

Pathways to Psychological Resilience: The Mediating Roles of Cognitive Emotion Regulation and Social Support in the Link Between Ego Strength and Adaptation to Type II Diabetes

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ABSTRACT

This study aimed to investigate the mediating roles of cognitive emotion regulation strategies and social support in the relationship between ego strength and adaptation to type II diabetes. This descriptive-correlational study employed a path analysis design. The statistical population consisted of patients with type II diabetes aged 30–75 years who attended the Taban Diabetes Clinic in Tehran, Iran. A total of 250 patients were selected through random sampling. Data were collected using standardized questionnaires assessing ego strength, cognitive emotion regulation strategies, perceived social support, and adaptation to diabetes. Two mediation models were examined to distinguish the roles of adaptive and maladaptive cognitive emotion regulation strategies. Structural relationships among the study variables and the significance of direct and indirect effects were evaluated using structural equation modeling and path analysis in AMOS software. Structural equation modeling demonstrated that ego strength had a significant direct effect on adaptation to type II diabetes and also exerted significant indirect effects through cognitive emotion regulation strategies and social support. Adaptive cognitive emotion regulation strategies significantly mediated the relationship between ego strength and disease adaptation, with an indirect effect of 0.21. Social support also showed a significant positive mediating effect, with an indirect effect of 0.14. In the alternative model, maladaptive cognitive emotion regulation strategies significantly mediated the association between ego strength and adaptation in a negative direction, with an indirect effect of –0.14. Thus, higher ego strength was associated with better adaptation through greater use of adaptive regulatory strategies and stronger social support, whereas maladaptive strategies constituted a negative pathway linking psychological functioning to disease adaptation. Ego strength contributes to adaptation to type II diabetes through both direct and mediated psychological and social pathways. Adaptive cognitive emotion regulation and social support facilitate successful adjustment, whereas maladaptive emotion regulation may undermine adaptation.

Keywords: Cognitive emotion regulation strategies; Social support; Ego strength; Disease adaptation; Type II diabetes

1. Introduction

Type II diabetes mellitus is a chronic metabolic disease that requires sustained medical management, continuous self-monitoring, lifestyle modification, and long-term behavioral adaptation. Although diabetes is commonly conceptualized in terms of glycemic control, vascular complications, and other biomedical outcomes, its consequences extend considerably beyond the physical domain. Living with diabetes may require individuals to reorganize daily routines, regulate dietary patterns, adhere to medication regimens, manage uncertainty regarding future complications, and repeatedly confront health-related stressors. Consequently, adaptation to diabetes represents a complex process involving physical, emotional, cognitive, interpersonal, and behavioral components rather than a simple response to a medical diagnosis. Contemporary diabetes research increasingly recognizes the importance of addressing psychological functioning and quality of life alongside biomedical indicators, particularly because emotional burden and difficulties in self-management can interact with disease progression and treatment adherence. The broader epidemiological literature also demonstrates that diabetes constitutes an important and persistent health challenge across age groups and populations, while its management becomes increasingly complicated when chronicity, comorbidity, and age-related vulnerabilities are considered (Tomic et al., 2025). Advances in metabolic treatment and diabetes prevention have improved the possibilities for controlling disease risk and progression, yet pharmacological improvement alone cannot fully explain why some patients adapt effectively to chronic illness while others experience persistent psychological distress or impaired self-management (Jastreboff et al., 2025). Diabetes is additionally associated with clinically important physical complications, including heightened susceptibility to infection, which can further increase the burden of illness and intensify patients' concerns about their health and future functioning (Holt et al., 2024). In Iran, epidemiological evidence likewise indicates that diabetes represents a substantial public-health problem associated with notable morbidity and mortality, underscoring the necessity of examining not only prevention and treatment but also patients' capacity to adapt psychologically to the disease (Jafarvand et al., 2021). From this perspective, successful adaptation to type II diabetes can be regarded as a multidimensional outcome reflecting the extent to which patients preserve psychological equilibrium, maintain

effective functioning, accommodate disease-related demands, and integrate the illness into their daily lives without allowing it to dominate their overall sense of self.

Psychological adaptation to chronic illness is influenced by the way individuals appraise stressors, mobilize internal psychological resources, regulate emotional responses, and access interpersonal support. Psychosocial adjustment generally refers to the process through which individuals attain or restore functional and emotional balance in response to difficult circumstances, chronic conditions, or significant life transitions (Stubley & McCroy, 2024). Within chronic disease contexts, adjustment therefore includes the ability to tolerate uncertainty, reorganize personal goals, respond flexibly to changing limitations, and sustain meaningful social and occupational roles. Research in other chronic illnesses supports the proposition that adaptation is shaped by a constellation of personal and interpersonal factors. For example, resilience, spiritual well-being, and social support have been associated with better adjustment among individuals facing cardiac disease (Besharat & Ramesh, 2019), while psychological adjustment among patients with cancer has been modeled in relation to emotion regulation, self-compassion, and spiritual health (Rahimzadegan et al., 2022). Similarly, among individuals with multiple sclerosis, illness perception, coping, and cognitive emotion regulation have been implicated in differences in adaptation to disease (Rast et al., 2022). Perceived social support has also been identified as an important explanatory mechanism in psychosocial adjustment among women coping with polycystic ovary syndrome, illustrating how interpersonal resources can mediate the relationship between personal beliefs and adaptation (Akbarzadeh & Hashemi, 2024). These findings suggest that the psychological consequences of chronic illness are not determined exclusively by disease severity or medical characteristics; rather, adaptation develops through dynamic transactions between personal capacities, cognitive-affective processes, and the social environment. Such a framework is particularly relevant to type II diabetes because its management is highly dependent on sustained self-regulation, repeated decision-making, adherence behavior, and the capacity to cope with recurring emotional demands.

