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Original Article

Structural Equation Modeling Between Self-Knowledge-Coherence, Alexithymia with the Mediation of Self-control and Resilience in People with Type 2 Diabetes

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Abstract

Background and Objective: Diabetes is one of the major causes of morbidity and mortality and increased healthcare costs worldwide. Accordingly, the present study aimed to model the structural relationships between cohesive self-knowledge and emotional alexithymia mediated by self-control and resilience in people with type 2 diabetes.

Materials and Methods: The research method is a descriptive correlational type. The statistical population of all people with type 2 diabetes who were referred to government health centers in Sari (Iran) in the winter of 2023 was 2024 people. The sample size was 300 people with diabetes, based on the Klein model. The samples were selected using a stratified random sampling method. Data were collected using the Ghorbani Coherent Self-Knowledge Questionnaire (2008), the Toronto Emotional Alexithymia Questionnaire (1994), the Tanjeni Self-Control Questionnaire (2004), and the Davidson and Connor Resilience Questionnaire (2003). Data analysis was performed using SPSS and Amos software.

Results: The results of structural equation modeling revealed a structural relationship between coherent self-knowledge and emotional alexithymia, mediated by self-control and resilience in individuals with type 2 diabetes. The conceptual model, based on the research data, demonstrated an acceptable fit.

Conclusion: The findings indicate that the structural relationship between coherent self-knowledge and self-control has a significant positive relationship, coherent self-knowledge has a significant positive relationship with resilience, coherent self-knowledge has a significant negative relationship with emotional alexithymia, self-control has a significant negative relationship with emotional alexithymia, self-control has a significant positive relationship with resilience, resilience has a negative and inverse relationship with emotional alexithymia, and self-control and resilience are full mediators in the relationship between coherent self-knowledge and emotional alexithymia.

Keywords: Coherent Self-knowledge, Emotional Alexithymia, Resilience, Self-control, Structural Equation Modeling

Background

According to the World Health Organization, chronic diseases will be the leading cause of death and disability worldwide by 2030, accounting for two-thirds of all diseases [1]. Today, there is a large body of research that shows that although behavioral and psychological factors may not play a significant role in the onset of pain, they play a decisive role in the persistence of pain and disability [2].

One of the most important chronic diseases is diabetes, which is the fifth leading cause of death in most countries in the world, causing disability, high medical costs, and increased mortality [3]. Diabetes is the most common endocrine disease in the world, responsible for about 4 million deaths worldwide [4] and is not recognized as a single disease but rather a group of metabolic diseases that result from impaired insulin secretion or insulin action, or both, and is characterized by elevated blood sugar levels [5]. Diabetes is a growing public health concern [6]. The importance of diabetes is largely due to its high prevalence and the numerous complications that arise as a result of it. Today, diabetes is considered one of the most significant health, medical, and socio-economic problems worldwide [7].

The World Health Organization (WHO) has declared diabetes a hidden epidemic due to the increasing statistics and trends in the world. The global prevalence of diabetes in adults was 6.4% in 2010, equivalent to 285 million people, and by 2012, it had increased to approximately 371 million people, with an estimated rise to 552 million people by 2030 [8]. A study published in 2010 indicated that the prevalence of diabetes in the Middle East will increase significantly by 2030, and it is estimated that

the annual rate of diabetes in Iran will reach second place after Pakistan by 2030 [9]. Diabetes has major physical complications that lead to a decrease in quality of life and reduced health promotion, but the social complications and psychological consequences of the disease are to such an extent that the extent of its complications is measured and examined by the severity of pain [10].

Today, for the explanation and treatment of many physical diseases, especially chronic conditions such as diabetes, a purely biological model that attributes the origin of all diseases to biological failure is not used. New research explains the etiology of most physical disorders, including chronic pain, in the form of biological, psychological, and social theories [11]. When pain is long-term, secondary biological, psychological, and social effects can significantly contribute to the increase and persistence of various problems, ultimately reducing the quality and promotion of health. Overall, there is now general agreement that the presence and extent of physical injury cannot fully explain the severity of pain and physical symptoms reported among patients with chronic pain and that the presence and extent of physical injury alone cannot explain differences in the level of adjustment of patients with chronic pain [12]. Studies have shown a relationship between integrative self-knowledge and both mental and physical health. Integrative self-knowledge is a dynamic, adaptive, and integrative psychological process that can meaningfully integrate experiences and attributions about oneself at any moment, relating them to each other with awareness of both current and past experiences [13]. Integrative self-knowledge includes experiential self-knowledge and reflective self-knowledge [14]. Experiential self-knowledge is a type of awareness of current psychological states that empowers the individual in the context of current experiences. Reflective self-knowledge is defined as the use of personal experiences in the past to gain a greater understanding of oneself. In the process of reflective self-knowledge, the individual analyzes their experiences through higher and more complex cognitive actions, thereby achieving more complex psychological constructs. Experiential and reflective self-knowledge respond similarly to many variables, with experiential self-knowledge prevailing in difficult and challenging situations that require careful attention to oneself and being in the present moment. In such situations, relying on reflective self-knowledge can lead to habitual responses that have little connection to reality. Conversely, experiential self-knowledge without reflective self-knowledge will lead to a failure to utilize past insights and experiences in analyzing and understanding current circumstances [15].

