UMSHA Press

JECH
Journal of Education and Community Health

J Educ Community Health. 2025; 12(3):164-170. doi:10.34172/jech.3604

http://jech.umsha.ac.ir

Original Article

The Impact of Emotional Distress on Self-Management Among Patients With Type 2 Diabetes Mellitus in Hamadan City, Iran

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Article history:
Received: April 26, 2025
Revised: July 20, 2025
Accepted: July 23, 2025
ePublished: September 30, 2025

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Abstract

Background: Diabetes-related emotional distress is increasingly recognized as a barrier to effective self-management in individuals with type 2 diabetes mellitus (T2DM). This study aimed to assess the impact of emotional distress on self-management among patients with T2DM.

Methods: This cross-sectional study consisted of 250 patients with T2DM who attended the Endocrinology Specialty Clinic in Hamadan, western Iran, between 2023 and 2024. Participants completed validated Persian versions of the Problem Areas in Diabetes Scale (PAID-5) and the Diabetes Self-Management Questionnaire (DSMQ).

Results: A total of 250 patients (mean age: 57.23 ± 12.00, 51.60% female) were included in the analysis. Patients under 60 years and those with a high school education or diploma reported engaging in self-care behaviors more frequently. The PAID-5 showed a positive correlation with the overall DSMQ score (correlation coefficient = 0.22, $P < 0.001$), glucose management (0.16, $P = 0.01$), dietary control (0.21, $P < 0.001$), physical activity (0.08, $P = 0.21$), and use of healthcare services (0.08, $P = 0.22$). Regression analysis indicated that, after controlling for age and education, each one-unit increase in PAID-5 was associated with a 0.19-unit increase in the mean overall DSMQ score (β [95% CI] = 0.19 [0.06, 0.32], $P = 0.005$).

Conclusion: These findings highlight the importance of integrating routine psychological assessment and targeted interventions into diabetes care. Addressing emotional distress through education, psychological support, and skill development can enhance self-management and improve clinical outcomes for patients with T2DM in Iran and similar regions.

Keywords: Type II diabetes mellitus, Emotional distress, Self-management

Please cite this article as follows: Shekari A, Ayubi E, Borzouei S. The impact of emotional distress on self-management among patients with type 2 diabetes mellitus in Hamadan city, Iran. J Educ Community Health. 2025; 12(3):164-170. doi:10.34172/jech.3604

Introduction

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder that has become a major global public health concern due to its increasing prevalence and associated morbidity and mortality (1-3). The management of T2DM is complex and requires patients to engage in a range of self-management behaviors, including adherence to medication, dietary modifications, regular physical activity, and routine blood glucose monitoring (4). However, the psychological burden of living with diabetes—often referred to as diabetes-related emotional distress—can significantly impair patients' ability to maintain effective self-care practices (5,6). Diabetes distress encompasses the emotional challenges and stressors arising from the daily demands of diabetes management, fear of complications, and perceptions of inadequate support (6,7).

Studies have demonstrated that diabetes-related emotional distress is common among patients with type 2 diabetes and is associated with poor self-care behaviors and suboptimal glycemic control, negatively affecting self-management, treatment adherence, and glycemic outcomes (5,7,8). In Iran, the prevalence of T2DM is rising, making the psychosocial aspects of diabetes care increasingly important (9,10). However, limited research has specifically examined the relationship between diabetes-related emotional distress and self-management behaviors in Iranian populations (11). Understanding this relationship is essential for developing tailored interventions that address both psychological and behavioral factors, ultimately aiming to improve clinical outcomes for patients with T2DM.

For instance, Gonzalez et al found that both depressive symptoms and diabetes distress were strongly associated with poor self-management practices, underscoring the

need to incorporate psychological assessment into routine diabetes care (1). Similarly, Totesora et al reported that diabetes-related emotional distress and inadequate self-care are highly prevalent, and that poor self-care significantly increases the risk of adverse glycemic outcomes (5). Self-efficacy, defined as an individual's belief in their ability to manage diabetes, plays a mediating role in the relationship between emotional distress and self-management behaviors (12). Lower self-efficacy and higher diabetes distress are closely linked to poorer glycemic control, underscoring the importance of psychological support in diabetes management (4,12). Moreover, interventions that reduce diabetes-related emotional distress and enhance self-efficacy may improve both self-management behaviors and clinical outcomes (13).

