causes, consequences, controllability, timeline, and emotional meaning of their illness. In type 2 diabetes, patients who perceive diabetes as more severe, threatening, uncontrollable, or emotionally overwhelming may experience lower motivation for self-care, greater distress, and poorer quality of life. Longitudinal evidence indicates that illness perceptions are associated with glycemic control in type 2 diabetes, suggesting that the way patients understand and interpret their condition may have

implications for both psychological and clinical outcomes (Alyami et al., 2021). Research on adults with type 2 diabetes has also linked illness perception with coping and self-care adherence, indicating that illness beliefs may shape how patients respond to treatment recommendations and manage daily self-care tasks (Chindankutty & Devineni, 2024). Similarly, psychological predictors of treatment adherence among patients with diabetes have been explained through information, motivation, and behavioral skills, showing that adherence is not only a function of medical instruction but also depends on beliefs, motivation, emotional readiness, and practical self-management capacity (Akbari et al., 2022).

The relevance of illness perception is not limited to type 2 diabetes and can be situated within a broader chronic illness literature. In coronary heart disease, illness perceptions and health literacy have been strongly associated with health-related quality of life, anxiety, and depression, demonstrating that illness-related beliefs are closely tied to psychological adjustment and perceived health in chronic disease populations (Jennings et al., 2022). Among adolescent kidney transplant recipients, illness perceptions and medication beliefs have also been shown to influence health-related quality of life, supporting the broader assumption that subjective illness representations matter across long-term medical conditions (Zelikovsky & Nelson, 2021). In obesity, illness representations have been examined in relation to health-related quality of life through coping strategies, suggesting that illness beliefs may influence quality of life through intermediate psychological and behavioral mechanisms (Marfu'ah et al., 2022). Qualitative findings among adolescents with type 1 diabetes and their parents further indicate that illness representations are embedded in social contexts and everyday efforts to maintain normality, highlighting that illness beliefs are shaped not only by medical facts but also by family, peer, and social expectations (Hussein et al., 2023).

Diabetes distress is another central construct in understanding health-related quality of life among patients with type 2 diabetes. Unlike general psychological distress, diabetes distress refers specifically to emotional burden, frustration, worries, interpersonal tensions, and regimen-related pressure associated with living with diabetes. It may arise from the continuous need to monitor diet, medication, glucose levels, physical activity, complications, medical appointments, and uncertainty about future health. Evidence has shown that the burden of type 2 diabetes from the patient perspective includes frustration with treatment, concerns about disease progression, and the perceived value of achieving near normoglycemia, all of which reflect the emotional and practical demands of diabetes self-management (Gelhorn et al., 2021). Missed and mistimed insulin doses further illustrate the behavioral expression of treatment burden, as medication routines can be disrupted by daily life demands, fear, forgetfulness, stigma, or emotional fatigue (Robinson et al., 2021). Psychological care guidelines for diabetes also emphasize that emotional well-being should be integrated into diabetes management because psychological difficulties can interfere with self-care, adaptation, and long-term health outcomes (Wit et al., 2022).

Recent evidence has strengthened the view that diabetes distress is closely linked to health-related quality of life. A study examining distress and health-related quality of life among people living with type 2 diabetes showed that diabetes distress may operate within complex moderated mediation pathways involving mindfulness and social support, suggesting that the distress–quality of life relationship is shaped by protective psychological and social resources (Onu & Igwe, 2024). Depression and other mental health conditions may also intensify the burden of diabetes. A prospective analysis from the Hong Kong Diabetes Register showed that comorbid depression was associated with adverse cardiovascular-renal events and mortality among individuals with type 2 diabetes while accounting for patient-reported outcomes, indicating that psychological status has both subjective and clinical significance (Yeung et al., 2024). Recent cross-sectional evidence also indicates that mental health and diabetes complications have independent associations with health-related quality of life, confirming that psychological burden and clinical disease burden can simultaneously impair perceived health status (Hermanns et al., 2026). These findings suggest that diabetes distress may be an important explanatory mechanism through which negative illness perceptions translate into poorer health-related quality of life.

Perceived social support may buffer the adverse psychological effects of illness perception and diabetes distress. Social support can include emotional encouragement, practical assistance, informational guidance, family involvement, companionship, and validation from significant others. In diabetes care, support from family members and close social networks may facilitate adherence, reduce emotional isolation, strengthen coping capacity, and improve confidence in daily self-management. Recent work on family dyad-focused diabetes

self-management intervention reflects increasing recognition that diabetes management is not solely an individual process but often occurs within family and relational systems (Hu et al., 2025). Therapeutic patient education programs have similarly emphasized individualized and group-based approaches to improve diabetes care, suggesting that social learning, group participation, and structured support may enhance patient engagement and self-management (Kuklinski et al., 2025). Person-centered diabetes care research has also shown that empowerment and diabetes-specific quality of life are interconnected, indicating that patients' perceived agency and support within care relationships are central to living well with type 2 diabetes (Potočnik et al., 2024).