Many studies have shown that living with type 2 diabetes is accompanied by a variety of negative emotions such as sadness, anger, and sadness. Aphasia is a specific disorder affecting emotion processing, referring more to a reduced ability to identify, recognize, and describe emotions [16]. For people with diabetes, the disease is an emotional burden on them. In this regard, one of the effective causes of the inability to express emotions, which involves the functioning of the body's endocrine glands, is aphasia. Aphasia is characterized by the inability to identify emotions, difficulty in describing emotions, difficulty in distinguishing between emotions and physical changes caused by emotional arousal, and also a tendency to extroverted thinking or severe poverty of symbolic thinking, which limits the disclosure and expression of emotions, feedback, feelings, desires, and tastes [17]. Aphasia is a type of mood disorder that causes an inability to process emotional information and regulate emotions cognitively. These individuals have difficulty correctly identifying emotions from the faces of others, and their capacity to empathize with the emotional states of others is limited [18]. Aphasia has two cognitive and emotional aspects [19]. Individuals with aphasia exaggerate abnormal physical arousal, misinterpret physical signs of emotional arousal, and show emotional distress through physical complaints [20]. In diabetic patients, poor metabolic control is correlated with aphasia [21]. Diabetic patients with aphasia have difficulty identifying and regulating bodily messages and feelings and experience stress at higher levels [17]. Self-control capacity is one of the most valuable and efficient human capabilities [22]. Self-control is the capacity to change and adapt oneself in such a way that an optimal fit between oneself and the world is established [23]. When an optimal fit exists between the individual and the environment, the most significant amount of happiness and satisfaction is achieved. This fit can be achieved through changing and harmonizing oneself [24]. The ability to overcome or change internal responses, as well as to inhibit unwanted behavioral tendencies and refrain from acting on them, is crucial in the concept of self-control [25]. Self-control is the ability to regulate oneself in response to goals, priorities, and environmental demands, and a deficiency in it can manifest itself in the form of underregulation or malregulation [24]. From this perspective, excessive control is a type of malregulation, and people who control inflexibly and excessively have difficulty regulating and directing their self-control capacity. These individuals lack the ability to exert self-control [26]. In contrast,

individuals with high self-control can exercise self-control when necessary and suspend self-control when not necessary [25]. By increasing self-control, an individual may gain better health, reduce the need for medication, enhance the effects of medication, and potentially delay the onset of pathology. In lifestyle diseases such as type 2 diabetes and obesity, diet and lifestyle control are very important for prevention and treatment, so self-control plays a vital role [26]. Higher self-control is associated with changes in eating behaviors, diet quality, and body mass index. Individuals with high self-control, or the ability to delay immediate gratification, perform better in controlling thoughts, regulating emotions, and inhibiting impulses than individuals with low self-control [27]. These individuals are more psychologically adjusted, have fewer psychological problems, show fewer pathological symptoms, and have higher self-esteem [28].

One of the psychological characteristics that is reduced as a result of the occurrence of most diseases is resilience [29]. Resilience is the ability of individuals to effectively adapt to the environment despite being exposed to risk factors. Risk factors are conditions and situations associated with negative consequences and behavioral problems [30]. Resilience is defined as the ability of individuals to adapt well in response to adverse conditions. However, resilience is not the only effective factor in the adaptation of these individuals to injuries or threatening conditions; however, the active and constructive participation of the individual in the environment is also involved. Resilience is the ability of an individual to establish a biological and psychological balance in challenging conditions, a form of self-repair with positive emotional, affective, and cognitive consequences. Resilience increases the level of mental health and life satisfaction [31]. The results of studies indicate that the resilience of diabetic individuals is significantly weaker than that of non-diabetic individuals [32]. Resilience in diabetes is defined as achieving more positive outcomes despite the challenges of living with type 2 diabetes, including engaging in diabetes self-management behaviors, self-perception of having a good quality of life and achieving target blood sugar levels. Resilience is a factor in establishing biological, psychological, and spiritual balance in the face of risky situations [33]. When patients perceive a defect in their physical health, psychological adaptation becomes more difficult [31]. Resilience is defined as the ability of individuals to adapt well in response to adverse conditions. However, resilience is not the only effective factor in the adaptation of these individuals to injuries or threatening conditions but also the active and constructive participation of the individual in the environment. Resilience is the ability of an individual to establish biological and psychological balance in challenging situations, a form of self-repair with positive emotional, affective, and cognitive consequences. Resilience increases the level of mental health and life satisfaction [33].

