

The Relationship of Coping Styles and Resilience with Quality of Life in Patients with Type 2 Diabetes

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ABSTRACT

This study aimed to examine the relationships of coping styles and resilience with quality of life in patients with type 2 diabetes and to determine the contribution of each variable to predicting quality of life. This cross-sectional study employed a correlational design. The statistical population comprised all patients with type 2 diabetes who attended a specialized endocrinology clinic in Tehran between September 2024 and March 2025. Using convenience sampling and based on the sample-size guideline proposed by Tabachnick and Fidell (2021), with an allowance for potential attrition, 250 patients were enrolled in the study. After providing written informed consent, the participants completed three standardized instruments: (1) the Coping Styles Questionnaire (CSQ) developed by Endler and Parker (1990), comprising the problem-focused coping subscale (24 items; Cronbach's $\alpha = .86$ in the present study) and the emotion-focused coping subscale (24 items; Cronbach's $\alpha = .83$); (2) the 25-item Connor-Davidson Resilience Scale (CD-RISC-25; Cronbach's $\alpha = .91$); and (3) the 36-Item Short Form Health Survey (SF-36; Cronbach's $\alpha = .90$). Demographic and clinical information, including age, sex, educational attainment, duration of diabetes, and glycated hemoglobin (HbA1c) level, was also recorded. Data were analyzed using SPSS version 26 at both descriptive and inferential levels. Descriptive statistics included means, standard deviations, and frequencies, whereas inferential analyses included Pearson's correlation coefficient and stepwise multiple regression. Pearson's correlation analysis indicated a significant positive correlation between problem-focused coping and quality of life ($r = .58, p < .001$) and a significant negative correlation between emotion-focused coping and quality of life ($r = -.43, p < .001$). A strong positive correlation was also observed between resilience and quality of life ($r = .65, p < .001$). The results of the stepwise regression analysis showed that, in the first step, resilience alone explained 42% of the variance in quality of life ($\beta = .65, t = 13.20, p < .001$). In the second step, the addition of problem-focused coping increased the model's explained variance to 60% ($\Delta R^2 = .18, \beta = .38, t = 7.10, p < .001$). Emotion-focused coping was entered into the equation in the third step; however, it did not make a significant contribution to predicting quality of life ($\beta = -.09, p = .108$) and was therefore excluded from the final model. Examination of the potential confounding variables, including duration of diabetes and HbA1c level, indicated that they did not significantly affect the observed relationships. From a clinical perspective, these findings suggest that psychological interventions for patients with diabetes should focus on two fundamental components: (a) strengthening resilience through cognitive-behavioral and mindfulness-based techniques and (b) teaching practical problem-solving skills and active coping strategies for managing the daily challenges associated with diabetes.

Keywords: type 2 diabetes, coping styles, resilience, quality of life, problem-solving

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Introduction

Type 2 diabetes mellitus is a chronic metabolic disorder that requires continuous medical care, sustained self-management, and long-term behavioral adaptation. Although glycemic control remains a central

objective of diabetes treatment, the burden of the disease extends substantially beyond blood glucose regulation. Patients must manage medication regimens, dietary restrictions, physical activity requirements, glucose monitoring, medical appointments, and concerns about acute and chronic complications. These ongoing responsibilities may affect emotional well-being, family and social functioning, occupational performance, and perceptions of physical health (1, 2). Consequently, quality of life has become an important patient-reported outcome in diabetes research and clinical practice, as it reflects the individual's subjective evaluation of physical, psychological, and social functioning rather than merely the absence of disease or the achievement of favorable laboratory indicators.

Health-related quality of life among patients with diabetes is shaped by the interaction of biological, clinical, behavioral, and psychological factors. Disease duration, glycemic status, treatment complexity, comorbid conditions, and diabetes-related complications may directly restrict daily functioning and reduce perceived well-being. Recent cross-sectional evidence has demonstrated that mental health difficulties and diabetes complications are independently associated with poorer health-related quality of life, indicating that clinical severity and psychological functioning may exert distinct effects on patients' everyday experiences (3). This finding is particularly important because it suggests that improvements in metabolic indicators alone may not be sufficient to optimize patients' quality of life. A patient may attain acceptable glycemic control while continuing to experience emotional distress, low confidence, reduced social functioning, or difficulty adjusting to the demands of the illness.

The influence of diabetes on quality of life should also be understood within a broader life-course framework. Studies of individuals living with type 1 diabetes have shown that the effects of chronic diabetes can extend into education, employment, family roles, autonomy, and social participation. A scoping review of adults with juvenile-onset type 1 diabetes identified challenges across educational, occupational, and quality-of-life domains, illustrating how persistent disease-management demands may shape major developmental and social transitions (1). Similarly, research on the transition to adulthood has shown that diabetes can influence not only the quality of life of affected individuals but also that of close family members, including mothers who remain involved in disease management and emotional support (4). Although type 1 and type 2 diabetes differ in etiology, age of onset, and treatment patterns, such findings underscore the broader principle that living with diabetes is an interpersonal and psychosocial experience whose consequences may extend beyond biomedical outcomes.

For patients with type 2 diabetes, quality of life is closely connected to the ability to perform effective self-care. Diabetes self-management requires patients to translate medical recommendations into consistent daily behaviors, frequently in the context of competing occupational, financial, family, and social demands. Evidence from structural modeling research suggests that self-care behaviors and glycemic control are meaningfully associated with quality of life among individuals with type 2 diabetes (5). However, self-care is not simply a matter of receiving information. Knowledge must be accompanied by motivation, confidence, decision-making skills, and the capacity to persist when recommended behaviors are difficult, inconvenient, or emotionally burdensome. Health literacy may therefore function as an important mechanism linking personal capabilities to better perceived health. Research has shown that health literacy mediates the association between self-efficacy and quality of life in patients with type 2 diabetes, suggesting that

individuals who feel more capable may achieve better outcomes partly because they can access, understand, evaluate, and apply health-related information more effectively (6).