The psychological burden associated with diabetes provides further justification for identifying mechanisms that facilitate adaptation. Patients may experience diabetes-related distress, anxiety, fear regarding complications, frustration related to behavioral restrictions, and diminished

confidence in their ability to manage the disease. Evidence indicates that interventions directly targeting psychological tension can reduce diabetes-related distress and anxiety among people with type II diabetes, demonstrating that emotional burden is both clinically meaningful and potentially modifiable (Arunraj et al., 2025). Large-scale health data have also increasingly been used to identify individuals with type II diabetes who are at risk for depression and anxiety, further illustrating the close relationship between metabolic illness and psychological health (Feng et al., 2025). In younger adults with type II diabetes, health-related quality of life is linked to self-efficacy and self-care behaviors, suggesting that psychological resources influence adaptation partly through their effects on patients' confidence and disease-management behaviors (Jang & Yang, 2025). Related research in diabetes populations has emphasized that psychological adjustment should not be understood solely at the individual level because emotional experiences within family systems may also influence illness-related functioning. For instance, emotional contagion between adolescents with diabetes and their primary caregivers has highlighted the value of psychological support that addresses relational processes as well as the patient's individual experience (Rodríguez-Rubio et al., 2025). The psychological burden observed across diabetes populations, including younger individuals and their families, further supports the need for models that integrate intrapersonal and interpersonal determinants of adaptation (Karakolias & Iliopoulou, 2025). Accordingly, an explanatory model of adaptation to type II diabetes should consider both internal psychological strength and the mechanisms through which patients regulate distress and draw upon supportive relationships.

One potentially important internal resource is ego strength. Ego strength broadly reflects an individual's capacity to maintain psychological organization, tolerate internal and external pressures, regulate impulses and emotions, preserve realistic judgment, and respond adaptively to stress. Individuals with stronger ego functioning may be better able to maintain continuity of identity and purposeful behavior when confronted with prolonged adversity, whereas weaker ego resources may leave individuals more vulnerable to anxiety, dysregulated affect, avoidance, and ineffective coping. Empirical findings have linked ego strength with a range of psychological outcomes. Among university students, ego strength has been examined in relation to social anxiety, supporting the

relevance of stable internal psychological capacities to emotional functioning in socially demanding contexts (Zidan & Hmooud, 2024). Ego strength has also been identified as a mediating construct in research on attachment and executive functioning among individuals with mild cognitive impairment, suggesting that it may serve as an organizing psychological resource connecting relational patterns to higher-order cognitive functioning (Mohammadi et al., 2024). Particularly relevant to the present study, research among patients with rheumatoid arthritis has demonstrated that ego strength can contribute to adaptation to pain, with cognitive emotion regulation operating as a mediating mechanism (Jahangiri et al., 2022). These findings support the proposition that ego strength may affect adaptation to chronic disease not merely through a direct pathway but also through the cognitive and emotional processes that individuals employ when confronting illness-related stress. In type II diabetes, stronger ego functioning may facilitate acceptance of disease-related realities, consistent adherence to treatment demands, more effective management of negative affect, and greater willingness to seek or utilize interpersonal resources. Nevertheless, the mechanisms connecting ego strength to diabetes adaptation remain insufficiently clarified, particularly when cognitive emotion regulation and social support are examined simultaneously.

Cognitive emotion regulation constitutes one of the most plausible mechanisms through which ego strength may influence adaptation. Emotion regulation refers to the processes by which individuals modify the occurrence, intensity, duration, expression, or interpretation of emotional experiences in accordance with situational demands and personal goals. Contemporary conceptualizations emphasize that emotion regulation is not a unitary process but encompasses multiple strategies whose consequences vary according to context, flexibility, and the function they serve (Gross, 2024). Cross-cultural evidence similarly indicates that emotion regulation strategies are systematically associated with psychological health, although the adaptiveness of particular strategies may partly depend on cultural and situational contexts (Tamir et al., 2024). Cognitive emotion regulation specifically concerns the cognitive methods used to interpret and manage emotionally arousing events. Adaptive strategies may include positive reappraisal, planning, acceptance, perspective taking, and refocusing on constructive aspects of an experience, whereas maladaptive strategies may involve catastrophizing, rumination, self-blame, or persistent negative interpretation.

These strategies are especially relevant to chronic illness because the disease itself cannot simply be removed; patients must instead regulate recurring emotional reactions to symptoms, treatment demands, uncertainty, and perceived threats. Evidence from students has shown that cognitive emotion regulation can mediate the association between cognitive flexibility and anxiety, illustrating how broader psychological capacities may influence emotional outcomes through regulation processes (Garavand, 2023). Differences in cognitive emotion regulation strategies have also been observed in groups varying in anxiety-related characteristics, reinforcing the close association between regulation patterns and emotional vulnerability (Ghashghae et al., 2024). Intervention research further demonstrates that emotion regulation processes can be modified therapeutically and are associated with changes in maladaptive emotional phenomena such as anger rumination (Teymouri et al., 2020). Thus, cognitive emotion regulation represents a theoretically plausible bridge between internal ego resources and successful adaptation to diabetes.

A distinction between adaptive and maladaptive cognitive emotion regulation is particularly important because the two may operate through different pathways. Adaptive regulatory strategies can facilitate realistic appraisal, reduce emotional escalation, preserve problem-solving capacity, and allow individuals to continue engaging in treatment and daily activities despite distress. By contrast, maladaptive regulatory strategies may amplify negative affect, prolong stress responses, narrow attention toward threatening information, and reduce confidence in one's capacity to cope. This distinction has been increasingly emphasized across psychological research. Meta-analytic evidence from populations characterized by marked emotion-regulation difficulties demonstrates that dysregulation is associated with substantial functional and psychological consequences and that interventions targeting regulation may improve adjustment (Restoy et al., 2024). Broader developments in affective science have also expanded the measurement and interpretation of emotional processes. For example, computational models are increasingly capable of detecting emotional states and adapting responses based on emotional information (Shi, 2025), while multimodal deep-learning approaches have advanced the recognition of emotion from multiple behavioral and communicative signals (Geetha et al., 2024). Related work on visual and language-based emotion interpretation further demonstrates increasing scientific attention to the detection and representation of emotional

states across complex contexts (Song et al., 2024). Although such technological research differs methodologically from clinical studies of chronic illness, it reflects the growing recognition that emotion is multidimensional, dynamic, and central to adaptive behavior. For patients with diabetes, the essential issue is not merely whether negative emotions occur, but how these emotions are cognitively processed and whether regulation promotes constructive engagement or reinforces distress. Ego strength may therefore foster adaptation partly because individuals with stronger psychological organization are more capable of employing adaptive strategies and less likely to rely on maladaptive cognitive responses when confronted with disease-related stress.