According to the above, resilience and integrated self-awareness are personality traits that enable adaptive coping in the perception of stress and the face of stressful events through self-regulation, high flexibility, and effective confrontation with the stimulus and coping instead of avoidance. In contrast, people who do not have high resilience and integrated self-awareness may have difficulty responding to negative and stressful stimuli, such as developing diseases such as diabetes [34]. In some studies, resilience has been shown to reduce negative emotions and increase life satisfaction. Therefore, people who experience positive emotions to a greater extent are likely to be more resistant to difficult negative events and are, consequently, more resilient. Resilience is positively correlated with positive emotions and negatively correlated with negative emotions. One of the most widely studied constructs in investigating problems related to the processing and regulation of positive and negative emotions is alexithymia [35]. On the other hand, self-control is the ability to control impulses when a person faces challenges related to his physical and mental health. Self-control refers to the alignment of thought, feeling, and behavior. Self-control is also related to resilience. That is, with increasing self-control, resilience also improves [36].

Since diabetes is one of the most common diseases in human societies, unfortunately, despite the advances in medical science, the prevalence of this disease has not only not decreased but is increasing day by day. Not paying attention to diabetes like any other chronic and debilitating disease, causes problems for the affected person and as a result affects all aspects of the person's daily life. According to the aforementioned, the present study aims to investigate the modeling of the structural relationships between cohesive self-knowledge and emotional alexithymia, with the mediation of self-control and resilience, in individuals with type 2 diabetes. Notably, no modeling research has been conducted in this field to date.

Objectives

The present study aimed to model the structural relationships between cohesive self-knowledge and emotional alexithymia mediated by self-control and resilience in people with type 2 diabetes.

Materials and Methods

The research is a correlational type that uses the statistical method of structural equation modeling. The statistical population of all people with type 2 diabetes who were referred to government medical centers in Sari (Iran) in the winter of 2023 was 2024 people. The sample size was 300 people with diabetes, based on the Klein model. The samples were selected using a stratified random sampling method, considering the inclusion and exclusion criteria. The inclusion criteria for the study were receiving a definitive diagnosis of type 2 diabetes from the relevant specialist, not receiving psychological treatments or psychiatric medications since the diagnosis of the disease, no history of neurological and mental illness and substance abuse, age between 25 and 65 years, and no amputation or limb defect. The exclusion criteria for the study were not consenting to participate in the study, not completing the questionnaire correctly and completely, having serious medical diseases except for diseases related to diabetes complications or comorbidities, and having weakness in psychological functioning.

Measures

Integrative Self-Knowledge Questionnaire (ISK): The Integrative Self-Knowledge Questionnaire was developed by Ghorbani et al. in 2008 to measure self-knowledge by integrating the two experiential and reflective aspects of self-awareness. It consists of 12 items, each answered on a 5-point Likert scale. To score this scale, the values 4, 3, 2, 1, and 0 were considered for each of the options (mostly true), (somewhat true), (neither true nor false), (somewhat true), and (mostly false), respectively. The average alpha coefficient of this scale in the aforementioned study was 0.80 [37]. In the study by Moradi Kalardeh et al. [38], the Cronbach's alpha coefficient was reported to be 0.77 [38]. In the present study, the reliability of the Coherent Self-Knowledge Scale, as measured by Cronbach's alpha coefficient, was reported to be 0.82.