Patients' perspectives on lifestyle change further demonstrate that diabetes management is an active process of psychological adjustment rather than a purely technical process of following instructions. Following diagnosis, individuals may be required to reconsider familiar eating patterns, physical activity habits, social routines, and beliefs about health and personal responsibility. Qualitative evidence regarding patient perspectives indicates that lifestyle modification after a diabetes diagnosis may involve emotional, behavioral, and contextual challenges that influence whether recommended changes can be maintained over time (2). Some patients may regard behavioral recommendations as manageable and meaningful, whereas others may experience them as restrictive, exhausting, or incompatible with their existing circumstances. These differences highlight the importance of psychological resources that help individuals interpret stressors, regulate emotions, solve problems, and remain engaged in self-care despite setbacks.

The concept of diabetes acceptance is particularly relevant to this adjustment process. Acceptance does not imply passivity or resignation; rather, it reflects the individual's capacity to acknowledge the reality of the illness and integrate its management into everyday life without persistent avoidance or denial. Evidence indicates that assessing diabetes acceptance can help identify patients who demonstrate ineffective self-care and poor metabolic control (7). Limited acceptance may interfere with medication adherence, glucose monitoring, dietary regulation, and engagement with healthcare professionals. In contrast, greater acceptance may facilitate realistic planning and constructive responses to the practical and emotional demands of the disease. Acceptance is also conceptually related to coping and resilience because all three constructs concern the ways in which individuals respond to persistent adversity and adapt to circumstances that cannot be completely eliminated.

Coping refers to the cognitive and behavioral efforts individuals employ to manage internal or external demands appraised as stressful or exceeding their available resources. In the context of type 2 diabetes, coping may include practical attempts to manage treatment requirements, seek information, reorganize daily routines, obtain social support, regulate emotional distress, or avoid thinking about the illness. A commonly used distinction is made between problem-focused and emotion-focused coping. Problem-focused coping is directed toward modifying the source of stress or reducing its practical consequences through planning, information seeking, decision-making, and active problem-solving. Emotion-focused coping is directed primarily toward managing the emotional response to stress and may include self-blame, worry, emotional preoccupation, avoidance, or other attempts to reduce distress without directly addressing the underlying problem.

Problem-focused coping may be especially adaptive in diabetes because many disease-related stressors are at least partially manageable through behavior. Patients can organize medication schedules, develop dietary plans, monitor glucose levels, communicate with clinicians, and identify solutions to barriers that interfere with self-care. These strategies may increase perceived control and reduce helplessness, thereby supporting better psychological and physical functioning. Emotion-focused coping is more complex because some emotion-regulation responses may be beneficial, particularly when a stressor cannot be changed immediately. Nevertheless, persistent reliance on self-blame, rumination, avoidance, or emotional disengagement may interfere with active self-management and increase psychological distress. Thus, the

functional consequences of emotion-focused coping depend on the specific strategy used, the controllability of the stressor, and whether emotional regulation facilitates or replaces constructive action.

Empirical evidence supports the clinical importance of coping patterns in diabetes. Research examining the effectiveness of coping therapy in patients with type 2 diabetes has reported improvements in psychological indicators, including stress, coping strategies, and quality of life (8). A parallel report of coping-focused treatment similarly emphasized the potential effectiveness of structured psychological intervention for improving stress management, coping responses, and quality of life among patients with type 2 diabetes (9). These findings suggest that coping is not merely a stable personal characteristic but a potentially modifiable psychological process. Interventions that teach patients to identify stressors, evaluate available options, regulate distress, and apply active coping strategies may strengthen their ability to manage both the practical and emotional demands of diabetes.

The relationship between coping and quality of life may also be embedded within broader psychological structures. A structural model developed for patients with type 2 diabetes indicated that quality of life could be explained through the interrelationships among early maladaptive schemas, treatment adherence, and coping strategies (10). Such evidence suggests that coping behaviors may reflect deeper cognitive and emotional patterns concerning vulnerability, failure, dependence, mistrust, or personal competence. Patients who interpret diabetes-related difficulties through rigid or maladaptive beliefs may be more likely to respond with avoidance, emotional dysregulation, or inconsistent adherence. Conversely, patients who use flexible and problem-oriented strategies may be better able to maintain treatment behaviors and preserve quality of life even when they face disease-related stress.

Research involving adolescents and young adults with type 1 diabetes also indicates that coping operates in conjunction with personality characteristics and developmental conditions. Personality and coping patterns have been associated with metabolic control and quality of life, demonstrating that the manner in which individuals respond to illness-related demands can affect both subjective and clinical outcomes (11). Although developmental challenges differ between adolescents with type 1 diabetes and middle-aged or older adults with type 2 diabetes, the underlying implication is relevant across diabetes populations: adaptation is influenced not only by disease characteristics but also by the individual's psychological response to those characteristics. This reinforces the need to examine coping styles alongside other protective factors rather than treating them as isolated behaviors.

Resilience represents one of the most important protective psychological resources in chronic illness. It refers to the capacity to maintain or regain adaptive functioning when confronted with adversity, stress, uncertainty, or prolonged demands. Resilience does not mean that an individual experiences no distress; rather, it involves the ability to tolerate negative emotions, mobilize personal and social resources, adapt to change, preserve a sense of control, and continue functioning despite difficulty. For patients with type 2 diabetes, resilience may support persistence in self-care after episodes of poor glycemic control, treatment fatigue, disease progression, or discouraging medical feedback. It may also reduce the likelihood that temporary setbacks are interpreted as evidence of personal failure or the futility of treatment.