Social support constitutes a second important pathway through which ego strength may be related to adaptation. Social support encompasses emotional reassurance, practical assistance, informational guidance, companionship, and the perception that reliable others are available during periods of need. For individuals living with a chronic illness, social relationships can affect treatment adherence, illness perceptions, emotional security, motivation, and confidence in self-management. Patients who perceive adequate support may experience disease-related demands as more manageable because responsibility for coping is not experienced as entirely solitary. Social support may also reduce the emotional impact of stressful events by facilitating emotional expression, providing alternative interpretations, and reinforcing adaptive health behaviors. Evidence from chronic disease populations indicates that social support is associated with better adaptation and may interact with personal psychological resources (Besharat & Ramesh, 2019). Its mediating role has also been supported in models of psychosocial adjustment to illness, suggesting that interpersonal resources may translate internal beliefs or psychological characteristics into more successful adaptation (Akbarzadeh & Hashemi, 2024). Findings concerning family emotional processes in diabetes further indicate that patient adjustment may be embedded in reciprocal relational systems rather than determined exclusively by individual characteristics (Rodríguez-Rubio et al., 2025). Even outside medical contexts, research on psychosocial adjustment demonstrates that the quality of interpersonal functioning and the ways individuals position themselves in relation to others can distinguish more adaptive from less adaptive adjustment profiles (Garandean et al., 2025). Thus, social support is not merely an external background variable but may serve as a mechanism through

which stronger ego functioning translates into improved adaptation: individuals with greater ego strength may communicate needs more effectively, establish more stable interpersonal relationships, seek help when appropriate, and use available support more constructively.

Considering ego strength, cognitive emotion regulation, and social support within a unified framework may provide a more comprehensive account of adaptation to type II diabetes. Theoretical and empirical evidence suggests that chronic illness adaptation emerges from reciprocal relations among psychological resources, cognitive-affective processes, interpersonal relationships, and disease-management behaviors. Patients with stronger ego resources may be better positioned to tolerate the demands of chronic illness, but the beneficial effect of this internal capacity may depend partly on how they cognitively regulate emotional experiences and whether they can access and utilize supportive relationships. Adaptive cognitive regulation may convert ego strength into constructive interpretations and coping responses, while maladaptive regulation may weaken the potential benefits of ego strength by maintaining distress and negative cognitive patterns. Social support may simultaneously function as an interpersonal pathway that enhances emotional security, encourages self-care, and buffers disease-related stress. These pathways are especially important because effective diabetes management depends substantially on sustained patient engagement, self-efficacy, and repeated health behaviors rather than on isolated medical decisions (Jang & Yang, 2025). Moreover, recognition of diabetes as both a medical and psychological burden argues for integrated approaches that incorporate emotional assessment and psychosocial intervention into routine care (Arunraj et al., 2025; Feng et al., 2025). Despite the increasing attention devoted to psychological adaptation, emotion regulation, and social support across chronic illnesses, fewer studies have simultaneously examined adaptive and maladaptive cognitive emotion regulation strategies together with social support as mediators of the relationship between ego strength and adaptation specifically among individuals with type II diabetes, leaving an important gap in understanding the distinct intrapersonal and interpersonal pathways through which psychological resources contribute to successful disease adjustment. Therefore, the present study aimed to examine the mediating roles of adaptive and maladaptive cognitive emotion regulation strategies and social support in the relationship between ego strength and adaptation to type II diabetes.

2. Methods and Materials

2.1. Study Design and Participants

This study employed a descriptive-correlational design using path analysis to investigate the mediating role of cognitive emotion regulation strategies and social support in the relationship between ego strength and adaptation to type II diabetes. The statistical population comprised all diabetic patients aged 30 to 75 years who attended the Taban Diabetes Clinic in Tehran. Based on questionnaire responses, a sample of 250 individuals was selected through simple random sampling.

2.2. Data Collection Tools

Ego Strength Scale: The Ego-Strength Scale is a 25-item tool adapted from measures of Ego-control, Ego-resiliency, Defense mechanisms, and Coping strategies to assess the level of an individual's ability to manage and cope with challenging life situations (Besharat, 2016). This scale measures individual reactions to difficult life situations on a five-point Likert scale from 1 (very low) to 5 (very high) across five subscales: Ego-control, Ego-resiliency, Mature defense mechanisms, problem-focused coping strategies, and positive emotional-focused coping strategies. The minimum and maximum scores for each subscale of ego-strength are 5 and 25, respectively. The total score for ego-strength is calculated from the sum of the five subscale scores, ranging from 25 to 125. Psychometric properties of the Ego-Strength Scale have been examined and validated in several studies conducted from 2005 to 2014 on patient ($n = 372$) and normative ($n = 1257$) samples (Basharat, 2016). In these studies, Cronbach's alpha coefficients for each of the subscales were found to be: for ego-control from 0.73 to 0.79, for ego-resilience from 0.80 to 0.86, for developed defense mechanisms from 0.70 to 0.83, for problem-focused coping strategies from 0.81 to 0.90, for positive emotional-focused coping strategies from 0.69 to 0.85, and for the total score of the Ego-Strength Scale from 0.89 to 0.93. These coefficients confirm the internal consistency of the Ego-Strength Scale. Test-retest reliability of the Ego-Strength Scale for patient ($n = 122$) and normative ($n = 274$) samples was assessed over two occasions with intervals of 2 to 4 weeks, yielding coefficients of 0.65 to 0.73 for ego-control, 0.70 to 0.84 for ego-resilience, 0.73 to 0.85 for developed defense mechanisms, 0.71 to 0.78 for problem-focused coping strategies, 0.67 to 0.81 for positive emotional-focused coping strategies, and 0.83 to 0.88 for the total score