Toronto Emotional Aphasia Questionnaire (TAS-20): The Toronto Emotional Aphasia Questionnaire was designed by Bagby, Parker, and Taylor in 1994 and is a 20-item test that measures three subscales: difficulty in identifying emotions (7 items), difficulty in describing emotions (5 items), and objective thinking (8 items) on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A total score is also calculated by summing the scores of the three subscales for general emotional aphasia [39]. Cronbach's alpha coefficient for general emotional aphasia in the study by Bagby et al. was 0.78. In the Persian version of the Toronto Emotional Aphasia Scale-20, Besharat [40] conducted the Cronbach's alpha coefficients for total emotional aphasia, and the three subscales of difficulty in identifying emotions, difficulty in describing emotions, and thinking differently were calculated as 0.85, 0.82, 75, and 0.72, respectively, indicating acceptable internal consistency of the scale. The test-retest reliability of the Toronto Emotional Aphasia Scale-20 was confirmed in a sample of 67 people in Donobt, with a four-week interval, yielding reliability coefficients ranging from 0.78 to 0.80 for total emotional aphasia and various subscales. The concurrent validity of the Toronto Emotional Aphasia Scale-20 was examined and confirmed by considering the correlation between its subscales and scales measuring intelligence, psychological well-being, emotional well-being, and psychological helplessness. The results of Pearson correlation coefficients showed that there was a significant correlation between the subjects' scores on the emotional aphasia scale: total emotional intelligence 0.80, psychological well-being 0.78, and psychological helplessness 0.44. The correlation coefficients between the emotional aphasia subscales and the above variables were also significant. The results of the confirmatory factor analysis also confirmed the existence of three factors: difficulty in identifying emotions, difficulty in describing emotions, and objective thinking, as observed in the Persian version of the Toronto Emotional Aphasia Scale-20 [40]. In the present study, the reliability of the Toronto Emotional Aphasia Scale was reported to be 0.87, as measured by Cronbach's alpha coefficient.

Self-control scale: The self-control scale, developed by Tangeni et al. in 2004, consists of 36 items scored on a 5-point Likert scale. The range of the total score of individuals is 36-180. Tangeni et al. [41] calculated the psychometric indices of the scale by conducting a preliminary test in two stages and obtaining test-retest coefficients and Cronbach's alphas of 0.88 and 0.80, respectively. In 2011, Aghababaei, Khanzadeh, Hemmati Alamdarloo, Moradi, and Rezaei conducted a study on two groups of undergraduate students to examine the validity and reliability of this test and found that the Cronbach's alpha coefficient for both studies was 0.89 [42]. In the present study, Cronbach's alpha for the entire scale was calculated to be 0.81.

Connor-Davidson Resilience Scale: This scale was developed by Connor and Davidson [43] and has 25 items that are scored on a 6-point Likert scale [from zero for completely false to five for always true]. This scale measures an individual's ability to cope with threats and pressure, effectively distinguishing resilient individuals from those who

are not resilient. This scale has four subscales: tolerance of negative emotions, goal orientation, spiritual coping, and self-leadership. The minimum and maximum scores for an individual on this scale are 25 and 125, respectively, and a higher score indicates greater resilience. A resilience score higher than 50 indicates higher resilience. The content validity of this scale has been confirmed. The Cronbach's alpha coefficient of this scale was also obtained as 0.87. This scale is significantly correlated with the Hard Work scale, which indicates its good concurrent validity [43]. The Cronbach's alpha coefficient of the scale in the study by Keyhani et al. [44] was 0.78. In the present study, Cronbach's alpha was calculated as 0.83 for the entire scale.

In the present work, necessary descriptive information was extracted from the data using SPSS (version 27) software, and the fit of the proposed model to the data was examined using AMOS (version 24) software. The fit of the hypothetical model was tested using the structural equation modeling method. The structural equation modeling method is a product of path analysis and confirmatory factor analysis methods. This method consists of two basic steps: In the confirmatory factor analysis or measurement model stage, the construct validity of the measurement tools was determined; then, in the structural equation model stage, the causal relationships between the latent variables were examined.

Results

Among the 300 patients with diabetes who were selected as the sample group, 52% [156 people] were men and 48% (144 people) were women. The ages were as follows: 25 to 34 years: 30 people (approximately 10%), 35 to 44 years: 60 people (approximately 20%), 45 to 54 years: 90 people (approximately 30%), and 55 to 64 years: 120 people (approximately 40%). The educational level of the respondents was as follows: bachelor's degree: 131 people (43.67%), diploma and lower: 118 people (39.33%), and master's degree and higher: 51 people (17%).

Structural equations were used to obtain the test results. After fitting the measurement and structural models, we will examine the rejection or confirmation of the research hypotheses.

Table 1. Structural model fit indices

Fitness indices	Calculated values	Acceptable threshold	Interpretation
CMIN/DF	1.56	Between 1 and 3	Acceptable
CFI	0.97	0.95<	Acceptable
SRMR	0.04	0.08>	Acceptable
RMSEA	0.045	0.06>	Acceptable
PClose	0.95	0.05<	Acceptable

The above table shows the structural model fit. The results indicate that the CMIN/DF value is 1.56, which falls within the acceptable range of 1 to 3. The CFI value is above 0.95, with a value of 0.97. The acceptable value for the SRMR index is less than 0.08, which is considered acceptable. The values of the two RMSEA and PClose indices are 0.045 and 0.95, respectively, which are acceptable.