The moderating role of social support is particularly important because not all patients exposed to negative illness beliefs or diabetes distress experience the same level of quality-of-life impairment. Recent research found that social support moderated the association between healthcare discrimination and quality of life among persons with type 2 diabetes, suggesting that perceived support can reduce the harmful effects of stressful social or healthcare experiences on well-being (Ekpor et al., 2025). This finding is consistent with broader evidence showing that social and psychological resources may alter the magnitude of associations between stressors and quality-of-life outcomes. In type 2 diabetes, perceived social support may weaken the pathway from threatening illness perception to diabetes distress by helping patients reinterpret illness demands, share emotional burden, and access practical assistance. It may also weaken the negative effect of diabetes distress on quality of life by providing reassurance, coping resources, and relational connection. Emerging psychosocial and stress-focused case evidence also suggests that addressing emotional stress may be relevant for patients with type 2 diabetes, although stronger empirical designs are needed to clarify the mechanisms linking stress reduction, illness beliefs, and quality of life (Bablis et al., 2024).

The health-related quality of life of people with type 2 diabetes is shaped by additional clinical and behavioral factors that provide context for the present study. In Mexican older adults with type 2 diabetes, self-care has been associated with health-related quality of life, indicating that daily behavioral management may contribute to perceived physical and psychological functioning (Cortés-Hernández et al., 2025). In individuals with uncontrolled type 2 diabetes in China, factors influencing health-related quality of life included clinical and psychosocial characteristics, supporting the need to identify modifiable determinants among patients with suboptimal disease control (Li et al., 2025). Sleep is another relevant determinant, as a systematic review on type 2 diabetes showed that sleep and quality of life are closely related, with poor sleep potentially worsening fatigue, mood, functioning, and diabetes management capacity (Laverty et al., 2023). Although evidence from lung cancer survivors is not diabetes-specific, research linking obstructive sleep apnea, dyspnea, and health-related quality of life reinforces the broader principle that symptom burden and sleep-related impairment can substantially influence patient-reported health outcomes in chronic illness populations (Kim & Oh, 2024). Socioeconomic status may also influence quality of life through multiple mediating pathways, as shown in research on maintenance hemodialysis patients, suggesting that social disadvantage can affect health-related quality of life through psychological, clinical, and functional mechanisms (Mai et al., 2023). These findings collectively support the use of multivariable and mechanism-focused models for understanding quality of life in chronic illness.

Despite growing international evidence on illness perception, diabetes distress, social support, and health-related quality of life, several gaps remain. First, many studies have examined direct associations, while fewer have tested integrated models in which diabetes distress explains the link between illness perception and quality of life and perceived social support conditions the strength of this pathway. Second, existing evidence often focuses on either clinical determinants or psychological correlates, whereas patient-centered diabetes research increasingly requires combined psychosocial models that explain why some patients remain psychologically resilient despite illness burden. Third, there is a need for evidence from diverse healthcare and cultural contexts, including Georgia, where social support structures, chronic disease management practices, family involvement, and patient beliefs may differ from those observed in other regions. In such contexts, examining the mediating role of diabetes distress and the moderating role of perceived social support can provide practical implications for psychosocial screening, diabetes education, family-based support, and quality-of-life-oriented care.

The aim of this study was to examine the relationship between illness perception and health-related quality of life among patients with type 2 diabetes in Georgia, with particular attention to the mediating role of diabetes distress and the moderating role of perceived social support.

2. Methods and Materials

2.1. Study Design and Participants

This study was conducted using a cross-sectional, descriptive-correlational design with a moderated mediation approach. The statistical population consisted of adult patients diagnosed with type 2 diabetes mellitus who were receiving outpatient care from endocrinology and diabetes clinics in Georgia. Participants were recruited from diabetes care centers and internal medicine clinics located in Tbilisi, Kutaisi, and Batumi during 2025. The final sample included 384 patients with type 2 diabetes. Eligibility criteria included being 30 years of age or older, having a confirmed medical diagnosis of type 2 diabetes for at least one year, being able to read and complete the questionnaires independently, and providing informed consent to participate in the study. Patients were excluded if they reported a diagnosis of type 1 diabetes, gestational diabetes, severe psychiatric disorder, cognitive impairment, advanced diabetes-related complications requiring hospitalization at the time of data collection, or incomplete questionnaire responses. Participants were selected through convenience sampling from eligible patients attending routine follow-up visits. Before data collection, the purpose of the study was explained to all participants, and they were assured that participation was voluntary, anonymous, and without any effect on their treatment process. Ethical principles related to confidentiality, informed consent, and the right to withdraw from the study at any time were observed throughout the research process.