The Problem Areas in Diabetes Scale (PAID-5) and the Diabetes Self-Management Questionnaire (DSMQ) are widely used, validated tools for assessing diabetes distress and self-management, respectively (14,15). These instruments have demonstrated reliability and validity across diverse populations, including Iranian patients with T2DM (16,17). This study aimed to evaluate the relationship between diabetes-related emotional distress and self-management behaviors among adults diagnosed with T2DM in Hamadan, Iran.

Materials and Methods

Study Design and Patients

This analytical cross-sectional study was conducted at the Endocrinology Specialty Clinic in Hamadan, Iran, between July 2023 and February 2024. Inclusion criteria for entering the study included willingness and informed consent to participate, a diagnosis of T2DM for at least one year, and the ability to understand and complete questionnaires. Exclusion criteria included a current or prior diagnosis of any cognitive or psychiatric disorder confirmed by a physician.

Study Size

The sample size was calculated using data reported from the study by Javadi et al (18), in which the mean self-care and emotional distress scores were 56.65 ± 13.13 and 40.82 ± 15.15, respectively. Additionally, the reported correlation between the two variables was −0.25. The sample size was determined based on:

$$(N)=[(\frac{Z_{\alpha}+Z_{\beta}}{C})]^2+3$$

where

$Z_{\alpha} = 1.9600$ (for $\alpha = 0.05$, 95% confidence),

$Z_{\beta} = 1.2816$ (for $\beta = 0.20$, corresponding to 80% statistical power),

$$C = \frac{1}{2} \times \ln\left[\frac{1+r}{1-r}\right] \text{ with } r = -0.25.$$

The estimated sample size was 164 participants. Considering the inclusion of 15 individuals for each confounding variable, the final sample size was set at 250 patients.

Data Collection

Patients completed the Persian versions of the questionnaires in a quiet and private setting. Questionnaires were self-administered and supervised by a trained research assistant, who provided necessary guidance if required.

Demographic and Background Checklist

Data on participants' age, gender, marital status, educational attainment, type of diabetes treatment, and HbA1c levels were collected through self-report and laboratory results obtained at the same time.

Problem Areas in Diabetes Scale

The PAID-5 questionnaire is a short version of the original PAID, consisting of five questions designed to assess the emotional burden associated with diabetes management (19). The reason for using this questionnaire instead of the PAID-20 is its brevity and suitability for rapid screening of patient distress. Each item is rated on a 5-point Likert scale ranging from 0 (not a problem) to 4 (a serious problem), with higher total scores reflecting greater emotional distress. The validity and reliability of the Persian version of this tool have been previously confirmed in an Iranian study, with a reported Cronbach's alpha coefficient of 0.75 (20).

Diabetes Self-management Questionnaire

The DSMQ includes 16 questions (7 positively worded and 9 negatively worded) that evaluate self-care behaviors during the previous eight weeks across four domains: glucose management, dietary control, physical activity, and healthcare utilization (21). Each item is rated on a 4-point Likert scale from 0 to 3, where 0 indicates "does not apply" and 3 represents 'applies very much." For negatively worded items, reverse scoring was applied as follows: a score of 0 was converted to 3, a score of 1 to 2, a score of 2 to 1, and a score of 3 to 0. Higher scores on the DSMQ indicate better self-management behaviors. The validity and reliability of the Persian DSMQ have been confirmed in patients with T2DM in Iran (22).

Statistical Analysis

Descriptive statistics were presented as frequencies (percentages) for categorical demographic characteristics of the study participants. T-tests and ANOVA were used to compare PAID-5 and DSMQ scores based on binary and multi-category qualitative variables, respectively. Pearson's correlation coefficient was used to determine the pairwise correlation between PAID-5 and DSMQ scores. The effect of PAID-5 on DSMQ was evaluated using linear regression analysis in both univariate and multivariate models. A P value < 0.05 was considered statistically significant. Statistical analyses were performed using Stata software

version 14.