of the ego-Strength Scale. All of these coefficients were statistically significant at $p < 0.001$, confirming the test-retest reliability of the Ego-Strength Scale. Convergent and discriminant validity of the ego-strength Scale was assessed through concurrent administration of the Mental Health Inventory, Difficulties in Emotion Regulation Scale (DERS), and Positive and Negative Affect Schedule across various samples from both patient and normative groups, and was confirmed. These coefficients were also statistically significant at $p < 0.001$. Results from exploratory and confirmatory factor analyses identified five factors (ego-control, ego-resilience, developed defense mechanisms, problem-focused coping strategies, and positive emotional-focused coping strategies), confirming the construct validity of the Ego-Strength Scale (Basharat, 2016).

Multidimensional Scale of Perceived Social Support (MSPSS): The MSPSS is a 12-item tool that measures social support from three sources: family, friends, and significant others on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). The minimum and maximum scores for the total scale are 12 and 84, respectively, and for each of the subscales (family support, friend support, and significant other support), the scores range from 4 to 28. A higher score indicates greater perceived social support. The psychometric properties of the MSPSS have been validated in several studies. In a preliminary investigation of the psychometric properties of this scale in Iranian samples ($n = 742$; 311 students, 431 general populations), Cronbach's alpha coefficients for the total scale and the items of the three subscales were calculated as follows: 0.91 for the total scale, 0.87 for family support, 0.83 for friend support, and 0.89 for significant other support. These coefficients confirm the internal consistency of the MSPSS (Basharat, 2007). Correlation coefficients between scores of several participants (74 women, 63 men) over two occasions with intervals of 2 to 4 weeks, were calculated for the total scale and the three subscales: 0.86 for family support, 0.78 for friend support, and 0.69 for significant other support, and 0.75 for the total scale. These coefficients, which were statistically significant at $p < 0.001$, confirm the test-retest reliability of the MSPSS (Besharat, 2007). Convergent and discriminant validity of the MSPSS was assessed through concurrent administration of the Mental Health Inventory, the Emotional Empathy Scale, and the Positive and Negative Affect Schedule across various samples from both student and general population groups. The correlation coefficients for perceived social support with psychological well-being were 0.57, with emotional empathy 0.53, with positive affect

0.49, with psychological distress -0.51, and with negative affect -0.55. These coefficients were statistically significant at $p < 0.001$. Results from exploratory and confirmatory factor analyses identified three factors (family support, friend support, and significant other support), confirming the construct validity of the MSPSS (Besharat, 2007).

Adjustment to Illness Scale (AIS): The AIS is a 12-item tool that measures adjustment to medical illnesses on a 7-point scale ranging from 0 (not at all true) to 6 (very true) (Bazzazian & Besharat, 2010). The minimum and maximum scores for patients on the total scale are 0 and 72, respectively. A higher score indicates higher levels of adjustment to illness and participation in normal life activities despite experiencing and enduring the stresses and limitations associated with the illness. The psychometric properties of the AIS have been examined and validated in samples of patients with coronary artery illness ($n = 46$; 19 women, 27 men), multiple sclerosis ($n = 120$; 79 women, 41 men), chronic musculoskeletal pain ($n = 100$; 67 women, 33 men), and infertility ($n = 280$; 140 women, 140 men) (Basharat & Ramesh, 2019). Internal consistency of the AIS was confirmed in these studies, with Cronbach's alpha coefficients ranging from 0.71 to 0.87. Convergent and discriminant validity of the AIS was assessed through concurrent administration of the Mental Health Inventory, Hospital Anxiety and Depression Scale, and the Positive and Negative Affect Schedule across various samples. Correlation coefficients for adjustment to illness with psychological well-being were 0.65, with positive affect 0.59, with psychological distress -0.51, and with negative affect -0.57. These coefficients were statistically significant at $p < 0.001$. Predictive validity of the AIS was assessed by comparing adjustment scores between healthy and patient groups. Results indicated that the adjustment score was sensitive to differences and distinctions between the two groups at $p < 0.001$ (Besharat & Ramesh, 2019). Results from exploratory and confirmatory factor analyses identified a single general factor, confirming the construct validity of the AIS (Bazzazian & Besharat, 2010).

Cognitive Emotion Regulation Questionnaire (CERQ): The CERQ is an 18-item tool that measures cognitive emotion regulation strategies in response to threatening and stressful life events on a 5-point scale ranging from 1 (never) to 5 (always). It assesses these strategies based on nine subscales, which are: self-blame, other-blame, thought/rumination, catastrophizing, putting into perspective, positive refocusing, positive reappraisal, acceptance, and refocus on planning (Garnefski & Kraaij,

2006). The minimum and maximum scores for each subscale range from 2 to 10, respectively, with a higher score indicating greater use of that cognitive strategy. The psychometric properties of the CERQ have been validated in foreign studies (Garnefski, Kraaij, & Spinhoven, 2001; Garnefski & Kraaij, 2006; Garnefski, Baan, & Kraaij, 2005). In a preliminary investigation of the psychometric properties of this questionnaire in a sample of the general population ($n = 368$; 197 women, 171 men), Cronbach's alpha coefficients for the subscales ranged from 0.67 to 0.89 (Besharat, 2016). These coefficients confirm the internal consistency of the CERQ. Correlation coefficients between scores of several participants in the study (43 women, 36 men) over two occasions with time intervals of 2-4 weeks, were calculated for the subscales, ranging from $r = 0.57$ to $r = 0.76$. These coefficients, which were statistically significant at $p < 0.001$, confirm the test-retest reliability of the CERQ. The content validity of the CERQ was assessed based on the judgments of eight psychology experts, and Kendall's concordance coefficients for the subscales ranged from 0.81 to 0.92 (Besharat, 2016).

