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Developing a Causal Model of Self-Care Behaviors Based on Self-Compassion with Psychological Distress Mediation in Women and Men with Type 2 Diabetes

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A B S T R A C T

Type 2 diabetes mellitus is a common disease of the endocrine glands characterized by chronic hyperglycemia due to disturbances in insulin secretion and function. The metabolic complications of this disease lead to an increased burden of disease in society, and patients require lifelong special self-care behaviors. Psychological factors play a significant role in adherence to self-care programs and treatment outcomes in patients with type 2 diabetes. The present study was conducted with the aim of "developing a causal model of self-care behaviors based on self-compassion with psychological distress mediation in women and men with type 2 diabetes." This study was applied in objective, quantitative in data type, survey in data collection method, and descriptive-analytical based on correlation analysis in analysis type. The study population consisted of individuals aged 40 to 60 years with type 2 diabetes in Tehran, from whom 640 participants were selected using convenience sampling. Data collection tools were the Self-Compassion Scale (Neff, 2003), the Psychological Distress Scale (Kessler et al., 2003), and the Self-Care Behaviors Scale (Toobert & Glasgow, 2000). Data were analyzed using structural equation modeling and the software SPSS26 and Smart PLS 3.2. The results showed that all model fit indices were within acceptable limits (GOF for men = 0.725 and for women = 0.733), indicating the model's adequate fit with the data. Both direct and indirect effects of self-compassion with psychological distress as a partial mediator on self-care behaviors were confirmed ($P < 0.01$). The moderating role of gender in the relationship between self-care behaviors and self-compassion with psychological distress mediation was confirmed ($P < 0.01$), with the effect of self-compassion through psychological distress mediation on self-care behaviors being greater in men (β for men = 0.914) than in women (β for women = 0.855). Given the confirmed role of psychological factors on self-care behaviors in patients with type 2 diabetes, the presence of psychological counselors in the diabetes treatment team is essential. Therefore, psychological counselors are advised to pay more attention to the effective role of self-compassion and psychological distress in supportive and therapeutic interventions for patients with type 2 diabetes.

Keywords: *Self-care behaviors, Self-compassion, Psychological distress, Type 2 diabetes.*

1. Introduction

Diabetes is a serious and chronic disease that occurs due to insufficient insulin production by the pancreas or the body's cells' inability to effectively use insulin (1). In fact, diabetes is one of the most common non-communicable and chronic metabolic diseases in the world; in 2022, it was estimated that over 579 million people globally have diabetes, and this number is expected to more than double by 2050, reaching approximately 1.3 billion people (2). Type 2 diabetes, which constitutes 90 to 95 percent of diabetes cases, results from the insulin cells' inability to respond to insulin and insufficient compensatory insulin secretion (3). Type 2 diabetes, as the most common metabolic disease, is a chronic and progressive disorder that leads to the development of persistent complications and increases in cardiovascular diseases, cerebral vessels, peripheral vessels, nephropathy, retinopathy, neuropathy, diabetic foot, amputation, and mortality in affected individuals (4).

Due to its numerous complications worldwide, diabetes is recognized as a costly disease (5), imposing a significant economic burden on diabetic patients and their families and reducing their quality of life (6), while diabetes continues to spread as an unprecedented epidemic globally (7). Diabetes and its complications are the third leading cause of death worldwide (8), affecting 537 million people by 2021 (9).

The main cause of death among diabetic patients is the lack of health-based behaviors leading to self-care (10). Self-care behavior is a key concept in health promotion, referring to decisions and actions an individual can take to manage a health problem or improve their health (11). Self-care behaviors are health-promoting activities that refer to processes of maintaining health through positive health functions and disease management (12). Self-care is a strategy and approach that individuals adopt to promote health and cut dependency for adapting to life's events and stresses (13). Self-care involves the patient's active participation in self-care activities, including regular medication intake, diet adherence, exercise, blood sugar monitoring, and daily and continuous foot care (11). Self-care behaviors in diabetic patients are crucial for achieving goals such as self-protection against disease, improving quality of life, and enhancing patients' psychological, spiritual, and social conditions. In fact, patients with type 2 diabetes personally perform more than 95% of their treatment tasks (14).

Since diabetes is a chronic and difficult-to-treat disease, patients need lifelong self-care and lifestyle changes to manage the disease (15). Adherence to a therapeutic diet is one of the self-care behaviors that leads to successful control of the disease and also reduces the severity and negative outcomes (16). However, about half of the patients with chronic diseases are not adherent to their therapeutic regimes due to long-term treatment fatigue and disillusionment with a definitive cure (16). Adherence to treatment in diabetes not only reduces complications and improves the patient's quality of life (17) but also decreases the likelihood of hospital readmission (18). Numerous studies indicate a lack of commitment of type 2 diabetic patients to self-care behaviors and weak adherence among these patients, leading to increased problems and complications resulting from the disease (19).

