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Compilation of the causal model of self-care behaviors based on life events and perceived social support with the mediation of psychological distress in women and men with type 2 diabetes

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A B S T R A C T

Objective: This research aimed to develop a causal model of self-care behaviors based on life events and perceived social support with the mediation of psychological distress in men and women with type 2 diabetes.

Methods and Materials: The present study was applied in objective, quantitative in data type, survey-based in data collection, and descriptive-analytical based on structural equation modeling. The study population consisted of individuals with type 2 diabetes aged 40 to 60 in Tehran, with a sample of 640 selected through convenient sampling. Data collection tools included questionnaires on Life Events (Paykel, 1971), Perceived Social Support (Zimet et al., 1988), Psychological Distress (Kessler et al., 2003), and Self-Care Behaviors (Hampson & Glasgow, 2000). The statistical analysis process in the current study involved entering the collected data into IBM SPSS Statistics 26 and then Smart PLS 3.2 software, where variance-based structural equation modeling statistical tests and comparison of means between two independent groups were conducted.

Findings: The results showed that all model fit indices were within acceptable limits (GOF for Men = 0.725 and Women = 0.733), indicating the model's adequate fitting with the data. Both direct and indirect effects of life events and perceived social support, mediated partially by psychological distress, on self-care behaviors were confirmed ($p < 0.01$). In both genders, perceived social support (Men $\beta = 0.889$, Women $\beta = 0.982$) and life events (Men $\beta = -0.610$, Women $\beta = -0.570$) had the most significant total effect on self-care behaviors in individuals with type 2 diabetes. The moderating role of gender in the relationship between self-care behaviors and life events and perceived social support mediated by psychological distress was not confirmed ($p > 0.05$).

Conclusion: Given the confirmed role of psychological factors in self-care behaviors among individuals with type 2 diabetes, the presence of psychological counselors in the diabetes treatment team is essential. Accordingly, it is recommended that psychological counselors pay more attention to the significant roles of life events, perceived social support, and psychological distress in supportive and therapeutic interventions for individuals with type 2 diabetes.

Keywords: *Self-care behaviors, Life events, Perceived social support, Psychological distress, Type 2 diabetes.*

1. Introduction

Diabetes, one of the most common non-communicable metabolic diseases worldwide, is a serious and chronic autoimmune disease with a similar prevalence in both men and women. It is characterized by primary complications such as hyperglycemia, hyperlipidemia, destruction or reduction of beta cells in the islets of Langerhans of the pancreas, etc. (Suryasa et al., 2021). According to a study conducted in 2022 by the Institute for Health Metrics and Evaluation at the University of Washington, 529 million people globally suffer from diabetes. It is estimated that the current global prevalence rate of diabetes at 1.6% will increase to 9.8% by 2050, reaching approximately 1.3 billion affected individuals (Mirshahi & Nahbandani, 2022; Verdecias et al., 2023). In Iran, the prevalence rate of diabetes in the five years leading up to 2020 has increased by about 30%, reaching 14% (Mirshahi & Nahbandani, 2022). Type 2 diabetes, which accounts for 90 to 95 percent of diabetes cases, is caused by inadequate compensatory insulin secretion (Paudel et al., 2022; Strategies, 2017). This disease is a chronic and progressive disorder that leads to persistent complications and increases the likelihood of cardiovascular diseases, nephropathy, retinopathy, neuropathy, diabetic foot, amputation, and mortality (Mohammadi et al., 2023). Clinical studies indicate that type 2 diabetes is one of the most common diseases in middle-aged and elderly people, with about 50% of individuals over 65 years experiencing some degree of glucose intolerance (Mirshahi & Nahbandani, 2022).

Due to its chronic nature and numerous complications, diabetes is recognized as a costly disease worldwide, imposing significant economic burdens on patients, their families, and society (Verdecias et al., 2023). The healthcare costs associated with diabetes in 2021 were estimated at 966 billion dollars, expected to rise to 1054 billion dollars by 2045. Currently, diabetes is expanding as an unprecedented epidemic worldwide (Aliakbari dehkordi et al., 2021) and is the third leading cause of death globally (Mehraeen et al., 2022; Ostadzadeh et al., 2017). Clinical reports suggest that one of the reasons for the lack of success in controlling and treating diabetes complications is the lifelong nature of the disease, which results in limited patient participation in the treatment process (Zarbakhsh et al., 2021). The most significant cause of mortality in diabetic patients is reported to be non-adherence to health-based behaviors that lead to self-care (da Rocha et al., 2020).