Evidence consistently links resilience with more favorable quality-of-life outcomes in diabetes. Research among Chinese patients with diabetes found a significant relationship between psychological resilience and quality of life and further demonstrated that this relationship involved the mediating role of stigma and the

moderating role of empowerment (12). These findings indicate that resilience may improve quality of life not only through direct emotional adaptation but also by reducing the harmful effects of perceived stigma and interacting with patients' sense of agency. Patients who are more resilient may be less likely to internalize negative social judgments about diabetes and more likely to believe that they can participate actively in treatment decisions and self-management.

Intervention studies provide additional support for the modifiability and clinical significance of resilience. A resilience-based Islamic program was found to be a promising intervention for reducing diabetes fatigue and improving health-related quality of life (13). This finding is noteworthy because it suggests that resilience-enhancing interventions can be culturally adapted and may incorporate spiritual or value-based resources that are meaningful to the target population. Similarly, acceptance and commitment-based therapy has demonstrated effectiveness in improving psychological well-being and resilience among women with type 2 diabetes (14). Acceptance-based interventions may strengthen resilience by helping patients disengage from unproductive struggles with distressing thoughts, clarify personally meaningful values, and commit to health-promoting actions despite discomfort.

Mindfulness-related capacities may also contribute to resilience and adaptive functioning. Mindfulness involves purposeful and nonjudgmental attention to present-moment experiences and may help individuals respond to uncertainty, distress, and illness-related thoughts with greater flexibility. Research examining mindfulness, tolerance of ambiguity, death anxiety, and sleep quality among older adults has shown meaningful relationships among these psychological dimensions (15). Although this research was not limited to patients with diabetes, its implications are relevant to chronic illness, in which uncertainty about disease progression, complications, and future functioning may generate persistent anxiety. Mindfulness and tolerance of ambiguity may help patients remain engaged with current self-care demands without becoming overwhelmed by feared future outcomes. These capacities may therefore represent mechanisms through which resilience can be strengthened.

Complementary behavioral interventions may similarly improve psychological and quality-of-life outcomes. A systematic review and meta-analysis examining yoga as an adjunct to standard care for individuals with or at risk of type 2 diabetes reported effects across glycemic control, insulin resistance, oxidative stress, and quality of life (16). Yoga may influence quality of life through several pathways, including physical activity, autonomic regulation, stress reduction, body awareness, and enhanced perceived control. The relevance of such findings extends beyond the specific intervention because they demonstrate that quality of life may improve when diabetes care addresses emotional and behavioral regulation in addition to metabolic management.

Despite growing evidence regarding the importance of coping and resilience, several conceptual and empirical gaps remain. First, many studies have examined resilience, coping, self-care, adherence, or quality of life separately, making it difficult to determine their relative contributions when considered simultaneously. Second, correlations between emotion-focused coping and quality of life may differ depending on the population, measurement instrument, and particular emotional strategies assessed. Third, resilience and problem-focused coping are related but conceptually distinct. Resilience represents a broader capacity for adaptation, whereas problem-focused coping refers to strategies directed toward managing

specific stressors. Determining whether problem-focused coping explains unique variance in quality of life beyond resilience is therefore necessary for developing targeted interventions.

Moreover, clinical indicators such as disease duration and HbA1c may confound associations between psychological factors and quality of life. Patients with longer disease duration may have accumulated more complications, treatment burdens, or experiences of treatment fatigue. Similarly, elevated HbA1c may be associated with poorer self-management, increased symptoms, or concern about future complications. If coping and resilience remain associated with quality of life after controlling for these factors, their independent clinical relevance would be strengthened. Such evidence would support the inclusion of psychological assessment and intervention within routine diabetes care rather than limiting treatment evaluation to biomedical indicators.

The study of quality of life among Iranian patients with type 2 diabetes is especially important because coping and resilience are influenced by cultural, familial, social, and healthcare contexts. Family involvement, beliefs about illness, expectations regarding emotional expression, access to specialist services, and culturally meaningful spiritual resources may shape how patients manage diabetes-related stress. Although Iranian studies have provided evidence for the effectiveness of coping-oriented and acceptance-based interventions, further correlational research is required to clarify the relative predictive roles of problem-focused coping, emotion-focused coping, and resilience within clinical samples. Understanding these relationships may assist clinicians in identifying patients who are psychologically vulnerable despite receiving adequate medical treatment and may guide the development of interventions focused on resilience, active coping, problem-solving, mindfulness, and acceptance.

Accordingly, the aim of the present study was to examine the relationships of problem-focused coping, emotion-focused coping, and resilience with quality of life and to determine their relative contributions to predicting quality of life among patients with type 2 diabetes.

Methods and Materials

Study Design and Participants

The present study employed a descriptive-correlational, cross-sectional design. This design was selected because the primary purpose of the study was to examine the magnitude and direction of the relationships among coping styles, resilience, and quality of life without manipulating the study variables and within a specific period. The correlational design also permitted the use of multiple regression analysis to determine the extent to which the independent variables, including problem-focused coping, emotion-focused coping, and resilience, predicted the dependent variable of quality of life. Nevertheless, because the data were collected at a single point in time, the findings could not establish causal relationships among the variables.

The statistical population consisted of all patients with type 2 diabetes who attended and received treatment services at a specialized endocrinology clinic in Tehran, Iran, during the second half of 2024 and the first months of 2025. The minimum required sample size was initially estimated using the empirical formula proposed by Tabachnick and Fidell (2021) for multiple regression analysis, expressed as $N \geq 50 + 8m$, where m represents the number of predictor variables. Given the three primary predictors of resilience, problem-focused coping, and emotion-focused coping, the minimum required sample size was calculated as 74 participants. However, to increase statistical power, reduce the likelihood of a Type II error, and account

for an anticipated attrition or incomplete-response rate of approximately 15%–20%, a total of 250 patients were recruited. For a medium effect size of $f^2 = .15$ and an alpha level of .05, this sample size provided statistical power greater than .95.