Today, adherence to treatment in chronic diseases is considered one of the serious challenges, and diabetes, as a chronic disease with increasing prevalence, is no exception. Therefore, selecting correlative factors that play a central role in adherence to treatment in patients with type 2 diabetes seems essential. Among these, factors with behavioral, cognitive, and metacognitive nature exist, which according to findings, can play a significant role in diabetes control (4). Psychological issues, identified as an influential factor in approximately one-third of diabetic patients, play a crucial role in motivating these patients to adhere to treatment (20, 21).

One of the psychological factors that seems to be more thoroughly investigated for its role in increasing or decreasing health-based behaviors leading to self-care is self-compassion. Self-compassion is a protective factor against psychological harm, defined as attention and sensitivity towards one's inner pain and suffering and the desire to heal it (13). Having a compassionate and caring attitude towards oneself, as a coping strategy, helps individuals overcome psychological disturbances, fostering more positive thoughts about the future of the disease and more successful self-care behaviors (22). Through appropriate solutions, these individuals adjust challenges related to the disease and adapt well (23). Self-compassion, by regulating and moderating negative emotions and promoting positive emotions, helps reduce patient distress, leading to greater commitment to medical recommendations and health-related behaviors (22) and,

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through mindful awareness of negative thoughts and emotions and an accepting, understanding, and compassionate approach to oneself, aids in alleviating the detrimental consequences of stressful situations and restoring balance (13). Self-compassion can be considered an emotion regulation strategy, including managing emotions such as anger and shame resulting from self-criticism, affecting self-care behaviors in chronic diseases (23). In this context, a study indicated the significant impact of self-compassion on self-care in individuals with type 2 diabetes (Nasri et al., Accepted for publication). Another study involving 176 patients with type 2 diabetes showed that higher levels of self-compassion and lower levels of depression symptoms were significantly associated with long-term diabetes control (Morrison et al., 2021). Another study that predicted self-management behavior in 310 adults with diabetes based on self-compassion and internal locus of control showed that higher levels of self-compassion are usually associated with improved self-management behavior, medical outcomes, and psychological well-being in adults with diabetes, making self-compassion a potentially cost-effective and appropriate intervention target for diabetic patients (Ferrari, Dal Cin, & Steele, 2017).

On the other hand, difficulties in emotion regulation can become an obstacle to treatment adherence in diabetes, while treatment adherence is one of the most important factors in controlling this disease such that there is a high positive correlation between treatment adherence and optimal glucose metabolism control (Berking et al., 2008). Due to the chronic nature of diabetes and periodic fluctuations in blood serum glucose levels, these patients are more exposed to emotional and psychological disorders such as anxiety and depression (Parchman, Zeber, & Palmer, 2010) and, consequently, neglect their therapeutic diet (Appleton et al., 2013). Psychological distress is a specific discomfort and emotional state that individuals experience transiently or permanently in response to specific worries and harmful conditions. This variable, with depression, stress, and anxiety as its main examples (24), accompanies both emotional and physical symptoms (25). Therefore, another psychological factor that seems to be more thoroughly investigated for its role in increasing or decreasing self-care behaviors is psychological distress; diabetic patients endure significant psychological distress due to the potential for serious complications of the disease, the financial burden of self-management behavioral controls, and the constant anxiety of self-care deviating from its natural course, making low self-care behaviors in diabetic patients predictable due to psychological issues. Diabetes, as a chronic disease with physical and psychological consequences, and greater psychological health and lesser degrees of psychological distress facilitate the treatment process and care behaviors in chronic diseases like diabetes (26).