Since diabetes has no definitive cure, controlling it requires lifelong adherence to self-care behaviors (Zarbakhsh et al., 2021). According to Orem et al.'s self-care theory, self-care is a set of voluntary, conscious, learned, and purposeful activities carried out by individuals to maintain life, health, and well-being (da Rocha et al., 2020). Self-care involves health-preserving and enhancing activities realized through positive actions and disease management (Hoogendoorn et al., 2020). It is a strategy used by individuals to promote health and adapt to life's events and stresses (Heydari Aghdam et al., 2021). In diabetes, self-care results from the patient's active and continuous collaboration in care behaviors, including regular medication intake, diet adherence, exercise, blood sugar monitoring, and daily and continuous foot care (Hoogendoorn et al., 2020). Therefore, the goal of self-care in type 2 diabetes is to perform treatment-related tasks, as over 95% of the treatment process and mitigation of negative outcomes depend on the individual and lifestyle changes (Dagnew et al., 2021). However, research shows that these patients have poor adherence to self-care behaviors, leading to increased complications from the disease (Edraki et al., 2020).

As mentioned, adherence to treatment and self-care behaviors in type 2 diabetes, which is increasingly prevalent, is a serious challenge. Therefore, identifying factors influencing self-care behaviors in patients with type 2 diabetes becomes necessary. Factors with behavioral, cognitive, and metacognitive nature have been proven to impact individuals' commitment to treatment adherence and diabetes control (Mohammadi et al., 2023). Psychological challenges diagnosed in about one-third of diabetic patients are a significant factor in their motivation for non-adherence to self-care behaviors (American Diabetes, 2018). The most important problems for diabetic patients are psychological challenges; diabetes is emotionally and cognitively taxing and requires intense and complex self-care behaviors (Ramesh et al., 2020). This obligation to perform self-care behaviors can lead to significant psychological challenges in daily life (Umeda et al., 2020). Clinical studies report that diabetic adults are three to four times more likely to experience stress, anxiety, and depression compared to others (Bagheri Sheykhangafshe et al., 2021; Jalali-Farahani et al., 2022). The complications of this challenging disease can evoke various negative emotions, which might be precursors to self-care behaviors, as the perception of threat and danger can disrupt emotional regulation, crucial for adherence to treatment (Moulaei et al., 2022; Umeda et al., 2020). Therefore, an important goal in diabetes control is the

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psychological empowerment of patients to perform self-care behaviors.

In light of recent discussions, one of the psychological factors worth examining in greater detail regarding self-care behaviors is life events. Life events, including distinct, observable, and objectively reportable occurrences that require some form of social or psychological adaptation or both are significant factors influencing the prevalence of psychological distress, particularly depression (Connolly & Alloy, 2018; Vesal & Godarzi, 2016), anxiety (Miloyan et al., 2018), aggression (Kiive et al., 2017), and subsequent psychological distress. Any significant change in life can potentially initiate a period of stress and psychological pressure, reducing individual focus on self and exacerbating symptoms of existing diseases or leading to new physical and mental illnesses. Stress from life events also impacts mental health and physical well-being, subsequently influencing self-care behaviors (Sokratous et al., 2023). A study indicates that life events, along with variables like gender and disease duration, are significant predictors of self-care behaviors in diabetic individuals (Shrestha et al., 2021). Another study's findings suggest that experiencing stressful life events and how one interacts and adapts to them, as a practical experience, can lead to the continuation or discontinuation of daily self-care behaviors (Umeda et al., 2020; Zarbakhsh et al., 2021). It seems that diabetic individuals' tolerance of stressful life events, considering their conditions in terms of disease adaptation and self-management efforts, may not align with their capabilities, leading to psychological conflict and struggle (Sokratous et al., 2023).

Additionally, since self-care behaviors are complex and influenced by social factors (Park et al., 2021), another psychological factor that can affect the increase or decrease in self-care behaviors is perceived social support. Perceived social support is defined as the affection, companionship, and attention received from family members, friends, and other significant individuals in life, and the individual's mental assessment and satisfaction with this received support (Saeidi et al., 2021). Perceived social support is a complex, multifaceted mental construct that is a vital source of adaptation (Park et al., 2021) and a valuable factor in disease control and coping (Badpar et al., 2019; Saeidi et al., 2021). Individuals with extensive social networks and social support are better at coping with diseases (Thomas et al., 2022). Adequate social support for diabetic patients facilitates adherence to self-care behaviors and encourages treatment compliance. One study showed that individuals lacking social support have less adherence to self-care behaviors (Park et al., 2021). Another study reported perceived social support as an influential factor in self-care among individuals with chronic diseases (Saeidi et al., 2021). Another study indicated that social support directly and indirectly influences self-care behaviors through self-efficacy mediation in diabetes management (Badpar et al., 2019).