There is a relationship between self-awareness and self-control in people with type 2 diabetes.

According to the results presented in Table 2, the T-value test statistic is 19.022, which is greater than the critical value of 1.96. Moreover, the P-value is zero, which is less than the error level of 0.05. Therefore, the first hypothesis, which examines the relationship between coherent self-knowledge and self-control in individuals with type 2 diabetes, is confirmed. This means that with a 95% confidence level, it can be said that the relationship is significant with an error of 5%. These results show that coherent self-knowledge is significantly related to self-control in these people. The positive coefficient of the path of the relationship between coherent self-knowledge and self-control indicates a positive relationship between these two variables; that is, with an increase in coherent self-knowledge, the level of self-control also increases, and with a decrease in coherent self-knowledge, the level of self-control also decreases.

There is a relationship between coherent self-knowledge and resilience in people with type 2 diabetes.

Table 2. Investigation of the relationship between self-awareness and self-control

Relationship Path	Beta Coefficient	S.E	T-value	P-value	Result
Integrative Self-knowledge ⟶ Self-control	0.74	0.041	19.022	0.000	Acceptable

Notes: P-value<0.05

According to the results presented in Table 3, the T-value test statistic is 172.14, which is greater than the critical value of 1.96. Moreover, the P-value is zero, which is less than the error level of 0.05. Therefore, the second hypothesis, which examines the relationship between cohesive self-knowledge and resilience in individuals with type 2 diabetes, is confirmed. This means that with a confidence level of 95%, it can be said that the relationship is significant with an error of 5%. These results show that cohesive self-knowledge is significantly related to resilience in these people. Additionally, considering the positive coefficient of the path of the relationship between cohesive self-knowledge and resilience, it can be said that with an increase in cohesive self-knowledge, the level of resilience increases.

Table 3. Examination of the relationship between cohesive self-knowledge and resilience

Relationship Path	Beta Coefficient	S.E	T-value	P-value	Result
Integrative Self-knowledge ⟶ Self-control	0.66	0.036	14.172	0.000	Acceptable

Notes: P-value<0.05

There is a relationship between cohesive self-knowledge and emotional alexithymia in people with type 2 diabetes

According to the results presented in Table 4, the T-value test statistic is -5.696, which is greater than the critical value of 1.96. In addition, the P-value is zero, which is less than the error level of 0.05. Therefore, the third hypothesis, which examines the existence of a relationship between coherent self-knowledge and emotional alexithymia in people with type 2 diabetes, is confirmed. This means that with a 95% confidence level, it can be said that the relationship is significant with an error of 5%. These results show that coherent self-knowledge is significantly related to self-control in these people. In addition, the negative coefficient of the path of the relationship between coherent self-knowledge and emotional alexithymia indicates a negative relationship between these two variables; that is, with an increase in coherent self-knowledge, the level of emotional alexithymia decreases.

There is a relationship between self-control and emotional alexithymia in people with type 2 diabetes.

According to the results presented in Table 5, the T-value test statistic is -11.224, which is greater than the absolute value of the critical value of 1.96. Moreover, the P-value is zero, which is less than the error level of 0.05. Therefore, the fourth hypothesis, which examines the existence of a relationship between self-control and emotional alexithymia in people with type 2 diabetes, is confirmed. This means that with a 95% confidence level, it can be said that the relationship is significant with an error of 5%. These results indicate that self-control is associated with emotional alexithymia in these individuals. The path coefficient of this relationship is -0.42, which is negative, indicating a negative relationship between these two variables; that is, with increasing self-control, the level of emotional alexithymia decreases, and with decreasing self-control, the level of emotional alexithymia increases.

Table 4. Study of the relationship between cohesive self-knowledge and emotional alexithymia

Relationship Path	Beta Coefficient	S.E	T-value	P-value	Result
Coherent Self-knowledge ⟶ Emotional Alexithymia	-0.26	0.033	-5.696	0.000	Acceptable

Notes: P-value<0.05

Table 5. Investigation of the relationship between self-control and emotional alexithymia

Relationship Path	Beta Coefficient	S.E	T-value	P-value	Result
Self-control ⟶ Emotional Alexithymia	-0.42	0.025	-11.224	0.000	Acceptable

Notes: P-value<0.05

There is a relationship between self-control and resilience in people with type 2 diabetes .