In this regard, research findings indicate that psychological distress, by disrupting emotions, may affect individuals' personal and social daily functions and reduce self-care behaviors (27, 28). It should be noted that managing self-care behaviors in diabetic patients is challenging because it requires a multifaceted approach including diet, physical activity, blood sugar monitoring, adherence to medication, coping skills, and risk-reducing behaviors (29). Self-compassion leads to the emergence of active coping styles for the promotion and maintenance of individual mental health, thus individuals with high self-compassion have a more supportive perspective towards themselves, which reduces feelings of depression and anxiety (30) and prevents the occurrence of psychological distress. Furthermore, self-compassion moderates cortisol secretion in stressful situations, regulates heart rate, and helps soothe individuals during psychological stresses, thereby creating balance and emotional regulation, leading to reduced psychological distress (31). Self-awareness in individuals with self-compassion enables them to face problems arising from the disease efficiently through acceptance and understanding, deactivating destructive responses, and replacing them with self-soothing, self-kindness, and self-appreciation, thus preventing psychological distress (31) and fostering a more optimistic outlook compared to those lacking self-compassion, thereby better managing negative emotions such as anger, anxiety, and depression (30) and less likely experiencing psychological distress. Therefore, on one hand, psychological distress affects the self-care behaviors of diabetic individuals, and on the other hand, it seems to be significantly influenced by self-compassion. In this context, the findings of two meta-analyses conducted indicated that negative components of self-compassion (self-criticism, isolation, and over-identification or avoidance) have a greater impact on psychological distress than the positive components of self-compassion (self-kindness, shared human experience, and mindfulness) (32). Accordingly, it seems that psychological distress can play a mediating role in the relationship between self-compassion and self-care behaviors in individuals with type 2 diabetes.

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A review study indicated that men engage in better behaviors than women for clinical stability and health maintenance, mostly related to physical activities, while women's self-care behaviors are aimed at more and better monitoring of symptoms and disease indicators (33). Another study showed that self-care functions in men are more influenced by social factors, roles, opportunities, and high self-efficacy compared to women (26). Another research indicated that skipping meals is a common method among women for controlling diabetes, whereas men were more likely to use artificial sweeteners and consult nutritionists (34). Another study demonstrated that women focus on dietary restrictions for self-care, whereas men only adjust the consumption of unhealthy foods in social situations. Additionally, women use interactive social resources like educational classes and support groups for self-care, but men prefer to learn self-management and both genders emphasized the need for more guidance through the healthcare system (35). Therefore, understanding gender-related differences in self-care behaviors of diabetic patients plays a key role in designing educational interventions and needs to be examined in detail.

Given the recent content and a review of studies conducted on the topic of psychological factors affecting self-care behaviors of individuals with type 2 diabetes, it is found that the focus of conducted research has been around identifying and evaluating factors affecting self-care behaviors of individuals with type 2 diabetes, with a comparative analysis of the role of gender in how psychological factors affect self-care behaviors of individuals with type 2 diabetes being neglected. Thus, the present study aims to address these limitations by proposing a model of psychological factors affecting self-care behaviors of men and women with type 2 diabetes, considering the role of gender separately and comparing the impact of self-compassion on self-care behaviors with psychological distress mediation in men and women with type 2 diabetes. Considering that research focusing on the mediating role of psychological distress in the causal relationship between self-care behaviors and self-compassion in individuals with type 2 diabetes, distinguished by gender, has not been explored, there is a research gap in this area, which motivated the execution of the current study.

The necessity of addressing this topic arises from the fact that, as mentioned, diabetes is one of the most common non-communicable and chronic metabolic diseases, being the third leading cause of death worldwide, with the main cause of death among diabetic patients being the lack of self-care behaviors. Psychological problems, identified as an influential factor in approximately one-third of diabetic patients, play a crucial role in motivating these patients to adhere to treatment, while about half of the patients with chronic diseases are not adherent to their therapeutic regimes due to long-term treatment fatigue and disillusionment with a definitive cure. Thus, difficulties in emotion regulation can become an obstacle to treatment adherence in diabetes, potentially worsening the disease and leading to the death of these individuals. On the other hand, it seems that due to biological differences and different roles, men and women follow different patterns in adhering to self-care behaviors.

Therefore, considering that the topic of self-care behaviors and related issues in individuals with type 2 diabetes is of significant interest to policymakers, researchers, and practitioners in this field, with their needs for improving living conditions and the treatment process being considered, the present study was conducted with the goal of "developing a causal model of self-care behaviors based on self-compassion with psychological distress mediation in women and men with type 2 diabetes."

2. Methods and Materials

2.1. Study Design and Participants

The present study was applied in goal, quantitative in data type, survey in data collection method, and descriptive-analytical based on the correlation design using structural equation modeling with a partial least squares approach, conducted in 2023 in Tehran. The study population consisted of individuals aged 40 to 60 years with type 2 diabetes in Tehran. The diagnosis of type 2 diabetes was based on a specialist's opinion and the result of the HbA1c test in the past four months, with a measured hemoglobin level higher than 6.5. In this study, to determine the sample size, considerations related to sample size determination in structural equation modeling were used; based on the suggestions of Bentler & Chou (1988), Nunnally & Bernstein (1994), and Stevens (1999), considering up to 10 samples for the total questionnaire items in relational analyses is estimated as an optimal sample size. Therefore, considering the effective sample size for conducting structural equation modeling and taking into account an 80% response rate, the sample size was estimated to be 640 individuals, selected using a convenience sampling method; the inclusion criteria for