Emotional dysregulation is one of the most significant barriers to adherence to treatment and self-care behaviors in individuals with diabetes (Bahador et al., 2023). Treatment adherence plays a crucial role in controlling this disease, and there is a strong and positive relationship between adherence to treatment and optimal glycemic control (Skinner et al., 2020). Due to the chronic and intractable nature of diabetes and periodic fluctuations in blood serum glucose levels, individuals with diabetes are more prone to emotional and psychological disorders such as anxiety and depression (Mehrdadian et al., 2023; Mohammadi et al., 2023), leading to non-adherence to treatment plans (Dotti Sani et al., 2023). Psychological distress is an emotional state and a specific type of discomfort in facing harmful situations and specific worries, occurring transiently or permanently (Bagheri Sheykhangafshe et al., 2021). Psychological distress, along with depression, stress, and anxiety, includes symptoms and signs of emotional and physical nature (Bagheri Sheykhangafshe et al., 2021). It appears that psychological distress is another psychological factor that can significantly influence the increase or decrease in self-care behaviors in diabetic patients. This is because, on one hand, diabetes has both physical and psychological repercussions, and on the other, diabetic patients face high levels of psychological distress due to the serious complications of the disease, the financial burden of control and treatment, the stress of self-managing control behaviors, and anxiety due to the constant possibility of deviating from treatment and self-care plans (Vesal & Godarzi, 2016). In such circumstances, non-adherence to treatment plans and self-care behaviors due to psychological disorders seems predictable (Bagheri Sheykhangafshe et al., 2021).

Studies in this area have shown that psychological distress, associated with emotional dysregulation, affects the personal and social daily functioning of patients and hinders adherence to self-care behaviors. However, managing health-oriented behaviors leading to self-care in patients with type 2 diabetes is challenging, requiring a multidimensional approach consisting of continuous medication intake, blood sugar control, diet adherence,

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physical activity, and effective coping skills, and adherence to risk-reducing behaviors (Gao et al., 2022). Psychological distress not only affects self-care behaviors in diabetic patients but also significantly is influenced by life events and perceived social support. Research has confirmed the role of negative life events in increasing psychological distress (Abbasi, 2019; Duru & Balkıs, 2022; Gungor et al., 2021). A study showed that lack of social support, due to creating problems in maintaining relationships, fear of rejection, and avoidance of social situations, leads to increased psychological distress (Chan et al., 2022). Other studies have also confirmed the impact of social support in reducing psychological distress (Khatiwada et al., 2021; Tindle et al., 2022). Another study indicates that perceived social support reduces individual vulnerability to anxiety, depression, and various mental and physical illnesses, especially important in Asian countries (Bazzazian, 2013). Therefore, it is likely that psychological distress plays a mediating role in the relationship between self-care behaviors in patients with type 2 diabetes and life events and perceived social support.

Clinical reports indicate that men and women, due to biological differences and differences in social roles and responsibilities, exhibit different patterns of self-care behaviors (Park et al., 2021; Saeidi et al., 2021). However, the role of gender in the cultural and social context of Iran in the adherence of diabetic patients has been less studied. A study showed that health-oriented behaviors leading to self-care are more common in men than women, with men focusing on physical activities and women on monitoring and tracking disease symptoms (Baroni et al., 2022). Another study revealed that men, due to roles, social factors, opportunities, and higher self-efficacy, perform better in self-care behaviors compared to women (Kazemi et al., 2020). Another study found that skipping meals is more common among women and consulting a nutritionist and using artificial sweeteners is more common among men for diabetes control (Ashfaq et al., 2019). Another study emphasized that women focus on self-care behaviors through dietary restrictions and men through the consumption of healthy foods, with men preferring self-directed and women preferring interactive and social support resources for self-care (Mathew et al., 2012). Thus, considering gender differences in designing educational interventions for self-care behaviors in diabetic patients seems essential.

Review of studies on psychological factors affecting self-care behaviors in patients with type 2 diabetes shows that previous research has focused on identifying and evaluating factors affecting self-care behaviors in diabetic patients, and no study has specifically examined the role of gender in how psychological factors influence self-care behaviors. Therefore, the current research aims to fill this research gap by presenting a model of psychological factors affecting self-care behaviors in male and female patients with type 2 diabetes, comparing the analytical impact of life events and perceived social support on self-care behaviors mediated by psychological distress in men and women with type 2 diabetes.