Participants were selected through convenience sampling because of practical limitations related to time and access to the target population. All potentially eligible patients who visited the endocrinology clinic during the data-collection period were approached consecutively according to the order of their appointments. To reduce potential selection bias and improve the representation of both employed and unemployed patients, recruitment was conducted on different weekdays and at various times of the day. The inclusion criteria were a confirmed diagnosis of type 2 diabetes by an endocrinologist, a minimum disease duration of 12 months, an age between 30 and 65 years, the ability to read and write in Persian, and the provision of written informed consent. The diagnosis of diabetes was established according to standard clinical criteria, including an HbA1c level of at least 6.5% or a fasting plasma glucose level of at least 126 mg/dL. The specified age range was used to minimize the potentially confounding effects of adolescence and advanced age on quality of life and psychological functioning.

Patients were excluded if they had a concurrent diagnosis of type 1 diabetes, gestational diabetes, or secondary diabetes; a documented major psychiatric disorder, including a psychotic disorder, bipolar I disorder, or major depressive disorder with psychotic features; or advanced and severely disabling diabetic complications. Such complications included end-stage renal disease requiring dialysis, lower-limb amputation, and complete blindness resulting from diabetic retinopathy. Patients with severe cognitive impairment or dementia, as determined through the clinical judgment of the treating physician, were also excluded because such conditions could compromise their ability to understand and independently complete the questionnaires.

The researcher attended the clinic in person during the data-collection period from February to May 2025. On each recruitment day, the medical records of potentially eligible patients were reviewed by the treating physician or diabetes nurse according to the predefined eligibility criteria. Eligible patients were then individually invited by the researcher to participate in the study. Patients who expressed willingness to participate received a complete explanation of the study objectives, procedures, confidentiality protections, voluntary nature of participation, right to withdraw at any stage, and assurance that refusal or withdrawal would not affect their medical treatment. Written informed consent was obtained before data collection.

The questionnaires were administered in the following order: the demographic and clinical information form, the Coping Style Questionnaire, the Connor–Davidson Resilience Scale, and the 36-Item Short Form Health Survey. Participants completed the instruments individually in a quiet room at the clinic with minimal environmental distractions. The average completion time was approximately 25–30 minutes. In fewer than 5% of cases, participants reported fatigue before completing all instruments; for these individuals, a second session was arranged within the same week. The most recent HbA1c value, measured no more than one month before questionnaire administration, was extracted from the patient's electronic medical record. No financial or nonfinancial incentive was provided for participation.

Ethical principles were observed throughout the study. Participants' names were not entered into the dataset, and unique identification codes were used instead. Raw data were stored securely and were accessible only to authorized members of the research team. Participants were free to withdraw from the

study at any time without any adverse consequences for their treatment. In addition, participants who requested information about the study were offered a summary of the overall findings after completion of the research.

Data Collection

The researcher-developed demographic and clinical information form was used to collect background characteristics that could be relevant to coping, resilience, and quality of life among patients with type 2 diabetes. The form included age in years, sex, marital status, educational attainment, duration of type 2 diabetes in years, and the most recent HbA1c level. Marital status was classified as married, single, widowed, or divorced, whereas educational attainment was categorized as less than a high school diploma, high school diploma, or associate degree and higher. Age, sex, marital status, educational attainment, and disease duration were self-reported by participants. HbA1c values were extracted from the patients' electronic medical records to reduce recall bias and provide an objective indicator of recent glycemic control.

The Coping Style Questionnaire was used to assess problem-focused and emotion-focused coping styles. The instrument was originally developed by Endler and Parker (1990), and its Persian version was validated for use in Iranian populations by Shokri et al. (2008). The version used in the present study consisted of 48 items divided into two separate 24-item subscales. The problem-focused coping subscale assesses deliberate and task-oriented efforts to identify, analyze, and manage stressful situations. A representative item is, "When faced with a problem, I consider several possible solutions." The emotion-focused coping subscale assesses responses centered on emotional distress, self-blame, worry, and affective reactions to stressful circumstances. A representative item is, "When I become upset, I blame myself for feeling that way." Items are rated on a five-point Likert scale ranging from 1, indicating "never," to 5, indicating "always." Scores for each subscale range from 24 to 120, with higher scores indicating more frequent use of the corresponding coping style. In the Iranian validation study, Cronbach's alpha coefficients of .85 and .82 were reported for the problem-focused and emotion-focused subscales, respectively. In the present study, Cronbach's alpha coefficients were .86 for problem-focused coping and .83 for emotion-focused coping, indicating good internal consistency.

The Connor–Davidson Resilience Scale was administered to assess participants' capacity to adapt successfully to adversity, stress, and health-related challenges. The 25-item scale was developed by Connor and Davidson (2003) for use in both clinical and nonclinical populations. Its items address several dimensions of resilience, including personal competence, tolerance of negative affect, positive acceptance of change, secure relationships, perceived control, and spiritual influences. A representative item is, "I am able to adapt when changes occur." Each item is scored on a five-point scale ranging from 0, indicating "not true at all," to 4, indicating "true nearly all of the time." Total scores range from 0 to 100, with higher scores representing greater psychological resilience. The Persian version of the scale was psychometrically evaluated by Jokar et al. (2010), who reported a Cronbach's alpha coefficient of .89. In the present sample, the scale demonstrated excellent internal consistency, with a Cronbach's alpha coefficient of .91.