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individuals in the sample were: (1) diagnosis of type 2 diabetes, (2) no type 1 diabetes or gestational diabetes, (3) age range 40 to 60, (4) minimum literacy level to answer questions, and exclusion criteria were: (1) unwillingness to participate in the study, (2) presence of another serious medical condition (such as cancer or heart disease), (3) having a major psychological disorder and undergoing treatment for the patient, (4) cognitive impairments or weakness in cognitive functions of the patient, (5) very poor general medical condition based on the treating physician's opinion. To adhere to ethical considerations of the study, all individuals received written information about the research to participate if interested, and the researcher committed to maintaining the principle of confidentiality and not disclosing personal information of the respondents. Therefore, to respect privacy, participants' names and surnames were not recorded.

2.2. Measures

2.2.1. Self-Care Behavior

This scale, designed by Hampson and Glasgow in 2000 to measure adherence to self-care programs in diabetic patients, is a self-report measure with 15 items assessing 5 subscales: adherence to diet, blood glucose testing, timely medication intake, physical activity, and foot care. The items are rated on a 7-point Likert scale from completely true (code 7) to completely false (code 1), with higher scores indicating greater adherence to self-care programs. Hampson and colleagues (2000) validated the scale in their initial study and confirmed its reliability and validity; the Persian version of this scale was psychometrically assessed in a study conducted by Ezatti, Abedsaeidi, & Nasiri (2012), where its internal consistency reliability and content validity were evaluated and confirmed through expert panel consultation; in this study, a Cronbach's alpha of .78 and an average content validity ratio according to 8 experts of .84 were reported (Ezatti, Abedsaeidi, & Nasiri, 2012).

2.2.2. Self-Compassion

Designed by Neff in 2003 to measure self-compassion, this self-report scale includes 26 items evaluating 6 subscales: self-kindness, self-judgment, common humanity, isolation, mindfulness, and over-identification. The items are rated on a 5-point Likert scale from completely true (code 5) to completely false (code 1), with higher scores indicating greater self-compassion. To calculate the overall self-compassion score, the subscales of self-judgment, isolation, and over-identification are reverse-scored. Neff (2003) validated the scale in the initial study and confirmed its reliability and validity; the Persian version of this scale was psychometrically assessed in a study conducted by Momeni et al. (2013), where its internal consistency reliability, test-retest reliability, and validity were evaluated through factor analysis; in this study, a Cronbach's alpha of .70 and a test-retest reliability over a 10-day interval of .89 were reported (Momeni, Shahidi, Mootabi, & Heydari, 2013).

2.2.3. Psychological Distress

Designed by Kessler et al. in 2003 to measure psychological distress, this self-report scale has 10 items assessing 2 subscales: depression and anxiety. The items are rated on a 5-point Likert scale from completely true (code 5) to completely false (code 1), with higher scores indicating greater psychological distress. Kessler and colleagues (2003) validated the scale in their initial study and confirmed its reliability and validity; according to Kessler et al. (2003), this scale has suitable sensitivity and specificity for screening individuals with anxiety and depression and is an appropriate tool for post-treatment monitoring and surveillance (Kessler et al., 2003). The Persian version of this scale was psychometrically assessed in a study conducted by Poorhosseini Dehkordi, Sajadian, & Sharbafchi (2019), where its reliability was assessed through Cronbach's alpha and its validity through expert panel consultation; in this study, a Cronbach's alpha of .85 was reported (Poorhosseini Dehkordi, Sajadian, & Sharbafchi, 2019).

2.3. Data Analysis

Data Analysis Process: The quantitative data, after being collected, were entered into SPSS 26 and analyzed using this software and Smart PLS 3.2 for descriptive and inferential statistics. The inferential statistical methods used were structural equation modeling with a partial least squares approach. Subsequently, to compare the overall effect of variables such as life events, self-compassion, and perceived social support on self-care behaviors in women and men with type 2 diabetes, an independent samples t-test was employed.

3. Findings and Results

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The means, standard deviations, and correlation coefficients of the model variables are presented in Table 1.