The necessity of this study stems from the fact that, on one hand, diabetes as the most common chronic and non-communicable metabolic disease, ranks third in causing global mortality, and the primary cause of death in diabetic patients is non-adherence to self-care behaviors. On the other hand, about one-third of diabetic patients suffer from psychological problems, which is a significant factor affecting their motivation to follow treatment plans and perform self-care behaviors. This is particularly concerning as nearly half of those with chronic diseases, especially diabetes, do not persist in health-oriented behaviors leading to self-care due to fatigue from long-term treatments and failure in definitive treatment. Emotional problems resulting from the stress of the disease often lead to unpleasant emotional reactions, hindering patients' adherence to treatment, worsening their condition, and potentially leading to death. In this context, the current study was conducted to "develop a causal model of self-care behaviors based on life events and perceived social support with the mediation of psychological distress in men and women with type 2 diabetes."

2. Methods and Materials

2.1. Study Design and Participants

The present study was applied in purpose, quantitative in data type, field-based in data collection method, and descriptive-analytical in analysis approach with a correlation perspective, based on variance-based structural equation modeling. It was conducted in the first half of the year 2023 in Tehran. The statistical population of this study consisted of patients with Type 2 diabetes in Tehran, aged between 40 to 60 years. To diagnose Type 2 diabetes, the specialist doctor's opinion and the HbA1c test result in the past four months, with a hemoglobin level of more than 6.5, were used. For determining the sample size in this study, considerations related to determining sample size in structural equation modeling were used. Therefore,

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considering the optimal estimate and assuming an 80% response rate, the sample size for the current study was estimated at 640 participants, and convenience sampling was executed. The criteria for including individuals in the sample were: (1) having Type 2 diabetes, (2) not having Type 1 diabetes or gestational diabetes, (3) being in the 40 to 60-year age range, (4) literacy in answering the questionnaire, (5) not having major psychological disorders and being under treatment, with incomplete questionnaires considered as exclusion criteria. Also, in line with research ethics, written information about the study's subject was provided to the participants, ensuring their voluntary participation. The researchers committed to maintaining confidentiality and not disclosing respondents' personal information; therefore, participants' names and surnames were not recorded to respect their privacy. The data collection tools in this study were the following questionnaires:

2.2. Measures

2.2.1. Self-Care Behaviors Scale

Developed by Hampson and Glasgow in 2000, this questionnaire measures adherence to self-care plans in diabetic patients. It is a self-assessment tool with 15 questions, including 5 sub-tests: diet adherence, blood sugar testing, timely medication intake, physical activity, and foot care. Responses are on a seven-point Likert scale from completely correct (score 7) to completely incorrect (score 1), with higher scores indicating greater adherence to self-care plans. Hampson et al. (2000) psychometrically validated this questionnaire, assessing and confirming its reliability and validity; Iranian researchers psychometrically validated the Persian translation and adaptation, confirming its internal consistency reliability and content validity through expert panel reviews, with Cronbach's alpha determined at 0.78 and the average content validity ratio based on 8 experts' opinions set at 0.84 (Aliakbari dehkordi et al., 2021; Heydari Aghdam et al., 2021).

2.2.2. Life Events Scale

Developed by Holmes and Rahe in 1967, this questionnaire measures the stress level due to various stressors throughout life. It is a self-assessment tool with 43 items, assessing the number of stressors and the level of stress. Responses are on a five-point Likert scale from completely correct (score 5) to completely incorrect (score 1), with higher scores indicating higher stress due to various life stressors (Paykel et al., 1971). Iranian researchers also psychometrically validated the Persian translation and adaptation, confirming its internal consistency reliability and test-retest reliability, and content validity through expert panel reviews, with Cronbach's alpha determined at 0.78 and test-retest reliability at 0.82 (Sabouri & Mansouri, 2022).

2.2.3. Perceived Social Support Scale

Developed by Zimet et al. in 1988, this questionnaire measures perceived social support. It is a self-assessment tool with 12 questions, including 3 sub-tests: perceived support from family, friends, and significant others. Responses are on a five-point Likert scale from completely correct (score 5) to completely incorrect (score 1), with higher scores indicating higher perceived social support. Zimet et al. (1988) psychometrically validated this questionnaire, assessing and confirming its reliability and validity (Zimet et al., 1988); Iranian researchers also psychometrically validated the Persian translation and adaptation, confirming its internal consistency reliability and factor analysis-based validity, with Cronbach's alpha determined at 0.81 (Saeidi et al., 2021; Zarei, 2022).