2.2. Measures

Demographic and clinical information was collected using a researcher-designed form that included age, gender, marital status, educational level, employment status, duration of diabetes, type of treatment, presence of diabetes-related complications, history of hospitalization, and self-reported glycemic control status. Illness perception was assessed using the Brief Illness Perception Questionnaire developed by Broadbent, Petrie, Main, and Weinman in 2006. This instrument consists of nine items designed to evaluate patients' cognitive and emotional representations of illness. Eight items are scored on a scale from 0 to 10 and assess perceived consequences, timeline, personal control, treatment control, identity, concern, illness understanding, and emotional response. The ninth item is open-ended and asks respondents to identify the main perceived causes of their illness; however, in the present quantitative analysis, only the eight scored items were used. Higher total scores indicate a more threatening perception of diabetes. Previous studies have confirmed the validity and reliability of the Brief Illness Perception Questionnaire in patients with chronic diseases, including diabetes.

Diabetes distress was measured using the Diabetes Distress Scale developed by Polonsky and colleagues in 2005. The scale contains 17 items and evaluates emotional and behavioral distress specifically associated with living with diabetes. The Diabetes Distress Scale includes four subscales: emotional burden, physician-related distress, regimen-related distress, and interpersonal distress. Items are rated on a 6-point Likert scale ranging from 1, indicating "not a problem," to 6, indicating "a very serious problem." The mean score is calculated for the total scale and for each subscale, with higher scores reflecting greater diabetes-related distress. A mean score of 3 or higher is generally interpreted as indicating clinically meaningful diabetes distress. The psychometric properties of this instrument, including construct validity, internal consistency, and clinical sensitivity, have been confirmed in previous studies among adults with type 2 diabetes.

Perceived social support was assessed using the Multidimensional Scale of Perceived Social Support developed by Zimet, Dahlem, Zimet, and Farley in 1988. This scale consists of 12 items and measures perceived support from three sources: family, friends, and significant others. Each subscale contains four items, and responses are scored on a 7-point Likert scale ranging from 1, indicating "very strongly disagree," to 7, indicating "very strongly agree." Total scores range from 12 to 84, with higher scores representing greater perceived social support. The scale can also be interpreted through the mean score, where higher mean values reflect stronger perceived support. The Multidimensional Scale of Perceived Social Support has been widely used in health psychology research and has demonstrated acceptable validity and reliability across different cultural and clinical populations, including patients with chronic illnesses.

Health-related quality of life was measured using the 12-Item Short Form Health Survey developed by Ware, Kosinski, and Keller in 1996. The SF-12 assesses general health-related quality of life through 12 items derived from the longer SF-36 Health Survey. It evaluates eight domains of health, including physical functioning, role limitations due to physical health, bodily pain, general health, vitality, social functioning, role limitations due to emotional

problems, and mental health. Scores are summarized into two main components: the Physical Component Summary and the Mental Component Summary. Scores are transformed so that higher values indicate better perceived health-related quality of life. The SF-12 has been extensively used in studies of chronic disease populations, including individuals with type 2 diabetes, and previous research has supported its reliability, construct validity, and sensitivity for evaluating both physical and psychological dimensions of health-related quality of life.

2.3. Data Analysis

Data were analyzed using SPSS version 27 and AMOS version 24. Before conducting the main analyses, all data were screened for missing values, outliers, normality, linearity, and multicollinearity. Descriptive statistics, including mean, standard deviation, frequency, and percentage, were used to describe the demographic and clinical characteristics of the participants and the main research variables. The internal consistency of the questionnaires was examined using Cronbach's alpha coefficient. Pearson correlation coefficients were calculated to examine the bivariate relationships among illness perception, diabetes distress, perceived social support, and health-related quality of life. To test the mediating role of diabetes distress in the relationship between illness perception and health-related quality of life, mediation analysis was performed using bootstrapping procedures with 5,000 resamples. The indirect effect was considered statistically significant when the 95% bootstrap confidence interval did not include zero.

To examine the moderating role of perceived social support, interaction terms were created after mean-centering the predictor variables. Perceived social support was tested as a moderator in the relationship between illness perception and diabetes distress and in the relationship between diabetes distress and health-related quality of life. A moderated mediation model was then examined to determine whether the indirect effect of illness perception on health-related quality of life through diabetes distress varied across different levels of perceived social support. Conditional indirect effects were estimated at low, moderate, and high levels of perceived social support. Age, gender, duration of diabetes, and presence of diabetes-related complications were entered as control variables because of their potential association with quality of life and psychological adjustment in patients with diabetes. The level of statistical significance was set at $p < .05$. Model fit in the structural equation modeling analysis was evaluated using commonly accepted fit indices, including the chi-square to degrees of freedom ratio, comparative fit index, Tucker–Lewis index, root mean square error of approximation, and standardized root mean square residual.