Results

A total of 250 patients were included in the analyses. Table 1 presents the demographic characteristics of the participants. The majority of participants (62.8%) were under 60 years old (mean age: 57.23 ± 12.00 years), and the gender distribution was nearly equal, with 48.4% male and 51.6% female. Most participants were married (94.8%), and 44.4% had less than a high school education. Regarding treatment, 74% were treated with oral medication, while 8.4% received insulin only, and 17.6% were on combination therapy. Hemoglobin A1c levels, an indicator of glycemic control, were suboptimal in most participants, with 82.4% having values > 6.5%.

Table 2 illustrates the comparison of PAID-5 and DSMQ scores based on demographic characteristics. Patients under 60 years old had significantly higher PAID-5 scores compared to those aged 60 and above (mean difference = 1.9; $P < 0.001$). Women had significantly higher PAID-5 scores than men (9.1 ± 4.4 vs. 7.4 ± 3.8; $P = 0.001$). Single patients had higher PAID-5 scores (9.9), but this difference was not statistically significant ($P = 0.16$). In terms of education level, those with a high school diploma had the highest PAID-5 scores. No significant differences in PAID-5 scores were observed based on treatment type or HbA1c level. Only age and education level showed significant impacts on DSMQ scores, with individuals under 60 and those with less than a high school education or a high school diploma having higher DSMQ scores.

Table 3 displays the bivariate correlation between the PAID-5 score and the DSMQ total score as well as its various subsets. The results indicate that the PAID-5 score had significant correlations with the overall DSMQ score (correlation coefficient = 0.22, $P < 0.001$), glucose management (0.16, $P = 0.01$), and dietary control (0.21, $P < 0.001$).

Linear regression analysis demonstrated that, in the univariate regression model, each one-unit increase in the PAID-5 score was associated with a 0.23-unit increase in the mean DSMQ score (β [95% CI] = 0.23 [0.10, 0.35], $P = 0.001$). After adjusting for the effects of age and education level as confounders, for each one-unit increase in the PAID-5 score, the mean DSMQ score increases by 0.19 units (β [95% CI] = 0.19 [0.06, 0.32], $P = 0.005$).

Table 1. Demographic and Background Characteristics of Study Participants

Variable		Frequency (%)
Age (y)	≤60	157 (62.8)
	>60	93 (37.2)
Gender	Male	121 (48.4)
	Female	129 (51.6)
Marital status	Single	13 (5.2)
	Married	237 (94.8)
Education	Less than high school education	111 (44.4)
	High school diploma	57 (22.8)
	University-level education	82 (32.8)
Type of treatment	Injection	21 (8.4)
	Oral	185 (74)
	Injection, Oral	44 (17.6)
Hemoglobin A1c (%)	≤6.5	44 (17.6)
	>6.5	206 (82.4)

Discussion

The present study investigated the impact of diabetes-related emotional distress on self-management behaviors among adults with T2DM in Hamadan, Iran, using validated tools such as the PAID-5 and DSMQ questionnaires. The findings contribute to the growing body of literature highlighting the complex interplay between psychological factors and diabetes self-care, offering implications for both clinical practice and public health interventions.

Table 2. The Comparison of PAID-5 Scores and DSMQ Scores According to Demographic Characteristics

Variable		PAID-5 Scores	*P* Value	DSMQ Scores	*P* Value
Age (y)	≤60	9 (4.2)	<0.001	24.1 (4.9)	0.06
	>60	7.1 (3.9)		23 (3.4)	
Gender	Male	7.4 (3.8)	0.001	23.4 (4.5)	0.23
	Female	9.1 (4.4)		24.1 (4.4)	
Marital Status	Single	9.9 (4.8)	0.16	22.8 (4.5)	0.41
	Married	8.2 (4.2)		23.8 (4.4)	
Education	Less than high school education	7.8 (4.2)	0.003	23.4 (4.1)	0.04
	High school diploma	9.9 (4.3)		25 (3)	
	University-level education	7.8 (3.9)		23.3 (4)	
Type of treatment	Injection	9.6 (5.4)	0.30	24 (3.6)	0.90
	Oral	8.1 (4.1)		23.7 (4.5)	
	Injection, Oral	8.5 (3.9)		23.9 (4.8)	
Hemoglobin bA1c (%)	≤6.5	8.2 (3.8)	0.83	23.7 (3.9)	0.95
	>6.5	8.3 (4.3)		23.7 (4.5)	

Note. PAID: Problem areas in diabetes scale; DSMQ: Diabetes self-management questionnaire.