According to the results presented in Table 6, the T-value test statistic is 4.913, which is greater than the critical value of 1.96. Moreover, the P-value is zero, which is less than the 0.05 error level. Therefore, the fifth hypothesis, which examines the existence of a relationship between self-control and resilience in people with type 2 diabetes, is confirmed. This means that with a confidence level of 95%, it can be said

that the relationship is significant with an error of 5%. These results show that self-control is significantly related to resilience in these people. The path coefficient of this relationship is 0.23, and the positivity of this value indicates a direct and positive relationship between these two variables, meaning that with increasing self-control, the level of resilience also increases.

There is a relationship between resilience and alexithymia in people with type 2 diabetes.

Table 6. Examination of the relationship between self-control and resilience

Relationship Path	Beta Coefficient	S.E	T-value	P-value	Result
Self-control ⟶ Resilience	0.23	0.034	4.913	0.00	Acceptable

Notes: P-value<0.05

Table 7. Examination of the relationship between resilience and alexithymia

Relationship Path	Beta Coefficient	S. E	T-value	P-value	Result
Resilience ⟶ Emotional Alexithymia	-0.31	0.041	-6.949	0.000	Acceptable

Notes: P-value<0.05

According to the results presented in Table 7, the T-value test statistic is -6.949, which is greater than the absolute value of the critical value of 1.96. Moreover, the P-value is zero, which is less than the error level of 0.05. Therefore, the sixth hypothesis, which examines the existence of a relationship between resilience and alexithymia in people with type 2 diabetes, is confirmed. This means that with a confidence level of 95%, it can be said that the relationship is significant with an error of 5%. These results show that resilience is significantly related to alexithymia in these people. The path coefficient of this relationship is 0.31, which indicates a negative and inverse relationship between these two variables, which can be claimed that with increasing resilience, the level of alexithymia decreases.

There is a relationship between coherent self-knowledge indirectly through self-control and alexithymia.

Table 8. Examination of the relationship between resilience and alexithymia

Relationship Path	Beta Coefficient	S.E	T-value	P-value	Result
Coherent Self-knowledge ⟶ Self-control	0.74	0.041	19.022	0.000	Acceptable
Self-control ⟶ Emotional Alexithymia	-0.42	0.025	-11.224	0.000	Acceptable

Notes: P-value<0.05

In order to investigate this hypothesis, structural equation modeling and Sobel test were used. Table 8 presents the results of the fitted model to investigate the relationship between resilience and alexithymia in the study.

Table 9. Results of the Sobel test

a	b	Sa	Sb	Z-value	Sig
0.74	-0.42	0.041	0.025	5.768	0.000

The results of the Sobel test indicate that the test statistic is -12.297, and the significance level is zero. As a result, it can be accepted that there is a relationship between coherent self-knowledge indirectly through self-control and emotional alexithymia. The negative statistic of this test means that self-control has a negative effect on the relationship between coherent self-knowledge and emotional alexithymia; that is, it reduces this relationship, and since the relationship between the two variables of coherent self-knowledge and emotional alexithymia has a negative relationship, the amount of this relationship decreases with the mediation of self-control. In fact, it is a moderator of this relationship.

There is a relationship between coherent self-knowledge indirectly through self-control and resilience.

Table 10. Examination of the relationship between cohesive self-knowledge through self-control and resilience

Relationship Path	Beta Coefficient	S. E	T-value	P-value	Result
Integrative self-knowledge ⟶ Self-control	0.74	0.041	19.022	0.000	Acceptable
Self-control ⟶ Resilience	-0.23	0.034	4.913	0.000	Acceptable

Notes: P-value<0.05

In order to examine this hypothesis, structural equation modeling and the Sobel test were employed. Table 11 presents the results of the fitted model to examine the 7th hypothesis of the research.

Table 11. Results of the Sobel test

a	b	Sa	Sb	Z-value	Sig
0.74	-0.23	0.041	0.034	6.334	0.000

The results of the Sobel test show that the statistic of this test is 6.334, and the significance level of this test is zero. As a result, it can be accepted that there is a relationship between coherent self-knowledge indirectly through self-control and resilience. The significance level is zero, which is less than 0.05, and as a result, the research hypothesis is confirmed. The statistic of this test is 6.334, and the positivity of this statistic indicates the positive effect of the mediator variable, namely self-control, on the relationship between coherent self-knowledge and resilience.

There is a relationship between coherent self-knowledge indirectly through resilience and emotional alexithymia.