3. Findings and Results

A total of 384 patients with type 2 diabetes participated in the study. The mean age of the participants was 58.41 years with a standard deviation of 9.76 years, and their ages ranged from 32 to 78 years. Of the participants, 206 individuals were women, representing 53.6% of the sample, and 178 individuals were men, representing 46.4%. Regarding marital status, 289 participants, equal to 75.3%, were married, while 95 participants, equal to 24.7%, were single, widowed, or divorced. In terms of educational level, 74 participants, equal to 19.3%, had primary education, 156 participants, equal to 40.6%, had secondary education, and 154 participants, equal to 40.1%, had university education. With respect to employment status, 138 participants, equal to 35.9%, were employed, 149 participants, equal to 38.8%, were retired, and 97 participants, equal to 25.3%, were unemployed or homemakers. The mean duration of diabetes was 8.72 years with a standard deviation of 5.64 years. Regarding treatment status, 205 participants, equal to 53.4%, were treated with oral glucose-lowering medications, 72 participants, equal to 18.8%, used insulin therapy, and 107 participants, equal to 27.9%, received a combined treatment regimen consisting of oral medication and insulin. Diabetes-related complications were reported by 169 participants, equal to 44.0%, while 215 participants, equal to 56.0%, reported no diagnosed diabetes-related complications. Moreover, 86 participants, equal to 22.4%, reported at least one diabetes-related hospitalization during the previous two years. These demographic and clinical characteristics indicate that the sample included a clinically relevant group of adults with established type 2 diabetes and sufficient variability in disease duration, treatment status, and complication history for examining psychological and quality-of-life outcomes.

Table 1

Descriptive statistics, reliability coefficients, and correlations among the main study variables

Variable	Mean	SD	Cronbach's alpha	1	2	3	4	5	6
Illness perception	48.62	12.37	.83	1					
Diabetes distress	2.89	0.84	.91	.56***	1				
Perceived social support	4.83	1.24	.92	-.32***	-.38***	1			
Physical component of health-related quality of life	42.31	8.72	.84	-.44***	-.50***	.36***	1		
Mental component of health-related quality of life	39.94	9.15	.86	-.49***	-.57***	.45***	.62***	1	
Total health-related quality of life	41.13	8.18	.88	-.53***	-.60***	.45***	.88***	.92***	1

As shown in Table 1, the internal consistency coefficients of all study measures were acceptable to excellent, with Cronbach's alpha values ranging from .83 for illness perception to .92 for perceived social support. These values indicate that the instruments demonstrated adequate reliability in the present sample. The mean score for illness perception showed that, on average, participants perceived type 2 diabetes as a relatively threatening and demanding chronic condition. The mean diabetes distress score was 2.89, suggesting that the sample experienced a moderate level of diabetes-related emotional burden and self-management distress. The mean perceived social support score was 4.83, indicating a moderate to relatively high level of perceived support from family, friends, and significant others. The mean scores of the physical and mental components of health-related quality of life were below the conventional normative midpoint of 50, indicating that participants experienced reduced physical and psychological health-related quality of life. The correlation analysis showed that illness perception was positively and significantly associated with diabetes distress, meaning that patients who perceived diabetes as more threatening also reported higher diabetes-related distress. Illness perception was negatively and significantly associated with the physical component, mental component, and total health-related quality of life, indicating that a more negative perception of illness was related to poorer quality of life. Diabetes distress also had strong negative correlations with all dimensions of health-related quality of life, especially the mental component. Perceived social support was negatively associated with illness perception and diabetes distress and positively associated with both physical and mental aspects of health-related quality of life. These findings provide preliminary support for the proposed conceptual model, in which illness perception is associated with poorer health-related quality of life both directly and through diabetes distress, while perceived social support may function as a protective psychosocial resource.

Table 2

Mediation model examining the indirect effect of illness perception on health-related quality of life through diabetes distress

Path	B	SE	β	t	p	95% CI
Illness perception → Diabetes distress	0.038	0.003	.56	13.21	< .001	0.032, 0.044
Diabetes distress → Health-related quality of life	-4.49	0.39	-.46	-11.54	< .001	-5.25, -3.73
Illness perception → Health-related quality of life, total effect	-0.350	0.031	-.53	-11.24	< .001	-0.411, -0.289
Illness perception → Health-related quality of life, direct effect	-0.179	0.034	-.27	-5.26	< .001	-0.246, -0.112
Illness perception → Diabetes distress → Health-related quality of life, indirect effect	-0.171	0.022	—	—	< .001	-0.217, -0.130

Table 2 presents the results of the mediation analysis examining diabetes distress as the mediating mechanism between illness perception and health-related quality of life. The path from illness perception to diabetes distress was positive and statistically significant, indicating that patients who perceived their illness as more severe, threatening, chronic, emotionally disturbing, or difficult to control experienced higher levels of diabetes-specific distress. The path from diabetes distress to health-related quality of life was negative and statistically significant, indicating that greater diabetes distress was associated with poorer health-related quality of life after controlling for illness perception and demographic and clinical covariates. The total effect of illness perception on health-related quality of life was also negative and significant, showing that a more threatening illness perception was associated with lower health-related quality of life. After diabetes distress was added to the model, the direct effect of illness perception on health-

related quality of life remained statistically significant but decreased in magnitude, indicating partial mediation. The bootstrapped indirect effect was significant because the 95% confidence interval did not include zero. This result demonstrates that diabetes distress partially explains the relationship between illness perception and health-related quality of life. In practical terms, patients who interpreted diabetes as more threatening were more likely to experience emotional and self-management distress, and this distress was associated with poorer perceived physical and mental health. The mediation model accounted for 34% of the variance in diabetes distress and 44% of the variance in total health-related quality of life, indicating that the proposed psychological pathway had substantial explanatory value.