Table 1

Description of Research Variables

Variable	Mean (Men)	SD (Men)	Mean (Women)	SD (Women)	Correlation 1	Correlation 2	Correlation 3
Self-Compassion	3.84	0.280	3.48	0.286	-	-0.673**	-0.682**
Psychological Distress	3.81	0.372	3.94	0.353	-	-	-0.601**
Self-Care Behaviors	5.00	0.933	5.27	0.856	-	-	-

*p<0.05; **p<0.01

The findings of Table 1 show that there is a significant relationship between the research variables (P < .01), with the smallest relationship pertaining to psychological distress and self-care behaviors (r = -.592 for women and r = -.601 for men) and the strongest relationship in men related to self-compassion and self-care behaviors (r = .682) and in women related to self-compassion and psychological distress (r = -.655).

Table 2

Model Fit Indices for the Research Model

Variable	VIF	AVE	α (Alpha)	CR	R^2	Q^2	RMSE	SRMR
Men/Women								
Self-Compassion	3.211	0.719	0.778	0.767	-	-	-	-
Psychological Distress	-	0.743	0.746	0.828	0.711	0.371	0.055	0.062
Self-Care Behaviors	-	0.848	0.734	0.800	0.721	0.369	0.047	0.076
Self-Compassion	1.921	0.672	0.879	0.773	-	-	-	-
Psychological Distress	-	0.667	0.865	0.792	0.714	0.380	0.060	0.053
Self-Care Behaviors	-	0.892	0.954	0.863	0.739	0.391	0.077	0.071

Goodness of Fit Index for Men (GOF) = 0.725, Goodness of Fit Index for Women (GOF) = 0.733

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of sphericity were examined to assess the feasibility of conducting structural equation modeling, with the KMO statistic for self-compassion, psychological distress, and self-care behaviors in men being .753, .727, and .761 respectively, and in women being .772, .721, and .803 respectively, all above .70, thus the sample size is suitable for structural equation modeling. Also, the significance level of Bartlett's test for all variables was P < .001, indicating that the correlation matrix of items is not an identity matrix and there are degrees of correlation between some items, hence the data are suitable for structural equation modeling. The evaluation of structural equation modeling in the partial least squares approach begins with assessing potential multicollinearity among predictor constructs in structural model regressions, followed by evaluating measurement model fit indices, the significance and effect size coefficients, and concludes with analyzing the model's explanatory and predictive power. The indices for multicollinearity, validity, reliability, and model fit goodness are presented in Table 3.

Table 3

Summary of Fitted Model Statistics

Model Variables	Men (Standardized Impact Coefficient)	Men (Test Statistic)	Men (Significance Level)	Women (Standardized Impact Coefficient)	Women (Test Statistic)	Women (Significance Level)
Self-Compassion → Self-Care Behaviors	0.641	8.247	0.000	0.577	10.405	0.000
Psychological Distress → Self-Care Behaviors	-0.482	-7.442	0.000	-0.536	-9.769	0.000
Self-Compassion → Psychological Distress	-0.566	-11.652	0.000	-0.519	-9.495	0.000

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The findings of Table 3 indicate that in all paths, the multicollinearity indices, the measurement model fit indices, the structural model fit indices, and the overall model fit indices are in a satisfactory condition, thus confirming the model's reliability, validity, and predictive power, allowing judgments about the magnitude and direction of the relationship between model variables based on significant coefficients and path coefficients. The summary statistics of the fitted model are presented in Table 3.

The findings of Table 3 show that in both genders, the direct effects of self-compassion (β = .641 for men and β = .577 for women) and psychological distress (β = -.482 for men and β = -.536 for women) on self-care behaviors are confirmed (P < .01). Also, the direct effect of self-compassion (β = -.566 for men and β = -.519 for women) on psychological distress is confirmed (P < .01). The fitted model, based on standard path coefficients and significant coefficients, is presented in Figure 1.

The findings of Table 3 and Figure 1 show that in both genders, the empirical data have a suitable fit with the theoretical model, thus quantitatively confirming the accuracy of the mentioned models. The magnitude and direction of indirect pathways and the total effects of the fitted model are presented in Table 4.