Table 1

Means, Standard Deviations, and Correlations of Research Variables

Variables	Mean (SD)	1	2	3	4
1. Adjustment to Illness	36.61 (8.00)	1			
2. Adaptive Coping Strategies	3.49 (0.877)	0.641 ($p < .01$)	1		
3. Maladaptive Coping Strategies	2.57 (0.89)	-0.587 ($p < .01$)	-0.345 ($p < .01$)	1	
4. Social Support	59.75 (20.24)	0.570 ($p < .01$)	0.464 ($p < .01$)	-0.472 ($p < .05$)	1
5. Ego Strength	81.28 (14.32)	0.556 ($p < .01$)	0.480 ($p < .05$)	-0.404 ($p < .001$)	0.598 ($p < .01$)

As shown in Table 1, adaptive coping strategies, perceived social support, and ego strength exhibited statistically significant positive correlations with illness adjustment at the 0.01 level ($r = 0.641$, $r = 0.570$, and $r = 0.556$, respectively). In contrast, maladaptive coping strategies were significantly negatively correlated with illness adjustment ($r = -0.587$, $p < .01$). Furthermore, adaptive coping was positively associated with social support ($r = 0.464$, $p < .01$) and ego strength ($r = 0.480$, $p < .01$), whereas maladaptive coping demonstrated significant negative associations with both social support ($r = -0.472$, $p < .01$) and ego strength ($r = -0.404$, $p < .01$). A strong

2.3. Data Analysis

Data were collected using standardized psychometric instruments and analyzed using AMOS software. The study hypothesized that emotion regulation strategies and social support would mediate the association between ego strength and adaptation to diabetes. Model fit was assessed using established indices, including the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA). All procedures complied with ethical guidelines, including obtaining informed consent and ensuring participant confidentiality.

3. Findings and Results

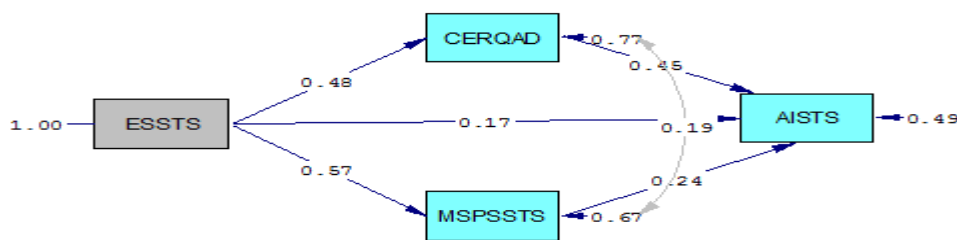
Table 1 presents the descriptive characteristics of the variables under study, including the mean and standard deviation, along with the correlation matrix of the research variables.

positive correlation was also found between social support and ego strength ($r = 0.598$, $p < .01$). Given that the data met normality assumptions, model estimation was performed using the Maximum Likelihood (ML) method.

Figure 1 illustrates the standardized path coefficients obtained from the model examining the mediating role of adaptive coping strategies and perceived social support in the relationship between ego strength and illness adjustment. Within this model, adaptive coping accounted for 23% of the variance, social support for 33%, and illness adjustment for 51%.

Figure 1

Standardized Path Coefficients in the Model Examining the Mediating Role of Adaptive Coping Strategies and Social Support

**Figure 2**

Standardized Path Coefficients in the Model Examining the Mediating Roles of Maladaptive Coping Strategies and Social Support (AISTS = Illness Adjustment; CERQAD = Maladaptive Coping Strategies; MSPSSTS = Social Support; ESSTS = Ego Strength)

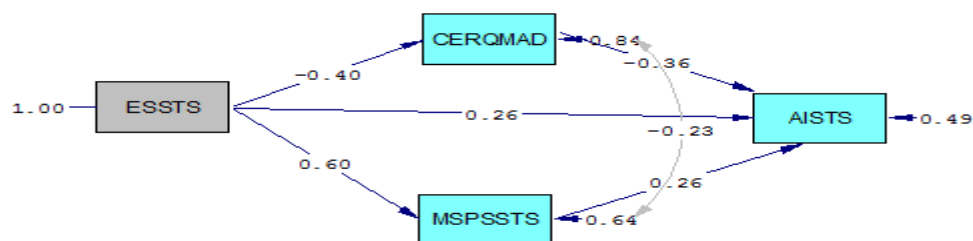


Figure 2 illustrates the standardized path coefficients derived from the structural model assessing the mediating roles of maladaptive coping strategies and perceived social support in the association between ego strength and illness adjustment. Within this framework, maladaptive coping

accounted for 16% of the variance, social support for 36%, and illness adjustment for 51%. Table 2 displays both the unstandardized and standardized coefficients associated with each model.

Table 2

Direct Structural Paths and Standardized Coefficients in the Proposed Research Models

Model	Predictor	Outcome	B	β	t
Model 1: Mediating Role of Adaptive Coping and Social Support	Adaptive Coping Strategies	Ego Strength	0.03	0.48	8.28
	Social Support	Ego Strength	0.86	0.57	10.55
	Illness Adjustment	Ego Strength	0.10	0.17	2.84
	Illness Adjustment	Adaptive Coping Strategies	0.38	0.45	8.18
	Illness Adjustment	Social Support	0.09	0.24	4.10
Model 2: Mediating Role of Maladaptive Coping and Social Support	Maladaptive Coping Strategies	Ego Strength	0.03	-0.40	-6.60
	Social Support	Ego Strength	0.88	0.60	11.29
	Illness Adjustment	Ego Strength	0.15	0.26	4.45
	Illness Adjustment	Maladaptive Coping Strategies	-0.27	-0.36	-6.69
	Illness Adjustment	Social Support	0.10	0.26	4.16

Note. B = Unstandardized coefficient; β = Standardized coefficient; t = t-value. Each model investigates distinct coping strategy constructs as mediators between ego strength and adjustment to illness.