Table 3

Moderating effects of the study model

Outcome variable	Predictor	B	SE	β	t	p	ΔR²
Diabetes distress	Illness perception	0.034	0.003	.50	12.14	< .001	
Diabetes distress	Perceived social support	-0.173	0.035	-.24	-4.94	< .001	
Diabetes distress	Illness perception × Perceived social support	-0.007	0.002	-.13	-3.31	.001	.018
Health-related quality of life	Illness perception	-0.143	0.032	-.22	-4.47	< .001	
Health-related quality of life	Diabetes distress	-4.12	0.42	-.42	-9.81	< .001	
Health-related quality of life	Perceived social support	1.52	0.31	.23	4.90	< .001	
Health-related quality of life	Diabetes distress × Perceived social support	0.76	0.26	.09	2.92	.004	.012

As presented in Table 3, perceived social support significantly moderated the relationship between illness perception and diabetes distress. The interaction between illness perception and perceived social support was negative and statistically significant, meaning that the positive association between threatening illness perception and diabetes distress was weaker among patients with higher perceived social support. This finding indicates that social support may buffer the emotional impact of negative illness beliefs. Patients who perceived diabetes as highly threatening generally experienced greater diabetes distress, but this association was less intense when patients reported stronger support from family, friends, and significant others. In addition, perceived social support significantly moderated the relationship between diabetes distress and health-related quality of life. The interaction between diabetes distress and perceived social support was positive and statistically significant. Since the main effect of diabetes distress on health-related quality of life was negative, the positive interaction coefficient indicates that higher perceived social support reduced the strength of the negative relationship between diabetes distress and quality of life. In other words, diabetes distress was most damaging to health-related quality of life among patients with low perceived social support, whereas patients with stronger perceived support appeared to be more protected against the adverse quality-of-life consequences of distress. The first moderation model explained 42% of the variance in diabetes distress, while the second moderation model explained 51% of the variance in health-related quality of life. These findings confirm that perceived social support plays a protective role at two points in the proposed model: it reduces the likelihood that negative illness perception will translate into diabetes distress, and it weakens the harmful effect of diabetes distress on health-related quality of life.

Table 4

Conditional indirect effects of the study model

Level of perceived social support	Conditional effect of illness perception on diabetes distress	Conditional effect of diabetes distress on health-related quality of life	Conditional indirect effect	Boot SE	95% bootstrap CI
Low perceived social support, -1 SD	0.043	-5.06	-0.216	0.029	-0.278, -0.165
Moderate perceived social support, Mean	0.034	-4.12	-0.140	0.018	-0.178, -0.108
High perceived social support, +1 SD	0.025	-3.18	-0.080	0.019	-0.121, -0.046
Index of moderated mediation	—	—	0.051	0.018	0.019, 0.091

Table 4 shows the conditional indirect effects of illness perception on health-related quality of life through diabetes distress at low, moderate, and high levels of perceived social support. The indirect effect was statistically significant at all three levels of perceived social support, as none of the bootstrap confidence intervals included zero. However, the magnitude of the indirect effect differed substantially across levels of perceived social support. Among patients with low perceived social support, the indirect effect was strongest, indicating that a threatening illness perception was more likely to increase diabetes distress and, through this distress, reduce health-related quality of life. At the mean level of perceived social support, the indirect effect remained significant but was smaller in magnitude. Among patients with high perceived social support, the indirect effect was still significant but became considerably weaker. The index of moderated mediation was significant, confirming that the mediating role of diabetes distress depended on the level of perceived social support. This pattern indicates that perceived social support did not completely eliminate the negative pathway from illness perception to health-related quality of life, but it substantially reduced its strength. Therefore, patients with stronger social support appeared to be less psychologically vulnerable to the adverse consequences of threatening illness beliefs and diabetes distress. These results support the moderated mediation hypothesis and demonstrate that the association between illness perception and health-related quality of life is not only explained by diabetes distress but is also conditioned by the social resources available to the patient.

Figure 1

Final moderated mediation model of illness perception, diabetes distress, perceived social support, and health-related quality of life