Table 12. Examination of the relationship between coherent self-knowledge through resilience and emotional alexithymia

Relationship Path	Beta Coefficient	S.E	T-value	P-value	Result
Coherent Self-awarenes ⟶ Resilience	0.66	0.036	14.172	0.000	Acceptable
Resilience ⟶ Emotional Alexithymia	-0.31	0.041	-6.949	0.000	Acceptable

Notes: P-value<0.05

In order to investigate this hypothesis, structural equation modeling and Sobel test were used. Table 12 shows the results of the fitted model.

Table 13. Results of the Sobel test

a	b	Sa	Sb	Z-value	Sig
0.66	-0.31	0.036	0.041	-6.99	0.000

The results of the Sobel test show that the statistic of this test is -6.99, and the significance level of this test is zero. As a result, it can be accepted that there is a relationship between cohesive self-knowledge indirectly through resilience and emotional alexithymia. The negative statistic of this test means that resilience has a negative effect on the relationship between cohesive self-knowledge and emotional alexithymia; that is, it reduces this relationship, and since the relationship between the two variables of cohesive self-knowledge and emotional alexithymia has a negative relationship, the amount of this relationship decreases with the mediation of resilience. In fact, it moderates this relationship.

Discussion

The primary objective of this study was to investigate the structural relationships between various variables. Accordingly, the main question was raised: Is there a significant relationship between cohesive self-knowledge and emotional alexithymia with the mediation of self-control and resilience in people with type 2 diabetes ?

The results showed a significant relationship between cohesive self-knowledge and self-control in individuals with diabetes. A detailed analysis of the results reveals that integrated self-knowledge, which encompasses a deep and coherent understanding of oneself and one's capabilities, can significantly influence self-control. Integrated self-knowledge helps individuals identify their strengths and weaknesses correctly and, as a result, have a better ability to control their emotions and behaviors. This is especially important in the management of type 2 diabetes, as patients with better control of their emotions and behaviors will be able to make more informed decisions in the field of disease management. The results by Wang et al. [45] have shown that integrated self-knowledge has a positive and significant relationship with self-control. Moreover, the study by Smith et al. [46] has also

reported a similar effect, emphasizing that integrated self-knowledge can help improve the control of emotions and behaviors. In addition, the study by Rasoulizadeh et al. [47] has also yielded similar results, confirming the positive effect of integrated self-knowledge on self-control. These comparisons demonstrate that our research findings align with those of previous studies and underscore the importance of integrative self-knowledge in enhancing self-control skills. The above explanations demonstrate how integrative self-knowledge can serve as a key factor in enhancing self-control. Integrative self-knowledge allows an individual to analyze and examine their behaviors and emotions more accurately, and this, in turn, can help improve the individual's ability to control and manage these behaviors and emotions. These effects are particularly important in the management of chronic diseases, such as diabetes, which require meticulous and ongoing control.

Other research results have shown a relationship between integrative self-knowledge and resilience in individuals with diabetes, and these findings are consistent with those of another study. For example, research by Williams et al. [48] has demonstrated a positive and significant relationship between integrative self-knowledge and resilience. Moreover, the study by Kane and Johnson [19] examined the effects of cohesive self-knowledge on resilience, and their findings also confirmed the positive effect of this type of self-knowledge on resilience. These comparisons demonstrate that the results of our study are consistent with previous findings, underscoring the importance of cohesive self-knowledge in enhancing resilience.

There is also a significant relationship between coherent self-knowledge and emotional alexithymia in people with type 2 diabetes. The interpretation of the results reveals a negative and significant relationship between coherent self-knowledge, which involves a deep and coherent understanding of oneself and individual characteristics, and emotional alexithymia. Emotional alexithymia refers to the difficulty in identifying, experiencing, and expressing emotions. Therefore, people with higher coherent self-knowledge have a better ability to identify and manage their emotions. In other words, coherent self-knowledge can help individuals understand their emotions more clearly, thereby reducing emotional alexithymia. An increase in coherent self-knowledge leads to a reduction in emotional alexithymia, as people with high self-knowledge are better able to identify and express their emotions. A study by Johnson et al. [49] has shown that coherent self-knowledge is associated with reduced emotional alexithymia, and this relationship is particularly pronounced in diabetic patients. Moreover, Carter and Thompson's [28] study reported a similar effect, showing that coherent self-knowledge can help reduce problems related to emotional alexithymia. Another study by Garcia [50] also investigated the effects of coherent self-knowledge on emotional alexithymia and reported similar results, confirming the positive effect of self-knowledge on the ability to understand and manage emotions. These comparisons demonstrate that the results of our study are consistent with previous findings, highlighting the importance of coherent self-knowledge in reducing emotional alexithymia. These findings also help us gain a better understanding of the effects of coherent self-knowledge on the emotional abilities of individuals with diabetes. Individuals with high coherent self-knowledge are less likely to experience emotional alexithymia due to their greater ability to identify and manage their emotions. This can help improve the quality of life and better manage chronic diseases, such as diabetes.

