

Effectiveness of Cognitive Self-Compassion Training on Perceived Stress and Depression in Patients with Type 2 Diabetes

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ABSTRACT

Introduction: Due to the chronic nature of type 2 diabetes mellitus (T2DM) and its potential to induce stress and depression, exploring interventions like cognitive self-compassion training to improve mental well-being in this population is crucial. This study aimed to determine the effectiveness of cognitive self-compassion training on perceived stress and depression in patients with T2DM.

Materials & Methods: The present study was quasi-experimental with a pretest-posttest design and a control group. The statistical population of this study included all patients with T2DM employed in the education sector of Mashhad in 2023. Thus, a sample of 24 (12 per group) was selected using the convenience sampling method and considering the study's inclusion criteria and were randomly assigned to two experimental and control groups. The participants completed the Perceived Stress and Depression Beck questionnaires in the pretest and posttest stages, and the experimental group underwent cognitive self-compassion training for ten 90-minute sessions. Data analysis was performed using analysis of covariance. Statistical significance was set at the level of 0.05.

Results: The mean age of all participants was 34.91 (SD = 4.61) years. No significant differences were observed between the experimental and control groups prior to the intervention. However, the findings indicated a significant reduction in both perceived stress and depression scores in the post-intervention period for the cognitive self-compassion training group compared to the control group ($P < 0.001$).

Conclusion: Cognitive self-compassion training effectively reduced perceived stress and depression in patients with T2DM, suggesting it as a valuable tool for improving psychological well-being and overall quality of life.

Keywords: Self-compassion, Perceived stress, Depression, Diabetes mellitus

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Introduction

Type 2 Diabetes Mellitus (T2DM) is the predominant form of diabetes, typically presenting in adulthood and often linked to lifestyle factors (1). Established risk factors for developing T2DM include obesity, particularly central adiposity, physical inactivity, and a positive family history (2, 3). The cardinal symptoms of T2DM encompass frequent urination, excessive thirst and hunger, weakness/fatigue, dry skin, and unintended weight loss (4). T2DM is a chronic metabolic disorder characterized by dysglycemia, a condition of impaired insulin secretion or action, leading to elevated blood glucose levels (5). In T2DM, the body's cells become resistant to the effects of insulin, the hormone responsible for facilitating glucose uptake from the bloodstream into cells for energy. This insulin resistance results in hyperglycemia, a defining characteristic of T2DM (6).

Stress, a ubiquitous feature of modern life, presents a significant challenge for individuals managing T2DM. Defined as a physiological, cognitive, and behavioral response to perceived threats or demands (7), stress is a normal and integral aspect of life. However, chronic or excessive stress can have detrimental consequences for both physical and mental well-being (8). The interplay between stress and T2DM is complex and multifaceted. Chronic stress can exacerbate T2DM by elevating blood glucose levels, impairing insulin sensitivity, and increasing the risk of developing diabetic complications (9). Furthermore, stress can negatively impact self-management behaviors, such as adherence to medication regimens and dietary recommendations, further compromising glycemic control (10).

Chronic diseases are often accompanied by a perceived loss of bodily autonomy and increased dependence on others, which can contribute to feelings of helplessness and subsequent depression (11). Notably, several risk factors for T2DM, such as weight gain, sedentary behavior, smoking, and alcohol consumption, are also associated with poor mental health. This suggests a potential bidirectional relationship between depression and T2DM. Depression may increase the risk of developing T2DM, and conversely, medications used to treat depression can sometimes lead to weight gain, further increasing T2DM risk (12). Chronic stress and depression are well-documented to promote unhealthy behaviors like overeating, physical inactivity, and sleep disturbances, all of which are risk factors for obesity and insulin resistance, key contributors to T2DM (13). Furthermore, depression can dysregulate the body's stress response system, impacting hormones like cortisol, insulin, and glucagon, which play crucial roles

in glucose metabolism (14). The presence of depression not only affects treatment adherence but can also worsen the prognosis of the underlying chronic disease (15).