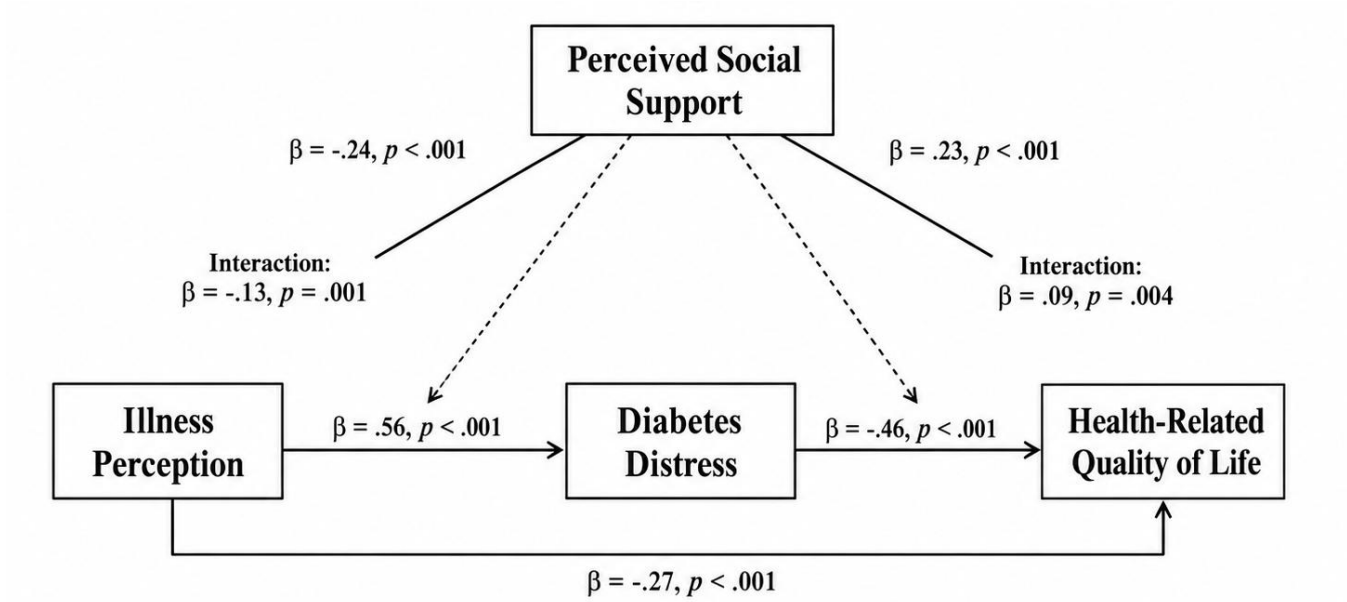

Figure 1 illustrates the final moderated mediation model supported by the findings of the study. The model shows that illness perception had a positive direct effect on diabetes distress and a negative direct effect on health-related quality of life. Diabetes distress also had a negative direct effect on health-related quality of life, confirming its mediating role. Perceived social support had a direct negative association with diabetes distress and a direct positive association with health-related quality of life. More importantly, perceived social support moderated both the path from illness perception to diabetes distress and the path from diabetes distress to health-related quality of life. The negative interaction between illness perception and perceived social support indicates that social support weakened the association between threatening illness perception and diabetes distress. The positive interaction between diabetes distress and perceived social support indicates that social support reduced the damaging effect of diabetes distress on health-related quality of life. Overall, the final model demonstrates that patients with more negative illness perceptions are at greater risk for diabetes distress and lower health-related quality of life, but this risk is less pronounced when perceived social support is high. The structural model showed acceptable fit to the data, with $\chi^2/df = 2.16$, CFI = .964, TLI = .951, RMSEA = .055, and SRMR = .041,

indicating that the proposed model adequately represented the observed relationships among the study variables.

4. Discussion

The present study examined the relationship between illness perception and health-related quality of life among patients with type 2 diabetes in Georgia, with diabetes distress tested as a mediating mechanism and perceived social support tested as a moderating factor. The findings showed that patients who perceived diabetes as more threatening, severe, emotionally disturbing, chronic, and difficult to control reported significantly higher diabetes distress and poorer health-related quality of life. Diabetes distress was also negatively associated with both physical and mental dimensions of health-related quality of life, indicating that the emotional and self-management burden of diabetes is closely connected with patients' perceived functioning and well-being. Perceived social support was positively associated with health-related quality of life and negatively associated with both illness perception and diabetes distress. The mediation analysis demonstrated that diabetes distress partially mediated the relationship between illness perception and health-related quality of life, meaning that negative illness beliefs were associated with poorer quality of life partly because they intensified diabetes-specific distress. The moderation analysis further showed that perceived social support weakened the association between illness perception and diabetes distress and also buffered the negative association between diabetes distress and health-related quality of life. Finally, the moderated mediation analysis indicated that the indirect effect of illness perception on health-related quality of life through diabetes distress was strongest among patients with low perceived social support and weakest among those with high perceived social support.

The significant negative association between threatening illness perception and health-related quality of life is consistent with the broader theoretical and empirical literature indicating that chronic illness outcomes are influenced not only by disease severity but also by how patients interpret and emotionally represent their condition. In type 2 diabetes, patients' beliefs about the consequences, controllability, duration, symptoms, and emotional meaning of the illness can influence self-care motivation, coping responses, treatment adherence, and emotional adjustment. Longitudinal evidence has shown that illness perceptions are associated with glycemic control in type 2 diabetes, suggesting that subjective beliefs about diabetes are clinically meaningful and may influence long-term disease management (Alyami et al., 2021). Similarly, research on adults with type 2 diabetes has demonstrated that illness perception is associated with coping and self-care adherence, supporting the view that patients who perceive diabetes as manageable and controllable may be more likely to engage in adaptive self-management behaviors (Chindankutty & Devineni, 2024). The present findings extend this line of evidence by showing that illness perception is also strongly linked to health-related quality of life, particularly when patients interpret diabetes as a threatening and emotionally burdensome condition.