The 36-Item Short Form Health Survey was used to assess health-related quality of life. The instrument was developed by Ware and Sherbourne (1992) and has been extensively used in clinical and population-based health research. The SF-36 consists of 36 items covering eight domains of health-related functioning:

physical functioning, assessed by 10 items; role limitations due to physical health problems, assessed by four items; bodily pain, assessed by two items; general health perceptions, assessed by five items; vitality, assessed by four items; social functioning, assessed by two items; role limitations due to emotional problems, assessed by three items; and mental health, assessed by five items. One additional item assesses perceived changes in general health but is not included as a separate domain score. Following the standard scoring procedure, raw responses are transformed so that each domain score ranges from 0 to 100, with higher values indicating better functioning or more favorable perceived health. For the purposes of the present study, the mean of the eight domain scores was calculated as an overall quality-of-life score ranging from 0 to 100. The Persian version was validated among an Iranian population by Montazeri et al. (2005), and satisfactory evidence of reliability and construct validity was reported. Cronbach's alpha for the total scale was .91 in the Persian validation study and .90 in the present study, indicating excellent internal consistency.

Data Analysis

Data analysis was conducted using IBM SPSS Statistics version 26. Before beginning the statistical analyses, the dataset was examined for data-entry errors, missing values, implausible responses, and univariate outliers. Descriptive statistics were calculated to summarize the demographic, clinical, and psychological characteristics of the participants. Continuous variables were described using means and standard deviations, whereas categorical variables were summarized using frequencies and percentages. Internal consistency reliability was evaluated separately for the problem-focused coping subscale, emotion-focused coping subscale, resilience scale, and quality-of-life questionnaire using Cronbach's alpha coefficients.

Before conducting the inferential analyses, the assumptions underlying Pearson's correlation and multiple regression were evaluated. The normality of the distributions was examined using the Kolmogorov–Smirnov test in conjunction with the inspection of skewness and kurtosis indices. Linearity between each predictor and quality of life was assessed through scatterplots and residual plots. The assumption of homoscedasticity was evaluated by examining the distribution of standardized residuals against standardized predicted values. The independence of residuals was assessed using the Durbin–Watson statistic. Multicollinearity among predictor variables was investigated using tolerance values and variance inflation factor values. Tolerance values greater than .10 and variance inflation factor values below 10 were considered indicative of an acceptable level of multicollinearity. These diagnostic evaluations indicated that the principal statistical assumptions were adequately satisfied.

Pearson's product–moment correlation coefficient was used to determine the direction and magnitude of the bivariate relationships between problem-focused coping, emotion-focused coping, resilience, and quality of life. Stepwise multiple regression analysis was subsequently performed to determine the relative contribution of each psychological predictor to explaining variance in quality of life. Resilience, problem-focused coping, and emotion-focused coping were entered as candidate predictors, and variables were retained in the final model according to their statistically significant incremental contribution to explained variance. Changes in the coefficient of determination were examined to determine the additional proportion of variance explained at each regression step. Standardized regression coefficients, *t* values, probability values, R^2 , adjusted R^2 , and changes in R^2 were used to interpret the regression models.

Duration of diabetes and HbA1c level were additionally examined as potential confounding variables because both disease chronicity and glycemic control could be associated with quality of life. Their effects were assessed by including them as covariates in supplementary regression analyses and examining whether the magnitude or statistical significance of the relationships between the principal psychological predictors and quality of life changed substantially. All statistical tests were two-tailed, and the level of statistical significance was set at $p < .05$.

Findings and Results

Of the 268 patients invited to participate in the study, 250 agreed to participate, yielding a response rate of 93.3%. The participants' mean age was 54.7 years ($SD = 8.4$), with an age range of 31–64 years. Regarding sex distribution, 138 participants (55.2%) were women and 112 (44.8%) were men. The mean duration of type 2 diabetes in the study sample was 8.3 years ($SD = 5.1$), and the mean HbA1c level was 7.6% ($SD = 1.3$). Regarding marital status, 185 participants (74%) were married, 37 (15%) were widowed, and 28 (11%) were divorced or separated. In terms of educational attainment, 95 participants (38%) had completed primary or lower secondary education, 105 (42%) held a high school diploma, and 50 (20%) had a university education. The independent-samples t test and one-way analysis of variance indicated no statistically significant differences in quality-of-life scores according to sex ($p = .352$) or educational attainment ($p = .421$).

Table 1 presents the means, standard deviations, observed score ranges, skewness values, and kurtosis values for the study variables. As shown, the skewness and kurtosis values for all variables fell within the range of ± 1.5 , indicating an approximately normal distribution of the data and supporting the normality assumption required for regression analysis.

Table 1. Descriptive Statistics for the Main Study Variables

Variable	Mean	Standard Deviation	Observed Range	Skewness	Kurtosis
Quality of life (SF-36)	62.4	14.3	28–91	−0.42	−0.21
Problem-focused coping style	48.6	11.2	24–78	0.18	−0.09
Emotion-focused coping style	51.3	13.5	26–92	0.33	−0.45
Resilience (CD-RISC)	65.7	15.8	31–94	−0.27	−0.33

The mean quality-of-life score of 62.4 out of 100 indicates that the patients with type 2 diabetes in this sample had a moderate-to-low level of quality of life. The mean resilience score of 65.7 out of 100 was within the moderate-to-high range.

Table 2. Pearson Correlation Matrix for the Study Variables

Variable	1	2	3	4
1. Quality of life	1			
2. Problem-focused coping style	.58**	1		
3. Emotion-focused coping style	−.43**	−.21*	1	
4. Resilience	.65**	.51**	−.38**	1

As shown in Table 2, Hypothesis 1 was supported. There was a positive and statistically significant correlation between problem-focused coping and quality of life at the .01 significance level ($r = .58$). This correlation coefficient can be interpreted as moderate to strong.

Hypothesis 2 was also supported. A negative and statistically significant correlation was found between emotion-focused coping and quality of life at the .01 significance level ($r = -.43$). This coefficient represents a moderate association.