In recognition of this psychological comorbidity, mental health professionals have increasingly incorporated third-wave cognitive-behavioral therapies (CBTs) alongside pharmacological treatments for patients with diabetes (16). The demonstrably positive effects of these interventions highlight the need for more integrated psychotherapies that effectively address the psychological sequelae of diabetes and alleviate the burden of both physical and mental health complaints experienced by patients (17). Self-compassion-based cognitive therapy is a promising non-pharmacological intervention in this regard. SCBT is defined by its focus on cultivating positive self-regard as a means to promote mental well-being (18, 19). In essence, self-compassion-based cognitive therapy fosters a healthy form of self-acceptance, encouraging individuals to embrace both positive and negative aspects of themselves and their lives. This approach emphasizes three core elements: self-kindness, recognition of shared human experiences (common humanity), and mindful awareness (20). By promoting a sense of security, social connection, and reduced self-criticism, self-compassion-based cognitive therapy has been shown to effectively reduce rumination, thought suppression, and anxiety (20). Research consistently supports the efficacy of self-compassion-based cognitive therapy in improving psychological distress, mental health, and overall quality of life (21-23).

Recognizing the potential benefits of self-compassion-based cognitive therapy for individuals with T2DM, this study aimed to investigate the effectiveness of this intervention in reducing perceived stress and depression among patients with this condition.

Materials and Methods

Study design

The present study employed a quasi-experimental design with a pretest-posttest and control group structure.

Setting and participants

The target population consisted of all patients with T2DM employed in the Mashhad Education Department in 2023. A sample of 24 participants (12 per group) was selected using purposive sampling and considering the study inclusion criteria. Participants were randomly

assigned to either the experimental or control group. After obtaining the necessary approvals from relevant authorities, an announcement was made informing potential participants about the therapy sessions and enrollment procedures. Interested individuals were screened for eligibility, and informed consent was obtained from all participants. To maintain ethical standards, participants were assured of the confidentiality of their responses. Inclusion criteria were: employed in the Mashhad Education Department, age between 18 and 45 years, not currently participating in any other treatment programs, and not receiving individual counseling or medication therapy. Exclusion criteria were: receiving concurrent psychological treatments, using psychiatric medications, unwillingness to continue participation in the study, and missing more than two therapy sessions. Following the pretest administration for both groups, the cognitive self-compassion training was implemented for the experimental group only. The control group did not receive any treatment. Upon completion of the intervention sessions, a posttest was administered to all participants in both groups. It is noteworthy that the intervention was provided to the control group in a condensed format after the completion of the research.

Sample Size, Randomization and Blinding

A priori power analysis using G-Power software determined a required sample size of 24 participants to detect a medium effect size ($f = 1.25$) with $\alpha = 0.05$ and power = 0.90. Participants were randomly assigned to the experimental and control groups using a random number table generated by software ($n = 12$). The random number table was used to sequentially assign participants to groups, ensuring equal probability of allocation (Figure 1). The final sample list was sealed, preventing any manipulation by the research team.

Measurements & Validity and Reliability

1. Demographic form

Demographic variables included age, gender, duration of illness, and highest level of education attained.

2. The Perceived Stress Questionnaire (PSQ)

This tool has 14-item self-report measure developed by Cohen et al. (24) to assess an individual's perception of stress in their life situations. Participants respond using a 5-point Likert scale ranging from 0 (never) to 4 (very often), with higher scores reflecting greater perceived stress. The total score ranges from 0 to 56. The original English version of the PSQ has demonstrated acceptable internal consistency, with a reported Cronbach's alpha coefficient of 0.78 (24). The Persian version of the PSQ has also been found to be a reliable and valid measure of perceived stress in various Iranian populations ($\alpha=0.72$) (25).

3. The Beck Depression Inventory (BDI)

This tool is a well-validated 21-item self-report measure developed by Beck et al. (26) to assess the severity of depressive symptoms. It is a widely used psychometric tool for depression measurement (26). Each BDI item is rated on a 4-point Likert scale (0–3), with total scores ranging from 0 to 63. Higher scores indicate greater depressive symptom severity. The original English version of the BDI has demonstrated excellent psychometric properties, including high reliability and validity (26). The Persian version of the BDI has also been found to be a reliable and valid measure of depressive symptoms in various Iranian populations ($\alpha=0.87$) (27). In the current study, the Persian version of the BDI demonstrated good internal consistency, with a Cronbach's alpha coefficient of 0.88.

Intervention

The cognitive self-compassion training protocol by Gilbert and Irons (28) was utilized. This protocol consists of 10 sessions lasting 90 minutes each, with two sessions per week. The session descriptions are outlined in Table 1.