Table 4

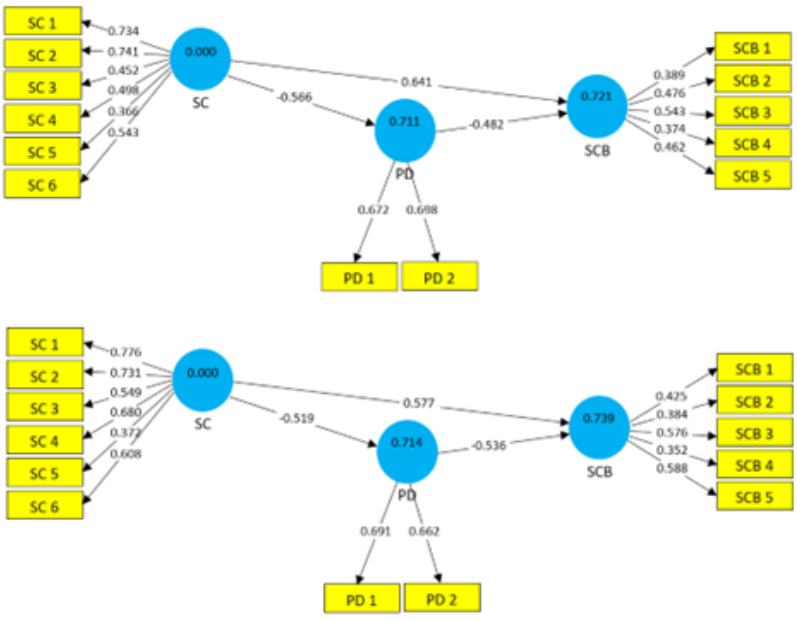
Indirect Effects and Total Effects in the Fitted Model

Model Variables	Indirect Effect (Men)	Sobel Z Statistic (Men)	Total Effect (Men)	Indirect Effect (Women)	Sobel Z Statistic (Women)	Total Effect (Women)
Self-Compassion → Distress → Self-Care Behaviors	0.273	5.460	0.914	0.278	5.465	0.855

The findings of Table 4 indicate that in all indirect paths of the fitted models, the Sobel test Z statistic is greater than 1.96, hence all indirect paths are significant at the 95% confidence level. Self-compassion has an indirect effect through psychological distress mediation on self-care behaviors in men (β = .273) and women (β = .278). On the other hand, self-compassion has a total effect on self-care behaviors in men (β = .914) and women (β = .855). In both genders, the effect of self-compassion through psychological distress mediation on self-care behaviors is direct (positive), meaning that with an increase in self-compassion, the level of self-care behaviors increases.

Figure 1

Model with Beta-Values for Men (Above) and Women (Below)



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Additionally, given that the direct relationship between the exogenous variable and the mediator, the direct relationship between the mediator and the endogenous variable were significant, and the indirect relationship between the exogenous and endogenous variables in the presence of the mediator, though reduced, remains significant, it can be concluded that psychological distress plays a partial mediating role in this relationship. Subsequently, as previously stated, to compare the total effect of life events, self-compassion, and perceived social support on self-care behaviors in women and men with type 2 diabetes, an independent groups t-test was utilized, the results of which are presented in Table 5.

Table 5

Comparison Test of Mean Total Effect of the Exogenous Variable on the Endogenous Variable in Men and Women

Group	Number	Mean	Standard Deviation	Test Statistic	Significance Level
Men	320	0.914	0.210	4.0886**	0.000
Women	320	0.855	0.217		

The findings of Table 5 show that the significance level of the test comparing the total effect of self-compassion with psychological distress mediation on self-care behaviors was less than $\alpha = .05$, therefore, with 95% confidence, it can be concluded that self-care behaviors based on self-compassion with psychological distress mediation in men and women with type 2 diabetes significantly differ from each other, with the strength of this relationship being greater in men than in women.

4. Discussion and Conclusion

Chronic diseases such as type 2 diabetes, characterized by complex origins, gradual onset, unpredictable deterioration and recovery, necessitate patient participation in self-care due to their prolonged nature. This disease is associated with numerous short-term and long-term complications, many of which are irreversible (1). The pathogenesis and mortality resulting from these complications are among the major health care issues worldwide, thus drawing significant attention towards investing in diabetes control (2). Proper blood sugar maintenance is the foundation of diabetes care and reduces the occurrence of diabetes complications. The International Diabetes Federation recommends that patients adopt self-care measures for stable blood sugar control, such as adhering to a healthy diet, regular medication intake, engaging in regular physical activity, and monitoring blood glucose levels regularly (3). Therefore, educating these patients on self-care to mitigate disease-related problems is deemed essential, as significant help cannot be extended to those unwilling or unable to manage their condition (4).

Research indicates that most patients do not adhere to their physician's self-care recommendations and often do not maintain quality self-care (5). Moreover, among those attempting to control their diabetes, only a minority can achieve their desired blood glucose levels (6). This does not suggest a lack of access to diabetes education or unawareness of its benefits among patients but rather points to the complicating role of individual and environmental psychological factors (7). In recent years, particular attention has been paid to factors such as self-compassion and psychological distress in facilitating adaptation and disease control in chronic conditions, especially in studies outside of Iran (13).