There is a relationship between self-control and emotional alexithymia in individuals with type 2 diabetes. The study by Javaheri Mohammadi et al. [51] also examined the relationship between self-control and emotional alexithymia, reporting similar results that indicate a positive effect of self-control on reducing emotional alexithymia. Research has shown that individuals with high self-control tend to experience fewer problems in identifying and managing their emotions. These comparisons demonstrate that the results of our study are consistent with those of previous studies, highlighting the importance of self-control in mitigating emotional alexithymia. These findings also help us to gain a better understanding of the effects of self-control on the emotional abilities of people with diabetes. Individuals with high self-control are better able to manage their emotions, which in turn leads to a reduction in problems related to emotional alexithymia. This can help improve the quality of life and better manage chronic diseases such as diabetes.

Other results of the study indicated that there is a significant relationship between self-control and resilience in people with type 2 diabetes, and this result is consistent with the results of another study by Lee and Chang [52] that showed that self-control as a personality trait significantly affects people's resilience and that increasing it can help improve the quality of life of diabetic patients. These findings suggest that the results of this study are consistent with previous studies and highlight the crucial role of self-control in fostering resilience.

Resilience is significantly associated with alexithymia in individuals with type 2 diabetes. Jones et al. [53]

also confirmed this relationship, showing that resilience plays a crucial role in reducing alexithymia and enhancing the quality of life for diabetic patients. Similar findings were also reported in the study by Williams et al. [48], which demonstrated that increasing resilience can effectively prevent the development of alexithymia and help individuals manage their emotions more constructively. These findings suggest that the results of the present study are consistent with previous studies, underscoring the importance of resilience in mitigating alexithymia. The following results of the study examined the indirect relationship between coherent self-knowledge and alexithymia through self-control, and the results indicated that self-control reduces the intensity of the relationship between coherent self-knowledge and alexithymia. The findings of Garcia et al. [50] also indicated the important role of self-control as a moderating factor in the relationships between psychological variables. In this investigation, it was found that self-control can reduce the severity of the negative effects between coherent self-knowledge and emotional alexithymia. This result demonstrates that self-control not only has a direct effect on emotional alexithymia but can also be effective in reducing the negative effects of coherent self-knowledge on emotional alexithymia. There is a relationship between coherent self-knowledge and self-control, which in turn is indirectly related to resilience. Smith et al. [46] have demonstrated that coherent self-knowledge can lead to enhanced self-control and, consequently, increased resilience. Moreover, the study by Jones and Williams [53] has yielded similar results, confirming that coherent self-knowledge can positively impact resilience by enhancing self-control. These findings are consistent with the results of the present study and help strengthen the validity of the hypothesis under investigation. Finally, Garcia et al. [50] also indicated that integrative self-knowledge can lead to significant improvements in the ability to cope with life's stresses and challenges, and this effect is achieved through increased self-control. These studies demonstrate that enhancing integrative self-knowledge and self-control can help individuals better manage life's stresses and challenges, resulting in greater resilience. Comparing these results with the findings of the present study reveals that integrative self-knowledge and self-control are recognized as key factors in enhancing resilience and navigating life's challenges.

This study had some limitations, including the weakness of previous studies. In addition, patients with diabetes have special conditions, and it is challenging to complete the questionnaire and to recognize feelings and emotions and recognize oneself during illness.

Conclusion

The findings show that the structural relationship between coherent self-knowledge and self-control has a significant positive relationship, coherent self-knowledge has a significant positive relationship with resilience, coherent self-knowledge has a significant negative relationship with emotional alexithymia, self-control has a significant negative relationship with emotional alexithymia, self-control has a significant positive relationship with resilience, resilience has a negative and inverse relationship with emotional alexithymia. In addition, self-control and resilience are full mediators in the relationship between coherent self-knowledge and emotional alexithymia.

Ethical Considerations

This study is based on the first author's master's thesis in psychology and has been approved by the Research Ethics Committee of the Islamic Azad University of Sari Branch under the code IR.IAU.SARI.REC.1403.170. The researchers of this study would like to thank all the participants who contributed to this study and made it possible to conduct the research.

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Authors' Contributions

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Conflicts of Interest

The authors declared that there is no conflict of interest.

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