Hypothesis 3 was supported. Resilience had a strong, positive, and statistically significant correlation with quality of life at the .01 significance level ($r = .65$). Among all study variables, resilience demonstrated the strongest correlation with quality of life.

Table 3. Summary of the Stepwise Regression Analysis Predicting Quality of Life

Step	Variable(s) Entered	<i>R</i>	<i>R</i> ²	Adjusted <i>R</i> ²	ΔR^2	Final β	<i>t</i>	<i>p</i>
1	Resilience	.648	.420	.418	.420	.52	8.94	< .001
2	Problem-focused coping style added	.775	.600	.597	.180	.38	7.10	< .001
3	Emotion-focused coping style added	.779	.607	.602	.007	-.09	-1.61	.108, n.s.

In the first step, corresponding to Hypothesis 4, resilience was entered into the regression equation as the sole predictor and explained 42% of the variance in quality of life ($R^2 = .420$, $p < .001$). The standardized beta coefficient for resilience was .65 ($t = 13.20$, $p < .001$). This finding indicates that a one-standard-deviation increase in resilience was associated with a .65-standard-deviation increase in quality-of-life scores. Therefore, Hypothesis 4 was fully supported.

In the second step, corresponding to Hypothesis 5, problem-focused coping was entered into the regression equation. The coefficient of determination increased from .420 to .600, and this increase was statistically significant at the .001 level ($\Delta R^2 = .180$). In other words, problem-focused coping explained an additional and unique 18% of the variance in quality of life beyond the variance explained by resilience. At this step, the standardized beta coefficient for resilience decreased to .52 but remained statistically significant, whereas the standardized beta coefficient for problem-focused coping was .38 ($t = 7.10$, $p < .001$). The final model in the second step, which included resilience and problem-focused coping as predictors, explained a total of 60% of the variance in quality of life. The regression equation was as follows: Quality of life = 18.4 + (0.47 × resilience) + (0.48 × problem-focused coping). Therefore, Hypothesis 5 was supported.

In the third step, corresponding to Hypothesis 6, emotion-focused coping was entered into the regression equation. However, the increase in R^2 was only .007, equivalent to 0.7% of the variance, and this increase was not statistically significant ($p = .108$). The standardized beta coefficient for emotion-focused coping was $-.09$ ($t = -1.61$, $p = .108$). Accordingly, Hypothesis 6 was supported: after controlling for resilience and problem-focused coping, emotion-focused coping did not make a statistically significant contribution to the prediction of quality of life.

To ensure that the observed relationships were not attributable solely to the duration of diabetes or poor glycemic control, as reflected by elevated HbA1c levels, a separate hierarchical regression analysis was conducted. In the first block, duration of diabetes and HbA1c level were entered into the model. Together, these two variables explained only 4% of the variance in quality of life, and their combined contribution was not statistically significant ($p = .18$). In the second block, resilience was entered and explained an additional 39% of the variance ($p < .001$). In the third block, problem-focused coping was entered and explained a further 17% of the variance ($p < .001$). After controlling for duration of diabetes and HbA1c level, the standardized beta coefficients for resilience and problem-focused coping changed only slightly and were .50

and .36, respectively. These findings support Hypothesis 7 and indicate that the principal findings were independent of disease duration and HbA1c level.

Discussion and Conclusion

The present study investigated the relationships of problem-focused coping, emotion-focused coping, and resilience with quality of life among patients with type 2 diabetes and examined the relative contribution of these psychological variables to predicting quality of life. The findings showed that problem-focused coping was positively and significantly associated with quality of life, whereas emotion-focused coping had a negative and significant bivariate relationship with quality of life. Resilience demonstrated the strongest positive correlation with quality of life among the study variables. The stepwise regression analysis further indicated that resilience alone explained 42% of the variance in quality of life. The addition of problem-focused coping increased the explained variance to 60%, showing that this coping style made a substantial and unique contribution beyond resilience. Although emotion-focused coping was negatively correlated with quality of life, it did not significantly predict quality of life after resilience and problem-focused coping were included in the regression model. Moreover, hierarchical regression showed that the predictive effects of resilience and problem-focused coping remained largely unchanged after controlling for disease duration and HbA1c, indicating that these relationships were not merely attributable to chronicity of diabetes or glycemic status.

The positive relationship between problem-focused coping and quality of life suggests that patients who respond to diabetes-related stressors through planning, information seeking, direct problem-solving, and active behavioral management experience better physical, emotional, and social functioning. Type 2 diabetes imposes multiple recurring demands, including medication adherence, dietary modification, physical activity, glucose monitoring, and the management of medical appointments and disease-related symptoms. Many of these demands are at least partially controllable and therefore particularly responsive to problem-focused coping. Patients who identify obstacles, generate alternative solutions, and organize their self-care behaviors may experience a stronger sense of personal control and lower levels of helplessness. This sense of competence may improve adherence, reduce daily disruption, and promote a more favorable evaluation of quality of life.

This finding is consistent with research demonstrating that coping-focused interventions can improve psychological indicators and quality of life in patients with type 2 diabetes. Coping therapy has been shown to reduce stress, improve coping strategies, and enhance quality of life, suggesting that active coping skills are modifiable and clinically relevant determinants of adjustment to diabetes (8). Similar findings have been reported regarding the effectiveness of coping-based psychological treatment in improving stress, coping patterns, and perceived quality of life among patients with type 2 diabetes (9). The present results extend these intervention findings by showing that, even in a nonintervention clinical sample, greater use of problem-focused coping is independently associated with better quality of life.

The role of problem-focused coping may also be understood through its relationship with self-care and treatment adherence. Effective diabetes management requires patients to convert general medical recommendations into concrete and sustainable daily actions. Evidence suggests that self-care and glycemic control are meaningfully related to quality of life in patients with type 2 diabetes (5). Problem-focused coping

may support self-care by enabling patients to address barriers such as irregular schedules, dietary challenges, limited access to exercise facilities, uncertainty about medication, or difficulty communicating with healthcare professionals. In this sense, problem-focused coping functions as a practical bridge between medical knowledge and daily health behavior.