2.2.4. Psychological Distress Scale

Developed by Kessler et al. in 2003, this questionnaire measures psychological distress. It is a self-assessment tool with 10 questions, assessing depression and anxiety. Responses are on a five-point Likert scale from completely correct (score 5) to completely incorrect (score 1), with higher scores indicating higher psychological distress. Kessler et al. (2003) psychometrically validated this questionnaire, assessing and confirming its reliability and validity; according to Kessler et al. (2003), this questionnaire is sensitive and specific enough for screening anxious and depressed individuals and is a suitable tool for post-treatment monitoring and control (Kessler et al., 2003). Iranian researchers psychometrically validated the Persian translation and adaptation, confirming its internal consistency reliability and validity through expert panel reviews, with Cronbach's alpha determined at 0.85 (Dehkordi et al., 2019).

2.3. Data analysis

The statistical analysis process in the current study involved entering the collected data into IBM SPSS Statistics 26 and then Smart PLS 3.2 software, where

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variance-based structural equation modeling statistical tests and comparison of means between two independent groups were conducted.

3. Findings and Results

Given that demographic characteristics influence perceptions, cognition, mental images, and individual expectations, describing the sample in terms of demographic factors is essential. The gender distribution was evenly split, with 320 men and 320 women, each constituting 50% of the sample. Regarding educational level, 24% (154 individuals) had a diploma or lower, 11% (70 individuals) had an associate degree, 31% (197 individuals) had a bachelor's degree, 27% (178 individuals) had a master's degree, and 7% (41 individuals) had a doctoral degree or higher. Marital status showed that 23% (147 individuals) were unmarried, while 77% (493 individuals) were married. The age distribution was divided into two categories: 39% (250 individuals) were between 40 to 50 years old, and 61% (390 individuals) were between 50 to 60 years old.

Table 1

Mean, Standard Deviation and Correlation Matrix

Gender	Variables	Mean	Standard Deviation	2	3	4
Men	1. Life Events	11.798	5.027	0.351*	0.661**	-0.458**
	2. Perceived Social Support	3.52	0.266	-	-0.775**	-0.759**
	3. Psychological Distress	3.81	0.372		-	-0.601**
	4. Self-Care Behaviors	5.00	0.933			-
Women	1. Life Events	10.78	5.020	0.376*	0.634**	-0.470**
	2. Perceived Social Support	3.49	0.285	-	-0.770**	-0.744**
	3. Psychological Distress	3.94	0.353		-	-0.592**
	4. Self-Care Behaviors	5.27	0.856			-

As seen in Table 1, the relationship between the research variables is significant for both men and women (P<0.01). The strongest correlation is between perceived social support and psychological distress (-0.775 for men and -0.770 for women), and the weakest correlation is between life events and perceived social support (0.351 for men and 0.376 for women).

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for the variables of life events (0.832 for men and 0.798 for women), perceived social support (0.748 for men and 0.769 for women), psychological distress (0.727 for men and 0.721 for women), and self-care behaviors (0.761 for men and 0.803 for women) indicated a suitable sample size for structural equation modeling. The Bartlett's test of sphericity was also significant for all variables (P<0.001), suggesting that the model variables are correlated and suitable for structural equation modeling. Indices related to examining collinearity, validity, reliability, and the fit of the adjusted model are observed in Table 2.

Table 2

Fit indices and Validity and Reliability of Model

Gender	Variables	VIF	AVE	α	CR	R2	Q2	RMSEA	SRMR
Men	1. Life Events	2.569	0.681	0.775	0.784	-	-	-	-
	2. Perceived Social Support	2.715	0.539	0.743	0.751	-	-	-	-
	3. Psychological Distress	-	0.743	0.746	0.828	0.711	0.371	0.055	0.062
	4. Self-Care Behaviors	-	0.848	0.734	0.800	0.721	0.369	0.047	0.076
Women	1. Life Events	3.756	0.668	0.922	0.832	-	-	-	-
	2. Perceived Social Support	2.117	0.666	0.832	0.740	-	-	-	-
	3. Psychological Distress	-	0.667	0.865	0.792	0.714	0.380	0.060	0.053
	4. 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					

As seen in Table 2, in both genders, the indices of collinearity, validity, reliability, and fit of the adjusted model are within acceptable limits, allowing for a judgment on the state of variable relationships in the model. The statistics related to the adjusted model are observed in Table 3.