Table 3. The Bivariate Correlations Between PAID-5 and DSMQ Scores and Its Components

	Mean (SD)	Pearson's Correlation	*P* Value
PAID-5 Score	23.8 (4.4)		
Glucose management	7.7 (2.0)	0.16	0.01
Dietary control	5.8 (1.8)	0.21	<0.001
Physical activity	4.4 (1.5)	0.08	0.21
Healthcare utilization	4.5 (1.7)	0.08	0.22
DSMQ score	8.3 (4.2)	0.22	<0.001

Note. PAID: Problem areas in diabetes scale; DSMQ: Diabetes self-management questionnaire.

Diabetes-related emotional distress, as measured by the PAID-5, was found to be prevalent among the study population, with notable demographic variations. Consistent with previous findings, including the GRADE study (1), younger individuals and women reported higher levels of emotional distress, supporting the view that emotional burden is unevenly distributed across demographic subgroups.

The weak but significant positive correlation between PAID-5 and DSMQ scores observed in this study suggests a nuanced relationship between emotional distress and self-management. While higher distress is often associated with poorer self-care, the direction and strength of this association may be influenced by contextual and individual factors, such as coping strategies, social support, and self-efficacy (2,23). One possible explanation is that the sample consisted of individuals with at least one year of diabetes history. Their familiarity with the disease and its management may have led to improved coping strategies and greater adherence to self-care practices, despite experiencing emotional distress. Emotional distress can also prompt individuals to identify and manage their emotions more effectively, which allows them to react healthier and make better decisions in difficult situations. Furthermore, the effect of factors such as social support cannot be ignored.

Notably, the regression analysis indicated that, after adjusting for age and education, each unit increase in emotional distress was associated with a modest but significant rise in self-management scores. This unexpected directionality may reflect compensatory behaviors among distressed individuals or methodological factors unique to the studied population.

Some patients may respond to distress or anxiety by engaging more rigorously in self-care behaviors as a coping mechanism to regain a sense of control. The influence of variables such as access to treatment resources or diabetes-related information cannot be ignored. Therefore, distress caused by diabetes complications may increase patients' awareness, perceived susceptibility and severity, and health literacy towards disease management, thereby leading to improved self-care behaviors (24,25). However, due to non-random sampling, the study sample may have included patients with higher motivation or better access to diabetes education, who might demonstrate greater self-care even under stressful conditions. Moreover, response bias cannot be ruled out, as social desirability and stigma might have led patients to over-report their self-care activities. Finally, other mediating variables, such as social support, access to healthcare services, information therapy strategies, and self-efficacy, may also influence this relationship but were not examined in the current study (26).

International studies consistently demonstrate that emotional distress impairs diabetes self-management. For example, Gonzalez et al found that both depression and diabetes distress predicted lower adherence and self-management, independent of glycemic control (1). Similarly, Lin et al reported that self-efficacy is a key mediator, with higher self-efficacy buffering the negative effects of distress on self-care and glycemic outcomes (2). This is echoed by Al-Khawaldeh et al, who found that self-efficacy and self-management behaviors are significant predictors of glycemic control, underscoring the importance of psychological empowerment in diabetes care (23).

The role of emotion regulation has gained increasing attention in recent literature. A 2024 study highlighted that difficulties in emotion regulation are typically associated with poorer self-management behaviors, indicating that interventions targeting emotion regulation skills may enhance diabetes self-care outcomes (27). This is particularly relevant in light of observed demographic trends in emotional distress, suggesting that younger and female patients may benefit from tailored psychological interventions.

Consistent with prior research, the current study found that age and education level significantly impact self-management behaviors. Individuals with higher education and younger age tend to exhibit superior self-management, possibly due to greater health literacy and adaptability to lifestyle modifications (7,23). However, the lack of significant differences in emotional distress or self-management based on treatment type or HbA1c levels suggests that psychological and behavioral factors may operate independently of certain clinical parameters in specific contexts.

The relatively weak correlation observed between emotional distress and self-management may also reflect cultural or systemic factors unique to the Iranian context, such as family support structures, healthcare accessibility, or stigma surrounding mental health issues. Previous studies have reported similar trends, underscoring the need for culturally sensitive interventions that address both the emotional and behavioral aspects of diabetes care (28,29).