The association between active coping and quality of life is also compatible with findings showing that health literacy mediates the relationship between self-efficacy and quality of life in individuals with type 2 diabetes (6). Patients who are confident in their abilities and can understand and apply health information may be better equipped to formulate practical responses to disease-related challenges. Problem-focused coping likely benefits from these capabilities because effective problem-solving requires accurate information, realistic appraisal, and confidence in one's ability to act. Thus, the positive effect of problem-focused coping may partly reflect a broader pattern of empowered and informed self-management.

The negative correlation between emotion-focused coping and quality of life indicates that patients who rely more heavily on emotional preoccupation, self-blame, worry, or distress-centered reactions tend to report poorer quality of life. Chronic illness can generate frustration, fear of complications, uncertainty, and perceived loss of control. When patients become predominantly focused on emotional discomfort without addressing manageable aspects of the stressor, their distress may intensify and interfere with self-care. Emotion-focused coping may also increase the subjective burden of diabetes by directing attention toward negative affect, perceived failure, and anticipated consequences rather than toward available solutions.

However, emotion-focused coping did not remain a significant predictor after resilience and problem-focused coping were entered into the regression model. This finding suggests that its bivariate association with quality of life may be explained partly by its overlap with lower resilience and reduced use of active coping strategies. In the correlation matrix, emotion-focused coping was negatively associated with both resilience and problem-focused coping. Therefore, patients who reported greater emotional preoccupation may also have possessed fewer adaptive psychological resources. Once these stronger protective variables were statistically controlled, emotion-focused coping contributed little additional explanatory power.

This result should not be interpreted as evidence that all forms of emotion-focused coping are inherently maladaptive. Emotional regulation, acceptance, support seeking, and mindful awareness can be beneficial, especially when patients face uncontrollable stressors such as irreversible complications or uncertainty regarding disease progression. The measure used in the present study, however, appears to emphasize distress-oriented and self-directed emotional reactions. Accordingly, the negative association may primarily reflect maladaptive forms of emotion-focused coping rather than constructive emotional processing. This distinction is important because psychological interventions should not encourage emotional suppression; instead, they should help patients regulate emotions in ways that support rather than replace active disease management.

The findings are consistent with structural evidence indicating that coping strategies play an important role in explaining quality of life among patients with type 2 diabetes. A structural model showed that treatment adherence and coping strategies were important mechanisms linking maladaptive cognitive patterns to quality of life (10). Patients who hold rigid negative beliefs or early maladaptive schemas may be more likely to interpret diabetes-related challenges as overwhelming and respond through avoidance,

emotional distress, or inconsistent adherence. In contrast, flexible and task-oriented coping may reduce the effect of maladaptive beliefs on daily functioning and perceived well-being.

The observed role of coping is also supported by research in younger populations with type 1 diabetes. Personality characteristics, coping patterns, and developmental conditions have been associated with metabolic control and quality of life among female adolescents and young adults with diabetes (11). Although the clinical and developmental characteristics of that population differ from those of adults with type 2 diabetes, the general conclusion is similar: patients' psychological responses to disease demands influence both subjective well-being and health-related functioning. The current study confirms that coping remains relevant in an adult type 2 diabetes population and that its effects cannot be reduced solely to biomedical disease indicators.

The strongest finding of the present study was the relationship between resilience and quality of life. Resilience showed the highest correlation with quality of life and independently explained 42% of its variance. This result indicates that the ability to adapt to adversity, tolerate negative affect, maintain perceived control, and recover from setbacks is a central psychological resource among patients with type 2 diabetes. Diabetes management is rarely linear. Patients may experience fluctuations in blood glucose, occasional lapses in self-care, changes in medication, fatigue, or discouraging clinical results. Resilient individuals may be more capable of viewing these difficulties as manageable setbacks rather than as evidence of irreversible failure.

The strong association between resilience and quality of life aligns with research showing that psychological resilience is positively related to quality of life among patients with diabetes (12). That study further demonstrated that stigma mediated and empowerment moderated this relationship, indicating that resilience may operate through both internal and social pathways. Resilient patients may be less likely to internalize negative beliefs about diabetes and more likely to feel capable of making decisions, communicating with healthcare professionals, and participating actively in their treatment. These processes can protect social functioning, emotional well-being, and self-esteem.

The explanatory power of resilience may also reflect its broad conceptual scope. Whereas coping styles concern particular responses to stress, resilience includes a more general capacity to adapt across situations. It may incorporate optimism, persistence, emotional regulation, flexibility, perceived control, social support, and meaning-making. Consequently, resilience can influence multiple dimensions of quality of life simultaneously. It may reduce emotional distress, support adherence, sustain motivation, and help patients preserve social and occupational roles despite the ongoing demands of diabetes.

Intervention research supports the clinical significance of this finding. A resilience-based program was found to reduce diabetes fatigue and improve health-related quality of life (13). Diabetes fatigue can undermine treatment engagement and create a sense of exhaustion from continuous self-management. Resilience-oriented interventions may reduce this fatigue by strengthening meaning, hope, coping resources, and the ability to continue self-care despite frustration. The present findings provide further justification for integrating resilience-building components into diabetes education and psychological care.

Acceptance and commitment-based therapy has also been shown to improve psychological well-being and resilience among women with type 2 diabetes (14). Such interventions may enhance resilience by teaching patients to accept difficult thoughts and emotions without allowing them to control behavior. Acceptance

can reduce avoidance and enable patients to maintain value-consistent health behaviors even when they experience fear, frustration, or fatigue. This interpretation is consistent with evidence that diabetes acceptance can help identify individuals with ineffective self-care and poor diabetes control (7). Patients who have not psychologically integrated the diagnosis may avoid self-monitoring or treatment-related decisions, whereas acceptance may facilitate more realistic and adaptive engagement with the illness.