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Table 3

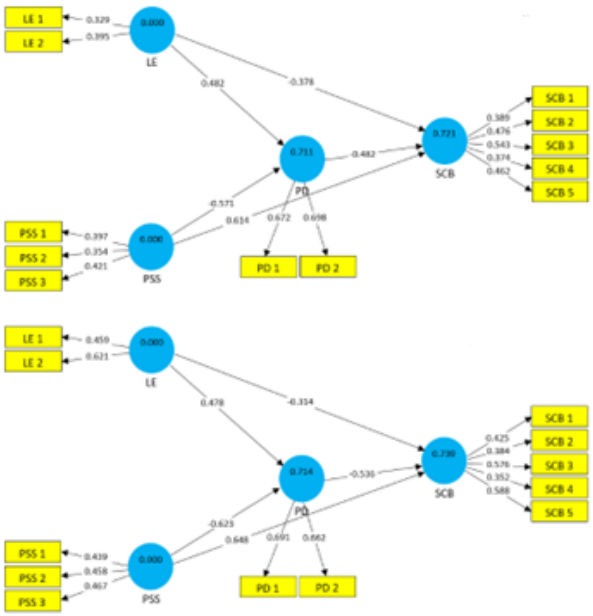
Direct Effects

External Variable	Direction	Internal Variable	Men - Standardized Effect Coefficient	Men - Test Statistic	Men - Significance Level	Women - Standardized Effect Coefficient	Women - Test Statistic	Women - Significance Level
Life Events	-->	Self-Care Behaviors	-0.378**	-5.677	0.000	-0.314**	-7.612	0.000
Perceived Social Support	-->	Self-Care Behaviors	0.614**	12.712	0.000	0.648**	12.247	0.000
Psychological Distress	-->	Self-Care Behaviors	-0.482**	-7.442	0.000	-0.536**	-9.769	0.000
Life Events	-->	Psychological Distress	0.482**	7.352	0.000	0.478**	8.832	0.000
Perceived Social Support	-->	Psychological Distress	-0.571**	-12.384	0.000	-0.623**	-12.487	0.000

**p<0.01

Figure 1

Final Model



As shown in Table 3 and Figure 1, the empirical data aligns with the theoretical model, confirming the goodness of fit of the tested model. The intensity and direction of indirect pathways and total effects in both genders are observed in Table 4.

Table 4

Indirect Effect

Gender	External Variable	Direction	Mediating Variable	Direction	Internal Variable	Indirect Effect	Sobel Z-Statistic	Total Effect

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Men	Life Events	-->	Psychological Distress	-->	Self-Care	-0.232	-5.395	-0.610
	Perceived Social Support	-->	Psychological Distress	-->	Self-Care	0.275	5.000	0.889
Women	Life Events	-->	Psychological Distress	-->	Self-Care	-0.256	-5.953	-0.570
	Perceived Social Support	-->	Psychological Distress	-->	Self-Care	0.334	5.387	0.982

As shown in Table 4, in both genders, the Sobel Z-test for all indirect pathways is less than -1.96 or more than 1.96, indicating that all indirect pathways are significant. The greatest indirect effect is related to perceived social support (0.275 for men and 0.334 for women) and life events (-0.232 for men and -0.256 for women), with the greatest total effect related to perceived social support (0.889 for men and 0.982 for women) and life events (-0.610 for men and -0.570 for women). Perceived social support has a direct (positive) effect, and life events have an inverse (negative) effect on self-care behaviors, meaning that an increase in perceived social support and a decrease in life events enhance self-care behaviors.

Since the direct effect of each independent variable of life events and perceived social support on the dependent variable and the mediating variable and the effect of the mediating variable on the dependent variable were confirmed, the role of the mediating variable psychological distress in the relationship between life events and perceived social support with self-care behaviors is partial. Subsequently, to compare the intensity of the effect of life events and perceived social support on self-care behaviors in women and men, an independent group mean comparison test was conducted, with results observed in Table 5.

Table 5

Comparison of Means

External Variable	Group	Number	Mean	Standard Deviation	Test Statistic	Significance Level
Life Events	Men	320	-0.610	0.198	-1.182	0.067
	Women	320	-0.571	0.190	-1.182	0.067
Perceived Social Support	Men	320	0.887	0.217	-1.778	0.058
	Women	320	0.982	0.199	-1.778	0.058

As seen in Table 5, in both genders, the test comparing the intensity of the effect of life events and perceived social support mediated by psychological distress on self-care behaviors was not significant (P>0.05). Therefore, self-care behaviors based on life events and perceived social support mediated by psychological distress do not significantly differ between men and women with Type 2 diabetes.

4. Discussion and Conclusion

Type 2 diabetes, due to its prolonged control and treatment process, requires patient participation in self-care (Jalali et al., 2023), yet many patients lack optimal self-care quality (Sanagouye Moharer et al., 2020). Thus, adherence to self-care behaviors is considered a serious challenge for this disease (da Rocha et al., 2020; Zarbakhsh et al., 2021), and identifying key factors that influence the continuity of self-care behaviors seems crucial. Considering the significant psychological stress associated with this disease (Ramesh et al., 2020), psychological factors play a special role among the factors affecting adherence to self-care programs (Ramesh et al., 2020; Umeda et al., 2020). In this context, the current study aimed to "develop a causal model of self-care behaviors based on life events and perceived social support with the mediation of psychological distress in men and women with Type 2 diabetes." Findings indicated that life events and perceived social support influence self-care behaviors in men and women with Type 2 diabetes, both directly and through the mediation of psychological distress.