As presented in Table 2, within Model 1—examining the mediating roles of adaptive coping strategies and social support—the direct effects of ego strength on adaptive coping, social support, and illness adjustment were statistically significant. Likewise, the direct effects of adaptive coping and social support on illness adjustment were both positive and significant. Sobel test results confirmed that the indirect effects of ego strength on illness adjustment, mediated by adaptive coping strategies ($\beta = .21$) and by social support ($\beta = .14$), were statistically significant. These findings indicate that both variables function as mediators between ego strength and illness adjustment.

Table 3

Model Fit Indices for the Structural Equation Models Assessing the Mediating Effects of Coping Strategies and Social Support

Model	χ^2	df	χ^2/df	RMSEA	GFI	AGFI	CFI
Model 1: Adaptive Coping Strategies and Social Support	3.80	1	3.80	0.05	0.97	0.96	0.96
Model 2: Maladaptive Coping Strategies and Social Support	2.98	1	2.98	0.04	0.95	0.93	0.94
Acceptable Thresholds ¹	—	—	< 3.00	< 0.08	≥ 0.90	≥ 0.85	≥ 0.90

Note. RMSEA = Root Mean Square Error of Approximation; GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index; CFI = Comparative Fit Index; df = degrees of freedom; χ^2 = chi-square statistic.

¹ Based on conventional cut-off criteria for adequate model fit in Structural Equation Modeling (SEM) literature.

Based on the obtained fit indices, it can be concluded that both models demonstrate an adequate level of congruence with the observed data. Therefore, the proposed conceptual model outlined in the introduction—characterized by acceptable beta coefficients and appropriate model-data fit, can be regarded as empirically supported.

4. Discussion

The present study examined the mediating roles of cognitive emotion regulation strategies and social support in the relationship between ego strength and adaptation to type II diabetes. The findings showed that ego strength exerted a significant direct effect on adaptation to diabetes and also influenced adaptation indirectly through adaptive cognitive emotion regulation strategies, maladaptive cognitive emotion regulation strategies, and social support. Specifically, adaptive cognitive emotion regulation strategies demonstrated a positive mediating effect, with an indirect effect of 0.21, while social support also positively mediated the relationship between ego strength and disease adaptation, with an indirect effect of 0.14. In contrast, maladaptive cognitive emotion regulation strategies showed a significant negative mediating effect, with an indirect

In Model 2, which assesses the mediating effects of maladaptive coping strategies and social support, the direct effects of ego strength on maladaptive coping, social support, and illness adjustment were also statistically significant. Furthermore, the direct effects of maladaptive coping and social support on illness adjustment reached significance. Sobel test results revealed that the indirect effects of ego strength on illness adjustment via maladaptive coping strategies ($\beta = .14$) and social support ($\beta = .16$) were both significant, supporting the mediational role of these constructs in the relationship between ego strength and illness adjustment.

effect of -0.14 . Taken together, these findings indicate that ego strength contributes to successful adaptation not only as an intrapsychic resource in its own right, but also through the cognitive strategies patients use to manage emotional experiences and through the social resources available to them. The results therefore support a multidimensional understanding of adaptation to chronic illness in which personal psychological capacity, emotion-regulation processes, and interpersonal support operate in an interconnected manner.

The significant direct relationship between ego strength and adaptation to type II diabetes suggests that patients with greater internal psychological organization may be better equipped to tolerate the ongoing demands of chronic disease and preserve adaptive functioning. Ego strength reflects the capacity to maintain emotional stability, realistic judgment, impulse regulation, and continuity of functioning under conditions of stress. These characteristics are particularly important in diabetes because patients must repeatedly respond to treatment demands, lifestyle changes, health uncertainty, and the possibility of long-term complications. The present finding is consistent with evidence indicating that ego strength is related to better psychological functioning and lower vulnerability to distress. Zidan and

Hmooud reported an association between ego strength and social anxiety, suggesting that stronger ego functioning may protect individuals against maladaptive emotional responses in demanding contexts (Zidan & Hmooud, 2024). Similarly, Mohammadi et al. identified ego strength as an important psychological mechanism linking attachment styles to executive functions, reinforcing the view that ego strength may contribute to effective regulation of cognition and behavior (Mohammadi et al., 2024). Particularly consistent with the present study, Jahangiri et al. showed that ego strength was associated with adaptation to pain among patients with rheumatoid arthritis and that this relationship was partly mediated by cognitive emotion regulation (Jahangiri et al., 2022). Together, these findings support the interpretation that ego strength functions as a general psychological resource that enhances patients' capacity to respond adaptively to chronic stressors and to preserve purposeful functioning despite illness-related demands.

The positive mediating role of adaptive cognitive emotion regulation strategies represents one of the central findings of the present study. The indirect effect of 0.21 indicates that part of the influence of ego strength on disease adaptation occurs because individuals with stronger ego functioning may be more likely to use constructive cognitive strategies when confronted with stress. Adaptive strategies such as positive reappraisal, acceptance, refocusing on planning, and putting adverse experiences into perspective can reduce emotional escalation and facilitate more effective problem solving. In the context of diabetes, these strategies may help patients interpret disease-related challenges in manageable rather than catastrophic terms, maintain engagement with treatment, and preserve a sense of control over daily self-management. This finding is consistent with the theoretical view that emotion regulation shapes the way individuals modulate emotional responses in accordance with situational demands and personal goals (Gross, 2024). It is also supported by cross-cultural evidence indicating that emotion regulation strategies are systematically related to psychological health, although the effectiveness of specific strategies may depend partly on context (Tamir et al., 2024). The present result extends this literature by showing that adaptive regulation may constitute a specific pathway through which ego strength facilitates adjustment to type II diabetes.