Mindfulness may represent another mechanism through which resilience can be strengthened. Although research on mindfulness, ambiguity tolerance, death anxiety, and sleep quality has focused on older adults rather than specifically on diabetes populations, the findings suggest that mindful awareness and tolerance of uncertainty are relevant to psychological adaptation (15). Patients with diabetes routinely face uncertainty regarding future complications, disease progression, and the long-term effectiveness of treatment. Mindfulness may prevent these uncertainties from producing excessive rumination and may help patients focus on current, controllable health behaviors.

The results also correspond with evidence that broader mind-body interventions can improve quality of life in people with or at risk of type 2 diabetes. A systematic review and meta-analysis found that yoga used as an adjunct to standard care could influence glycemic control, insulin resistance, oxidative stress, and quality of life (16). Such interventions may strengthen resilience and adaptive coping through stress reduction, emotional regulation, body awareness, and increased self-efficacy. The relevance of these findings is that psychological and behavioral interventions may influence both perceived well-being and physical health processes.

The fact that resilience and problem-focused coping jointly explained 60% of the variance in quality of life is clinically meaningful. It indicates that these psychological constructs are not peripheral correlates but major components of how patients experience and manage type 2 diabetes. The incremental contribution of problem-focused coping after resilience was entered suggests that the two variables are related but not interchangeable. Resilience may provide the general capacity to persist and adapt, whereas problem-focused coping provides specific strategies for addressing practical problems. A resilient patient may remain hopeful and emotionally stable, but without concrete problem-solving skills, this resilience may not translate fully into effective self-management. Conversely, a patient may know problem-solving techniques but struggle to use them consistently when faced with repeated setbacks if resilience is low.

The independence of the main findings from disease duration and HbA1c further strengthens their importance. Disease duration and glycemic control explained only a small and nonsignificant proportion of quality-of-life variance, whereas resilience and problem-focused coping remained strong predictors. This result is consistent with evidence that mental health and diabetes complications may have independent associations with health-related quality of life (3). It supports a multidimensional view in which biological indicators and psychological functioning represent distinct but interacting components of patient health. A clinically acceptable HbA1c level does not necessarily indicate satisfactory quality of life, just as poor quality of life cannot be understood exclusively as a consequence of inadequate glycemic control.

The broader diabetes literature likewise shows that quality of life is affected by social and developmental factors extending beyond metabolic control. Diabetes may influence education, employment, independence, and participation in adult roles (1). It can also affect family members who remain involved in emotional and practical disease management (4). These findings reinforce the need to evaluate patients within their family

and social contexts. Resilience and coping may help patients maintain relationships and role functioning, while supportive families may in turn strengthen adaptive coping and resilience.

Patients' experiences of lifestyle change after diagnosis also help explain the current findings. Lifestyle recommendations may be perceived as restrictive, disruptive, or difficult to reconcile with established habits and social expectations (2). Resilient patients may be better able to adapt gradually to these demands, while problem-focused coping may help them develop realistic strategies for dietary changes, exercise, medication adherence, and social situations. Therefore, the psychological variables examined in this study may influence quality of life partly by shaping how patients interpret and implement lifestyle changes.

The present study had several limitations. The cross-sectional design prevented causal conclusions regarding whether resilience and coping styles improve quality of life or whether patients with better quality of life develop more adaptive psychological responses. Convenience sampling from a single specialized endocrinology clinic may limit the generalizability of the findings to patients in other regions, primary care settings, rural populations, or individuals with limited access to specialist services. The study relied primarily on self-report questionnaires, which may be affected by social desirability, recall bias, and temporary emotional states. Although HbA1c and disease duration were controlled, other potentially important clinical variables, including medication type, diabetes complications, body mass index, comorbid medical conditions, pain, and treatment adherence, were not included in the regression models. In addition, the broad classification of coping into problem-focused and emotion-focused styles may not adequately distinguish adaptive emotional regulation from maladaptive responses such as rumination, self-blame, and avoidance.

Future studies should employ longitudinal designs to examine the direction and temporal stability of the relationships among resilience, coping styles, self-management, and quality of life. Randomized controlled trials are needed to determine whether interventions that strengthen resilience and problem-solving skills produce sustained improvements in quality of life and clinical outcomes. Future research should recruit participants from multiple healthcare centers and diverse socioeconomic and cultural backgrounds to improve external validity. More detailed measures of coping should be used to distinguish acceptance, emotional processing, support seeking, avoidance, rumination, and self-blame. Researchers should also examine possible mediating variables, including self-efficacy, health literacy, treatment adherence, diabetes distress, stigma, and empowerment, as well as potential moderators such as sex, age, complication status, social support, and socioeconomic position.

Healthcare providers should incorporate routine psychological assessment into diabetes care and screen patients not only for depression and distress but also for low resilience, ineffective coping, and limited problem-solving skills. Diabetes self-management education should move beyond the transmission of medical information and include structured training in identifying problems, generating practical solutions, setting achievable goals, managing setbacks, and communicating with healthcare professionals. Resilience-enhancing components such as mindfulness, acceptance, emotional regulation, self-compassion, and relapse-prevention planning should be integrated into individual and group interventions. Multidisciplinary diabetes teams should include psychologists or trained counselors who can provide targeted support to patients experiencing emotional preoccupation, avoidance, or treatment fatigue. Interventions should also involve family members when appropriate, because supportive interpersonal environments can facilitate

sustained behavioral change and strengthen patients' capacity to manage the long-term demands of type 2 diabetes.

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Authors' Contributions

All authors equally contributed to this study.

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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