One explanation for the impact of life events on self-care behaviors mediated by psychological distress is that life stressors are associated with increased psychological distress (Hayward et al., 2020; Sopheab et al., 2020), and heightened psychological distress in diabetic patients leads to a lack of focus and anxiety, resulting in decreased performance in self-care behaviors (Bala et al., 2021). A significant psychological challenge in self-care for diabetic patients is the psychological distress caused by the stressful

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event of being diagnosed with diabetes (Verdecias et al., 2023). This life event, due to its simultaneity with psychological barriers caused by the disease, especially psychological distress, exerts a doubly negative impact on the self-care process in diabetic patients and also creates extensive changes in the patient's life, imposing anxiety and stress, which in turn increases psychological distress. Increased distress leads to cognitive distortions such as all-or-nothing thinking, disrupting the self-care process. This thinking pattern leads patients to view minor and occasional deviations from the self-care plan as unacceptable and the treatment adherence process as discouraging, preventing self-care behaviors. Another explanation is that diabetic patients experience numerous psychological and social issues due to the physical and irreversible consequences of the disease, leading to feelings of insecurity and alterations in body image, which increase psychological distress (Kazemi Rezaei et al., 2023). The importance of psychological distress is that it exacerbates the impact of life events and disrupts self-care behaviors by affecting the individual's focus and thinking about the disease. Further, life events impose stress levels on patients, activating the hypothalamic-pituitary-adrenal axis and the autonomic nervous system, leading to negative cognitive components such as rumination and maladaptive coping strategies (Heydari Aghdam et al., 2021). Prolonged and frequent confrontation with stress and anxiety from negative life events disrupts mood self-regulation and increases allostatic load in brain areas like the prefrontal cortex and amygdala (Ma et al., 2023; Sabouri & Mansouri, 2022). Therefore, life events lead to psychological distress, a combination of mood problems, depression, and anxiety, which follow maladaptive and self-destructive behaviors that are in opposition to self-care. Ultimately, increased components of psychological distress due to the stressful event of diabetes negatively affect patients' objective assessment of life event challenges and hardships, leading to increased cognitive distortions and catastrophizing of stressful events, exacerbating their psychological distress and confronting self-care management with serious challenges.

In explaining the impact of perceived social support on self-care behaviors mediated by psychological distress, it is important to note that perceived social support in diabetic patients leads to the improvement and enhancement of psychological and emotional states, thereby improving self-efficacy, personal capabilities, and subsequently the state of self-care. The lower an individual's perception of social support, the greater the psychological distress from stress and anxiety of the disease and its negative consequences, weakening self-confidence in self-care and destabilizing treatment plans. Part of the gap between actual and perceived social support is due to the negative impact of psychological distress; psychological distress distorts the patient's cognition of current conditions, significantly reducing the perceived impact of social support by patients (Ardouin et al., 2023). Indeed, increased perceived social support in patients and the formation of social and supportive relationships become a source for increased self-belief, leading to more effective individual performances in self-care and disease control areas. Social supporters are influential individuals who provide conditions for care, attention, empathy, hope, and intimacy to patients, helping them overcome anxiety, depression, and distress, and in a calm environment, recognize their talents, abilities, and strong resources, and take action in self-care behaviors (Saeidi et al., 2021). Another explanation for this result is that the development and growth resulting from receiving full support from family members, friends, and acquaintances create intimate and friendly bonds, fostering feelings of empathy, solidarity, commitment, and acceptance (Park et al., 2021). Such a situation, by creating strong and firm supportive connections from the circle of family and friends, sets the stage for reducing psychological distress. In these circumstances, while the individual feels committed and motivated, commitment and adherence to self-care behaviors are facilitated.