The current study, aiming to "develop a causal model of self-care behaviors based on self-compassion with psychological distress mediation in men and women with type 2 diabetes," thus focused on psychological factors significantly influencing diabetic patients' adherence to self-care programs. It sought to review the role of psychological factors on self-care behaviors of type 2 diabetes patients, proven to affect the treatment and control process, to assist doctors and healthcare staff in fulfilling their crucial mission of improving the health of individuals with type 2 diabetes.

Accordingly, the analytical results of this study suggest that diabetes self-care, influenced by various social, structural, and disease characteristics, is directly affected by the psychological factor of self-compassion and also through the mediation of psychological distress. This finding aligns with the understanding that the stress associated with diabetes, beyond physical complications, leads to negative symptoms like depression and anxiety. The resulting psychological distress causes further negative outcomes, ultimately leading to resistance in the treatment and self-care process. Self-compassion, significantly influencing the improvement of anxiety and depression

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states, can create a calmer and more stable environment in an individual's life, facilitating committed self-care behaviors (14).

It's essential to recognize that high self-compassion in diabetic patients prevents continuous self-blame, a significant factor in their psychological distress. Indeed, self-compassionate individuals, by persevering in this path, combat psychological distress components such as feelings of isolation and over-identification with disease-induced thoughts and emotions, thereby reducing psychological distress and promoting self-care behaviors. Particularly, the supportive outlook in self-compassionate individuals reduces anxiety and isolation in diabetic patients, leading to positive psychological effects like continuous motivation to resolve personal conflicts related to their disease and maintaining physical and psychological abilities prior to the illness (16).

In another explanation of this finding, it's critical to consider that disturbances in self-care behaviors are often due to the financial costs and guilt and self-blame felt by diabetic patients, which stem from their psychological distress and struggle with stress, anxiety, and rumination. High self-compassion in diabetic patients can lead to positive mental imagery of themselves and an intimate, affectionate relationship with themselves, creating a psychological barrier against the hardships and distresses of the disease. This barrier enhances their peace of mind, focusing more intently on self-care actions. It's also significant that low self-compassion in patients with disease conditions increases psychological distress, diverting their focus from following health control recommendations towards self-blame and self-criticism. If self-compassion is low in patients with type 2 diabetes, psychological distress could exacerbate individual conditions and disrupt or delay self-care needs (36).

Furthermore, psychological distress in diabetic individuals accentuates the negative aspects of psychological and physical traits, creating a guilt-ridden and weak image in patients' minds, leading to a severe drop in self-esteem and self-concept (18). Self-compassion enables individuals to conceptualize and root out problems in a compassionate, supportive behavioral context, thereby expanding their capability to endure personal conflicts related to their illness and maintain physical and psychological capacities before the disease. Psychological distress involves a great deal of dissatisfaction with oneself, hence in the presence of a self-compassionate and supportive perspective, the coping power and distress tolerance in diabetic patients will improve, ultimately leading to increased self-attention and adherence to the therapeutic process for quicker recovery.

Moreover, self-compassion can serve as a resilient buffer against a vast amount of negative events and visualizations of the past, present, and future. When individuals exhibit low levels of self-compassion, they subject themselves to more rigid and inflexible mental judgments, readily accepting negative and harmful events as an incapable individual, and their self-evaluations will not be based on realities but on the pressure of negative thoughts. Therefore, patients with type 2 diabetes, while trying to be kind to themselves, accept responsibility for their decisions in negative events like their disease, leading to reduced psychological distress and promoting increased tolerance to disease effects, hope, and motivation towards treatment outcomes and self-care, thereby enhancing self-management and self-care behaviors during illness.

Another finding of the current study is that the overall effect of self-compassion mediated by psychological distress on self-care behaviors was greater in men than in women. To explain this finding, it should be noted that the impact of self-compassion in men is due to several factors; one significant factor is men's lesser self-judgment, allowing them to focus more on their positive skills and abilities and enhance their self-efficacy and self-confidence (37). On the other hand, the characteristic of self-judgment and self-blame is considerably higher in women, who often are self-critical and struggle to forgive their mistakes. This leads to high rumination and low self-esteem and self-efficacy, potentially disrupting the self-care process. The self-critical approach in women causes further self-degradation and the use of inappropriate and avoidant coping strategies when dealing with the disease. Avoidant coping strategies, such as denying the illness, can create doubt and hesitation in women regarding the initial acceptance of the disease and adherence to self-care behaviors. Furthermore, thoughts and feelings focused on self-blame in women sideline efficient cognitive processes and impair their ability to respond differently to a challenging and complex situation like diabetes, thereby leading to weaker self-care behaviors.