The observed association between negative illness perception and poorer quality of life is also aligned with evidence from other chronic illness populations. In coronary heart disease, illness perceptions and health literacy have been strongly associated with health-related quality of life, anxiety, and depression, indicating that the patient's understanding and interpretation of illness are central to both psychological and functional outcomes (Jennings et al., 2022). Among adolescent kidney transplant recipients, illness perceptions and beliefs about medication were also related to health-related quality of life, demonstrating that illness representations are relevant across medical conditions that require long-term treatment and adaptation (Zelikovsky & Nelson, 2021). Research on obesity has similarly suggested that illness representations can affect health-related quality of life through coping strategies, which supports the assumption that illness beliefs may shape quality of life indirectly through psychological and behavioral pathways (Marfu'ah et al., 2022). These findings support the interpretation that patients with type 2 diabetes who view their illness as more threatening may experience reduced perceived health, lower emotional well-being, and greater disruption in daily life.

The mediating role of diabetes distress is one of the central findings of the present study. The results indicated that illness perception had both a direct effect on health-related quality of life and an indirect effect through diabetes distress. This suggests that negative illness beliefs may reduce quality of life not only by shaping patients' general appraisal of their health but also by increasing the emotional burden of living with diabetes. Diabetes distress is distinct from general distress because it reflects the specific pressures of diabetes management, including dietary restrictions, medication routines, fear of complications, frustration with glycemic control, interpersonal strain, and

feelings of failure in self-care. Prior research has emphasized that the burden of type 2 diabetes from the patient perspective includes emotional, behavioral, and treatment-related demands that are not fully captured by biomedical markers alone (Gelhorn et al., 2021). The present finding is consistent with this perspective, as patients who perceived diabetes as more threatening were more likely to experience diabetes distress, which in turn predicted poorer health-related quality of life.

This result is also compatible with studies highlighting the importance of mental health and emotional burden in diabetes outcomes. Evidence indicates that mental health and diabetes complications have independent associations with health-related quality of life, demonstrating that psychological difficulties can impair quality of life even when clinical burden is considered (Hermanns et al., 2026). A prospective analysis of individuals with type 2 diabetes further showed that comorbid depression was associated with cardiovascular-renal events and all-cause mortality while accounting for patient-reported outcomes, emphasizing that psychological status has implications for both subjective and clinical outcomes (Yeung et al., 2024). In addition, psychological care guidelines for diabetes have stressed the need to integrate emotional well-being into diabetes care because psychological problems may interfere with self-management and adaptation (Wit et al., 2022). The current findings support this position by showing that diabetes distress is not merely an accompanying emotional symptom but a meaningful explanatory mechanism linking illness perception with quality of life.

The partial rather than full mediation observed in the study is also important. Although diabetes distress explained a significant portion of the relationship between illness perception and health-related quality of life, the direct effect of illness perception remained significant after diabetes distress was included in the model. This suggests that illness perception may affect quality of life through additional mechanisms beyond diabetes distress. For example, patients who believe that diabetes has severe consequences or is poorly controllable may be less likely to engage in effective self-care, adhere to treatment, maintain healthy lifestyle behaviors, or seek timely medical support. Research on treatment adherence among patients with diabetes has shown that psychological predictors, including information, motivation, and behavioral skills, are important for understanding adherence behaviors (Akbari et al., 2022). Similarly, missed and mistimed insulin doses illustrate how treatment burden and daily-life barriers can translate into self-management difficulties (Robinson et al., 2021). Therefore, negative illness perceptions may influence quality of life through distress, but also through adherence, self-efficacy, coping, lifestyle behavior, and perceived control.

The findings also showed that perceived social support had a protective role in the proposed model. Patients with higher perceived social support reported lower diabetes distress and better health-related quality of life. This finding is consistent with recent work emphasizing that diabetes care should be person-centered, relational, and supportive rather than limited to individual responsibility and biomedical monitoring. Research on person-centered diabetes care has shown that patient empowerment is related to diabetes-specific quality of life, suggesting that patients' perceived agency and support in the care process contribute to better adjustment (Potočnik et al., 2024). Family-focused diabetes self-management interventions also reflect the growing recognition that type 2 diabetes management often occurs within social and family systems, where support can facilitate self-care and emotional adaptation (Hu et al., 2025). Similarly, individualized and group-based therapeutic patient education programs have been proposed to improve type 2 diabetes care through structured learning, peer interaction, and supportive engagement (Kuklinski et al., 2025). The present results support the relevance of such approaches by demonstrating that perceived social support is associated with better psychological and quality-of-life outcomes.