In many cultures, including Iran, individuals may fear negative judgments when expressing their mental health problems and may conceal their emotional problems to avoid social stigma, potentially resulting in inadequate self-care behaviors. Moreover, cultural attitudes toward mental health may lead individuals to prioritize behaviors that are more related to maintaining social appearance over seeking help. While strong support networks can

help reduce emotional distress, their effectiveness may be diminished when these networks are affected by social stigma.

The use of validated instruments, such as the PAID-5 and DSMQ, strengthens the reliability of the present findings. Both tools have demonstrated robust psychometric properties in Persian-speaking populations, enabling meaningful comparisons with international data (30). However, the cross-sectional design precludes causal inference, and reliance on self-reported data may introduce response bias.

The observed associations underscore the importance of routine screening of emotional distress in diabetes care settings. Therefore, routine assessment of emotional distress, along with other patient-reported outcomes, is crucial for effective diabetes management. As recommended by Gonzalez et al, integrating psychological evaluation into standard diabetes management protocols can facilitate early identification of at-risk individuals and enable timely targeted interventions (1). Moreover, enhancing self-efficacy through education and skill-building programs has been demonstrated to enhance both psychological well-being and self-management behaviors (23,31). Furthermore, interventions targeting emotional distress, such as cognitive-behavioral therapy, peer support, and web-based self-management programs, have demonstrated efficacy in reducing distress and improving self-care outcomes (31). Addressing emotion dysregulation, in particular, may yield additional benefits, as recent evidence suggests that improving emotion regulation skills can directly enhance self-management behaviors (27).

The findings also highlight the need for a multidisciplinary approach to diabetes care that integrates medical, psychological, and educational support. Given the high prevalence of suboptimal glycemic control and emotional distress in the study population, comprehensive care models addressing both metabolic and psychosocial needs are warranted.

Overall, this study reinforces the critical role of emotional distress in shaping diabetes self-management behaviors. The results are consistent with international evidence indicating that distress can impair self-management, and that self-efficacy and emotion regulation are key mediators of this relationship (1,2,7,23,27). For example, Ataya et al reported that despite high levels of diabetes distress and poor mental health, patients with diabetes showed admirable self-efficacy in managing their diabetes (32). Future research should explore longitudinal patterns, intervention efficacy, and the influence of cultural factors on the distress-self-management link.

This study has several limitations. First, its cross-sectional design prevents establishing a temporal or causal relationship between diabetes-related emotional distress and self-management behaviors. Second, participants were recruited from a single specialty clinic in Hamadan, which may limit the generalizability of the findings to other populations. Third, reliance on self-reported questionnaires for both distress and self-management introduces potential recall and social desirability bias. Fourth, the exclusion of individuals with significant psychiatric disorders may have underestimated the true association between distress and self-management in the broader diabetic population. Fifth, potential confounding factors, such as socioeconomic status, diabetes duration, and social support, were not fully controlled, which could affect the observed relationships. Finally, the generalizability and external validity of the current study may be limited due to the sample being captured from a single clinic in Hamadan.

Conclusion

This study has demonstrated a positive relationship between diabetes-related emotional distress and self-management among patients with T2DM. Although these findings cannot be generalized to the entire diabetes population, addressing diabetes-related emotional distress through routine screening, patient education, and targeted psychological interventions is essential for optimizing self-management and improving clinical outcomes in T2DM. Clinicians should address both the emotional distress and disability associated with diabetes, alongside its physical complications. Health policymakers should prioritize integrating psychosocial care into diabetes management, especially in settings where the prevalence of T2DM is increasing and mental health resources are limited. Further large-scale, multicenter studies are recommended to more accurately evaluate the relationship between diabetes-related emotional distress and self-management.

Acknowledgments

The authors would like to acknowledge the Clinical Research Development Unit of Shahid Beheshti Hospital, Hamadan University of Medical Sciences, Iran, for their support in preparing this manuscript (Code: 140202191283).

Authors' Contribution

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Competing Interests

The authors declare that they have no competing interests.

Ethical Approval

The study received ethical approval from the Ethics Committee of Hamadan University of Medical Sciences (Ethical Code: IR.UMSHA.REC.1402.072). Written informed consent was obtained from all

participants prior to data collection.

Funding

This study was funded by Hamadan University Medical Sciences (Code: 140202191283).

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