The mediating role of cognitive emotion regulation is also consistent with findings from studies of other health and psychological conditions. Garavand demonstrated that cognitive emotion regulation mediated the association

between cognitive flexibility and coronavirus-related anxiety, indicating that broader psychological capacities may exert their effects through the ways individuals cognitively process emotional experiences (Garavand, 2023). Jahangiri et al. similarly found that cognitive emotion regulation played a mediating role in the relationship between ego strength and adaptation to pain in patients with rheumatoid arthritis (Jahangiri et al., 2022). Research on multiple sclerosis has also shown that cognitive regulation of emotion contributes to adaptation to chronic illness alongside disease perception and coping processes (Rast et al., 2022). In cancer populations, psychological adjustment has likewise been modeled as a function of emotion regulation and related intrapersonal resources (Rahimzadegan et al., 2022). Collectively, these findings suggest that adaptive emotion regulation is not merely a correlate of better functioning but may represent an explanatory mechanism through which internal psychological resources translate into more successful adaptation. For patients with type II diabetes, the ability to reinterpret negative events, accept uncontrollable aspects of illness, and redirect attention toward constructive action may reduce the emotional burden associated with treatment demands and thereby improve overall adjustment.

The negative mediating effect of maladaptive cognitive emotion regulation strategies provides complementary evidence regarding the mechanism connecting ego strength to adaptation. The indirect effect of -0.14 suggests that maladaptive strategies may weaken adjustment by amplifying negative affect and sustaining dysfunctional interpretations of illness-related events. Strategies such as rumination, catastrophizing, self-blame, and persistent focus on negative consequences can intensify perceived stress, undermine problem-solving capacity, and interfere with consistent self-care behaviors. Patients who repeatedly interpret disease-related difficulties through a maladaptive cognitive lens may be more likely to experience hopelessness, anxiety, and emotional exhaustion, which may in turn compromise adaptation. This interpretation is consistent with studies demonstrating that emotion dysregulation is closely associated with poor psychological functioning. Restoy et al., in a meta-analysis of emotion regulation and dysregulation, showed that maladaptive emotional processes are linked to poorer outcomes and that interventions targeting regulation can improve adjustment (Restoy et al., 2024). Ghashghaee et al. also reported meaningful differences in cognitive emotion regulation strategies in relation to anxiety-related characteristics,

reinforcing the association between maladaptive regulation and emotional vulnerability (Ghashghaee et al., 2024). Furthermore, Teymouri et al. demonstrated that interventions capable of modifying emotion regulation processes can influence maladaptive emotional outcomes such as anger rumination (Teymouri et al., 2020). The present finding therefore supports the proposition that one route through which ego strength contributes to adaptation is by reducing reliance on maladaptive cognitive strategies that otherwise prolong distress.

The importance of emotion-regulation processes becomes especially evident when the psychological burden of diabetes is considered. Diabetes requires sustained behavioral control and repeated confrontation with potentially threatening health information, which may create conditions conducive to anxiety and distress. Arunraj et al. showed that psychological interventions such as progressive muscle relaxation can reduce diabetes distress and anxiety among individuals with type II diabetes, indicating that emotional burden is an important and modifiable component of diabetes care (Arunraj et al., 2025). Feng et al. likewise highlighted the relevance of depression and anxiety among patients with type II diabetes by developing predictive models based on electronic health records (Feng et al., 2025). These studies support the present finding that emotional processes should be viewed as central rather than peripheral to diabetes adaptation. From this perspective, ego strength may provide the internal stability necessary to respond to illness-related stress, while cognitive emotion regulation determines how that stability is translated into specific appraisals and coping responses. Adaptive strategies may help individuals remain engaged with self-management, whereas maladaptive strategies may heighten distress and impair the ability to respond effectively to treatment demands.

The second major mediating pathway identified in the present study involved social support. Social support demonstrated a significant positive indirect effect of 0.14 in the relationship between ego strength and adaptation to type II diabetes. This finding suggests that stronger ego functioning may facilitate better adjustment partly because individuals with greater psychological stability are more capable of establishing, maintaining, or effectively utilizing supportive relationships. Social support can provide emotional reassurance, practical assistance, informational guidance, and reinforcement of health-related behaviors, all of which may be especially important in the management of a chronic condition. The finding is consistent with Besharat

and Ramesh, who reported that social support, resilience, and spiritual well-being were related to adjustment to heart disease (Besharat & Ramesh, 2019). It also aligns with Akbarzadeh and Hashemi, who found that perceived social support mediated the relationship between health locus of control and psychosocial adjustment to illness among women with polycystic ovary syndrome (Akbarzadeh & Hashemi, 2024). These findings indicate that social support may operate as a meaningful psychosocial mechanism across different chronic health conditions, buffering the effects of stress and facilitating more effective adaptation.

The role of social support may be particularly important in diabetes because many aspects of disease management occur within social and family environments. Dietary changes, medication adherence, appointment attendance, physical activity, and emotional coping can all be influenced by the responses of family members and significant others. Rodríguez-Rubio et al. emphasized the reciprocal emotional processes occurring between individuals with diabetes and their caregivers, showing that psychological support within family systems may be beneficial for adjustment (Rodríguez-Rubio et al., 2025). Karakolias and Iliopoulou similarly emphasized the broader psychological and family burden associated with diabetes, reinforcing the importance of considering patient well-being in relation to the social context (Karakolias & Iliopoulou, 2025). Although these studies focused on different diabetes populations, they converge with the present findings by indicating that adaptation cannot be understood solely as an individual process. Patients with stronger ego resources may be better able to communicate needs, seek assistance, respond constructively to interpersonal feedback, and avoid perceiving support as a threat to autonomy. Consequently, social support may strengthen the beneficial effect of ego strength by translating internal psychological stability into more effective interpersonal coping.