Another explanation for the significant difference between men and women in the model above relates to men scoring significantly higher than women on the self-kindness subscale in the self-compassion questionnaire. It should be noted that women are more inclined towards kindness and compassion towards others. Gender role

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norms in women emphasize caring for society and family, fostering members, and self-sacrifice (38), which could justify the gender difference in the self-kindness component. Therefore, focusing on others' needs in sickness might lead to neglecting self-care behaviors in women with type 2 diabetes. Women who are overly self-critical and have low levels of self-compassion essentially ignore their needs, thus neglecting self-care behaviors, a fundamental need in diabetic patients to prevent disease complications. This issue essentially reflects a decrease in the self-kindness subscale of self-compassion, making the individual vulnerable to mental and physical health problems (39).

A final point of explanation refers to the cultural context of Iranian society, which, despite changes in societal attitudes towards women's desires and needs in recent years, still is somewhat a traditionally male-dominated society. This social condition might lead to men paying more attention to themselves and striving to care for their emotional, physical, and psychological needs. Conversely, due to the prevailing social conditions, women may be influenced by the threat-defense system, engaging in self-criticism and experiencing lower levels of self-compassion; as Paul Gilbert (2009) supports this explanation with the viewpoint of developing self-compassion through the lens of evolutionary psychology, suggesting that self-compassion is linked to our soothing and safety system (related to care and attachment), while self-criticism and self-judgment infiltrate our threat-defense system (associated with a sense of danger and autonomic arousal) {Gilbert, 2014 #12269}. Thus, the activity of each system mentioned above due to current social conditions in women and men could have human and biological reasons, affecting the process of self-compassion and, as explained, impacting self-care in diabetic patients.

The current study was subject to several limitations, including:

- The lack of control over medication intake during the study, which could potentially decrease motivation for self-care behaviors due to concurrent medication use. Future research should consider this factor.
- The study did not control for the financial and economic status of the respondents, as concerns about economic issues could reduce motivation for self-care behaviors. Future research should control for the economic status of patients.
- The uniformity of participant invitation was another limitation due to organizational constraints in participant recruitment. Future studies should consider scheduling, setting an appropriate location for responses, and inviting participants based on the hardware capabilities of the centers.

Recommendations:

Given the results, it is recommended that educational workshops be organized in hospitals and diabetes clinics to increase self-compassion for diabetic patients, especially women with diabetes.

To apply the findings, it is suggested that psychological factors of self-compassion and psychological distress be addressed in clinics by diabetes care teams and psychologists, offering necessary training on enhancing the positive impact of these factors on the self-care process of diabetic patients.

It is recommended that self-help resources such as books on improving self-care behaviors be published and made available to patients with type 2 diabetes, and educational workshops be organized for them in this regard.

Also, counselors, therapists, and designers of psychological treatment packages for diabetes should use the results of the current study to improve and deepen the treatment and counseling process for diabetic patients.

Authors' Contributions

Ensiyeh Sharifpour contributed significantly to the conception and design of the study. She was primarily responsible for data collection and played a pivotal role in the interpretation of data. Ensiyeh also contributed to drafting the manuscript and revising it critically for important intellectual content.

Hossein Akbari Amarghan had a leading role in formulating the research hypothesis and design. He oversaw the methodological approach, data analysis, and interpretation of the results. As the corresponding author, Hossein was central to the integration of the team's contributions and ensuring the accuracy and integrity of the work. He also contributed to manuscript revision and approval of the final version to be published.

Hamid Nejat was instrumental in the analysis and interpretation of the data. He provided substantial contributions to the statistical analysis and modeling aspects of the study. Hamid also assisted in drafting the manuscript, particularly the methods and results sections,

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and contributed to the critical revision of the manuscript for key intellectual content.

Anis Iranmanesh contributed to the literature review and the theoretical framework of the study. She was involved in drafting the manuscript, focusing on the introduction and discussion sections. Anis also played a significant role in revising the manuscript critically for intellectual content and ensuring the coherence and argumentation throughout the paper.

All authors have read and approved the final manuscript. Each author has participated sufficiently in the work to take public responsibility for appropriate portions of the content. They agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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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Ethics Considerations

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

This research is derived from the first author's doctoral dissertation titled "Development of a Causal Model of Self-Care Behaviors Based on Life Events, Self-Compassion, and Perceived Social Support with Mediation by Psychological Distress in Men and Women with Type 2 Diabetes," approved by the Islamic Azad University, Central Tehran Branch, under code IR.IAU.CTB.REC.1402.046. The questionnaires were completed anonymously with informed consent. The researchers fully adhered to publication ethics, including avoiding plagiarism, misconduct, data falsification, or duplicate submission and publication.

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