The moderating role of perceived social support provides a more nuanced explanation of these relationships. The significant interaction between illness perception and perceived social support indicated that the association between threatening illness perception and diabetes distress was weaker when perceived social support was higher. This suggests that social support may help patients reinterpret illness demands, reduce emotional isolation, and manage fears related to diabetes. The significant interaction between diabetes distress and perceived social support further indicated that distress was less damaging to health-related quality of life among patients with stronger perceived support. These findings are closely aligned with evidence that social support can moderate the association between healthcare discrimination and quality of life in persons with type 2 diabetes, suggesting that supportive relationships can buffer the negative effects of stressful experiences on well-being (Ekpor et al., 2025). They are also consistent with research showing that distress and health-related quality of

life in type 2 diabetes can be understood through moderated mediation roles of mindfulness and social support (Onu & Igwe, 2024). Thus, perceived social support appears to function not only as a direct resource but also as a conditional factor that changes the strength of psychological risk pathways.

The conditional indirect effects further clarified this protective role. The indirect effect of illness perception on health-related quality of life through diabetes distress was strongest among patients with low perceived social support, smaller at the average level of support, and weakest among patients with high perceived social support. This pattern suggests that negative illness beliefs are most harmful when patients lack sufficient emotional and practical support. Conversely, when patients perceive that family members, friends, and significant others are available and supportive, the psychological pathway from threatening illness perception to distress and reduced quality of life becomes less intense. This finding is compatible with qualitative evidence showing that illness representations are embedded in social contexts and that patients' efforts to live normally with diabetes are shaped by family and relational environments (Hussein et al., 2023). It is also consistent with broader patient-reported outcome research emphasizing that diabetes affects daily functioning, emotional life, and social participation, and that these dimensions must be considered alongside biomedical treatment goals (Powell et al., 2026; Terwee et al., 2023).

5. Conclusion

The study also contributes to the literature on health-related quality of life in type 2 diabetes by reinforcing the multidimensional nature of this outcome. Previous research has shown that quality of life in type 2 diabetes is influenced by multimorbidity, complications, sleep, self-care, clinical control, and treatment-related factors (Cortés-Hernández et al., 2025; Laverty et al., 2023; Li et al., 2025; Shah et al., 2023). The present study adds that illness perception, diabetes distress, and perceived social support should be considered alongside these clinical and behavioral determinants. Studies on metabolic medicine, surgery, lifestyle change, and pharmacological innovation have increasingly emphasized patient-important outcomes, showing that treatment evaluation should include patients' subjective functioning and quality of life rather than focusing exclusively on clinical endpoints (Kheniser et al., 2022; Kintzoglanakis et al., 2024; Rosenfeld et al., 2025). In this regard, the present findings support a patient-centered model of diabetes care in which psychological screening and social-context assessment are integrated into routine management.

6. Limitations & Suggestions

This study had several limitations that should be considered when interpreting the findings. First, the cross-sectional design prevents causal conclusions about the relationships among illness perception, diabetes distress, perceived social support, and health-related quality of life. Although the proposed model was theoretically grounded and statistically supported, longitudinal research is needed to determine temporal ordering. Second, the data were collected using self-report questionnaires, which may be affected by response bias, recall bias, social desirability, or participants' current emotional state. Third, the sample was recruited through convenience sampling from outpatient diabetes care settings in Georgia, which may limit the generalizability of the findings to patients receiving care in rural areas, hospitalized patients, or individuals with limited access to healthcare services. Fourth, although several demographic and clinical variables were controlled, other potentially relevant factors such as HbA1c level, medication adherence, diabetes knowledge, dietary behavior, physical activity, sleep quality, and comorbid psychiatric conditions were not fully incorporated into the final model.

Future research should use longitudinal and prospective designs to examine whether illness perception predicts later diabetes distress and changes in health-related quality of life over time. Experimental and intervention studies are also recommended to determine whether modifying maladaptive illness perceptions or reducing diabetes distress can lead to measurable improvements in quality of life. Future studies should include objective clinical indicators such as HbA1c, body mass index, blood pressure, complication severity, and medication regimen in order to integrate psychological and biomedical pathways. It would also be valuable to examine whether different sources of perceived social support, including family, friends, healthcare providers, and peer groups, have distinct moderating effects. In addition, future research should compare urban and rural populations, investigate culturally specific illness beliefs in Georgia, and test whether the proposed moderated mediation model differs by age, gender, disease duration, treatment type, socioeconomic status, and presence of diabetes-related complications.

The findings suggest that diabetes care should include routine assessment of illness perception, diabetes distress, and perceived social support in addition to standard biomedical monitoring. Healthcare providers should identify patients who view diabetes as highly threatening or uncontrollable, because these patients may be at greater risk for emotional distress and reduced quality of life. Psychoeducational interventions should help patients develop more balanced and accurate illness beliefs, strengthen perceived control, and reduce catastrophic interpretations of diabetes. Diabetes distress screening should be incorporated into clinical visits, especially for patients with poor quality of life, long disease duration, complex treatment regimens, or complications. Family-based and socially supportive interventions may also be useful, as stronger perceived support appears to buffer the negative effects of illness perception and distress. Overall, diabetes management programs should move beyond a narrow focus on glycemic control and adopt an integrated patient-centered approach that addresses emotional burden, social resources, and daily functioning.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contributed to this article.

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