Another finding of this research was that there was no significant difference between the overall effect of life events and perceived social support mediated by psychological distress on self-care behaviors in men and women with Type 2 diabetes. The first explanation for the lack of significant difference between men and women with Type 2 diabetes in predicting self-care behaviors based on life events mediated by psychological distress is that the level of stress and the number of stress-inducing factors differ between men and women; men report more stress factors while women report higher levels of stress, although no significant difference is observed between the two genders' overall means. This is because the cognitive and psychological characteristics of women and men differ, leading to different perceptions of the types of events and the stress they cause. Although men are affected by a greater number of stress factors, this difference is balanced by women's higher susceptibility to the intensity of events, resulting in no significant difference in their overall impact once included in the model. Another explanation suggests

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that the characteristics of femininity and masculinity in Tehran are closely intertwined due to gender interactions. For instance, women performing traditionally male tasks and vice versa has deeply transformed the gender composition, making cultural differences in Tehran a possible reason for the lack of significant differences between men and women. Furthermore, considering the age range of 40 to 60 years in the study is essential; as age increases, due to the acquisition of more life skills, the likelihood of reducing the importance and influence of life events increases (Rossi, 2018; Wang et al., 2023). Therefore, the lack of significant difference in life events between genders could also be due to this factor. In fact, the high correlation of life events in both genders leads to no difference in the impact of life events on self-care behaviors, both directly and mediated by psychological distress in men and women.

Regarding the lack of significant difference between men and women with Type 2 diabetes in predicting self-care behaviors based on perceived social support mediated by psychological distress, it can be stated that despite differences in the scores of sub-scales, overall perceived social support does not significantly differ between men and women. Given no difference in the outcome of the sub-scales, their impact on self-care behaviors, both directly and mediated by psychological distress, does not significantly differ between genders. Another explanation emphasizes that research evidence regarding perceived social support in men and women varies; one study did not confirm a significant difference between men and women in terms of perceived social support (Siddiqui et al., 2019). Yet another study suggested greater perceived social support in men than in women, with men receiving more support from friends and women more from family and other individuals (Soman et al., 2016). The variation in research findings across different countries indicates the dependency of this variable on culture and its influence on the performance of men and women. What most researchers agree upon, and seems to be prevalent in the cultural context of Iranian society, is that men generally have a larger social network that can be a source of perceived social support, while women perceive the most social support from their family. Since each gender has its unique sources in this regard, it seems that there is no significant difference in the impact of perceived social support on self-care behaviors between men and women. On the other hand, research findings regarding psychological distress showed that both genders experienced more depression than anxiety. Despite different reactions of men and women during periods of depression, where women tend to be more passive and men more irritable and aggressive, depression ultimately leads to unpleasant emotional reactions towards the disease and non-adherence to self-care behaviors in both genders (Grey et al., 2020; Zarei, 2022). Since the current research did not find a significant difference in perceived social support and psychological distress between men and women, it seems that there is no significant difference in the impact of perceived social support on psychological distress and self-care behaviors between the genders.

5. Limitations & Suggestions

One of the limitations of this study is the cross-sectional design, which restricts the ability to establish causality between variables. Also, the sample was limited to individuals from specific diabetes clinics in Tehran, potentially limiting the generalizability of the findings to other regions or cultural contexts. The reliance on self-reported measures for assessing psychological distress and self-care behaviors could introduce response biases. Additionally, the study focused on a specific age group (40 to 60 years), which may not reflect the experiences of younger or older individuals with Type 2 diabetes. Future research should address these limitations by considering longitudinal designs, broader and more diverse populations, objective measures, and a wider age range.

Future research should consider longitudinal studies to better understand the causal relationships among life events, perceived social support, psychological distress, and self-care behaviors in individuals with Type 2 diabetes. Investigating these variables in different cultural and geographical settings could enhance the generalizability of the findings. It would also be beneficial to explore these dynamics in younger and older age groups and to include objective measures of diabetes management, such as blood glucose levels, to corroborate self-reported data. Additionally, research could examine the role of other psychological factors, like resilience or coping strategies, in managing Type 2 diabetes.

Based on the findings, it is recommended that diabetes care programs incorporate psychological support to address the impact of life events and enhance perceived social support. Healthcare providers should be aware of the psychological challenges faced by patients and offer resources to help manage stress and depression. Community-based interventions could be developed to strengthen social support networks for diabetic patients.

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Educational programs aimed at improving self-care behaviors should consider the psychological factors that influence adherence. Furthermore, policies should focus on providing comprehensive diabetes care that includes not only medical treatment but also psychological and social support to improve overall disease management and patient well-being.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethics Considerations

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

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

Zeynab Eshraghi, Anita Baghdasarians, Fatemeh Golshani, and Suzan Emamipour all made significant contributions to this research project. Zeynab Eshraghi played a key role in the design and compilation of the causal model, including the integration of life events, perceived social support, and psychological distress as factors influencing self-care behaviors in individuals with type 2 diabetes. Anita Baghdasarians contributed expertise in statistical analysis and data interpretation, ensuring the rigor of the research findings. Fatemeh Golshani contributed to data collection and the implementation of the study. Suzan Emamipour provided guidance and supervision throughout the research process.

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