The findings can also be interpreted in relation to self-management and health-related quality of life. Jang and Yang found that health-related quality of life among young adults with type II diabetes was influenced through diabetes self-efficacy and self-care behaviors, underscoring the importance of psychological processes in effective disease management (Jang & Yang, 2025). Although the present study did not directly examine self-efficacy or self-care, it is plausible that both adaptive emotion regulation and social support improve adaptation partly by strengthening patients' confidence and persistence in self-management. Individuals who regulate emotions effectively may be better able to

maintain treatment behaviors despite frustration or setbacks, while supportive relationships may provide encouragement and practical assistance. This interpretation also complements evidence that the burden of chronic disease includes psychological as well as medical dimensions. The need for integrated models is further emphasized by epidemiological evidence concerning the continuing burden of diabetes and its complications (Holt et al., 2024; Jafarvand et al., 2021). Even as biomedical treatments and preventive strategies advance (Jastreboff et al., 2025), psychological and social determinants remain important because treatment effectiveness depends partly on the patient's capacity to engage with long-term care.

More broadly, the present findings support an integrative model in which adaptation to type II diabetes emerges from interactions between relatively stable psychological resources and more proximal regulatory and interpersonal processes. Ego strength can be conceptualized as a foundational capacity that supports emotional stability and effective coping, while cognitive emotion regulation represents a mechanism through which patients interpret and manage the emotional demands of illness. Social support provides an interpersonal pathway that may buffer stress, reinforce adaptive behaviors, and increase perceived coping resources. This interpretation is compatible with contemporary perspectives emphasizing the complexity and multidimensionality of emotion and adjustment. Advances in emotion-recognition research have demonstrated that emotional states involve multiple interacting signals and cannot be reduced to a single response system (Geetha et al., 2024; Song et al., 2024). Similarly, emerging adaptive technologies increasingly seek to identify emotional states and tailor responses accordingly (Shi, 2025). Although such technological studies differ from the present clinical model, they reinforce a broader scientific shift toward viewing emotion regulation as a dynamic and central component of adaptive functioning. The current findings contribute to this perspective by showing that adaptation to chronic illness is shaped not only by whether patients experience distress but also by how they cognitively regulate that distress and whether they have access to supportive social resources.

5. Conclusion

The present findings also have implications for the conceptualization of psychosocial adjustment. Adaptation should not be regarded simply as the absence of depression, anxiety, or distress, but as the capacity to sustain functional

equilibrium and meaningful participation in life despite the continuing presence of illness-related challenges (Stubley & McCroy, 2024). This distinction is important because even patients with medically controlled diabetes may experience significant psychological strain, whereas others may maintain good psychosocial functioning despite substantial physical limitations. Research across different populations has shown that adjustment varies as a function of internal resources, interpersonal experiences, and emotional processes (Garandeanu et al., 2025). The current findings extend this perspective to adults with type II diabetes by demonstrating that ego strength contributes to adaptation through two qualitatively different regulatory pathways—adaptive and maladaptive cognitive emotion regulation—as well as through social support. The model therefore suggests that strengthening psychological resilience alone may be insufficient if patients continue to rely on maladaptive cognitive strategies or lack supportive interpersonal resources. Conversely, improvements in emotion regulation and social support may enhance the adaptive benefits associated with stronger ego functioning.

Several limitations should be considered when interpreting the findings of this study. First, the descriptive-correlational and cross-sectional design does not permit definitive conclusions regarding causal direction, even though path analysis was used to test theoretically specified relationships. Second, the sample was drawn from patients attending a single diabetes clinic in Tehran, which may limit the generalizability of the findings to patients receiving care in other regions, rural settings, private medical centers, or populations with different socioeconomic and cultural characteristics. Third, the use of self-report questionnaires may have introduced common-method bias, social desirability effects, and inaccuracies related to participants' subjective perceptions. Fourth, potentially relevant clinical variables such as duration of diabetes, glycemic control, medication regimen, presence of complications, psychiatric history, and comorbid medical conditions were not incorporated into the proposed model. Finally, the current model focused on selected psychological and social variables and did not examine other potentially influential constructs such as self-efficacy, illness perception, coping style, personality characteristics, family functioning, or socioeconomic stress.

Future research should employ longitudinal designs to clarify the temporal ordering among ego strength, emotion regulation, social support, and adaptation to diabetes. Repeated assessment across different stages of the disease

could determine whether these relationships remain stable over time or vary according to treatment phase, disease duration, or emerging complications. Future studies should also replicate the model in larger and more heterogeneous samples drawn from multiple clinical settings and geographic regions. Incorporating objective clinical indicators, including glycated hemoglobin, disease duration, treatment complexity, and complication status, would allow researchers to examine the interaction between psychological adaptation and medical outcomes. Additional studies could compare different age groups, men and women, and patients with varying socioeconomic backgrounds. It would also be valuable to test more complex models incorporating self-efficacy, illness perception, coping, family functioning, resilience, and health literacy, and to evaluate whether adaptive and maladaptive cognitive emotion regulation function differently across demographic or clinical subgroups.

From a practical perspective, the findings suggest that psychological assessment should be incorporated more systematically into the care of patients with type II diabetes. Screening for low ego strength, maladaptive cognitive emotion regulation, and insufficient perceived social support may help identify patients who are at greater risk of poor adaptation. Psychological interventions may be designed to strengthen internal coping resources, increase the use of adaptive strategies such as positive reappraisal and planning, and reduce maladaptive patterns such as rumination, catastrophizing, and self-blame. Family members and significant others may also be involved in psychoeducational programs to improve the quality and effectiveness of social support. Multidisciplinary diabetes services could benefit from closer collaboration among physicians, nurses, psychologists, and counselors so that emotional and interpersonal dimensions of chronic disease management are addressed alongside medical treatment. Such an integrated approach may facilitate more sustainable adaptation, improve engagement with self-care, and enhance overall psychological well-being among individuals living with type II diabetes.

Authors' Contributions

Authors equally contributed to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

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

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