Table 1. A summary of the cognitive self-compassion training sessions

Sessions	Description
1	Introduction to self-compassion The group leader introduces themselves and the group members. Group rules are established. The concepts of self-compassion and compassion are explained.
2	Exploring self-criticism Review of the previous session. The therapist discusses self-criticism, its types, and associated thoughts and behaviors.
3	Embracing mistakes The therapist explains mistakes and their acceptance as a natural part of life.
4	Cultivating mindfulness The group leader introduces mindfulness techniques to enhance understanding and tolerance of difficult situations.
5	Fostering self-worth The therapist defines self-worth, appreciation, and cultivating a sense of self-value.
6	Guided imagery and relaxation The group leader teaches breathing exercises and guided imagery techniques to promote feelings of well-being.
7	Self-compassion in action The therapist discusses the concept of self-compassion and self-compassionate behaviors.
8	Empty chair technique The therapist teaches the empty chair technique to identify and address conflicting emotions.
9	Writing self-compassionate letters Group members learn to write self-compassionate letters to manage negative emotions.
10	Review, commitment, and assessment The final session involves reviewing the learnings from previous sessions, committing to practicing self-compassion, and administering posttest assessments.

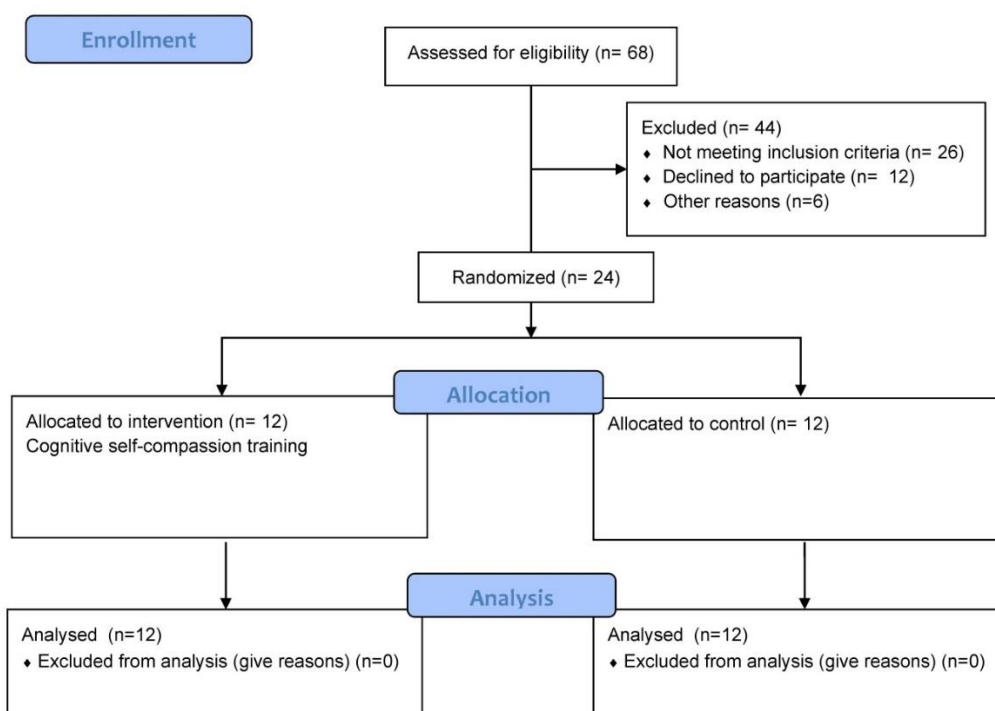


Figure 1. Flow diagram of the sampling process

Ethical Consideration

Ethical concerns included acquiring the ethics code (IR.IAU.AHVAZ.REC.1402.032), ensuring integrity in library collection and data reporting, getting signed informed permission from all participants in accordance with the Declaration of Helsinki, and adhering to principles of human intervention.

Statistical and Data Analysis

Data analysis was conducted using analysis of covariance (ANCOVA) in the SPSS-16. Statistical significance was set at the $\alpha = 0.05$ level.

Results

In the present study, the mean and standard deviation (SD) of age for participants in the experimental group were 33.28 (SD = 4.04) years and 36.54 (SD = 5.12) years in the control group. There were 11 (45.83%) female and 13 (54.17%) male participants. Table 3 presents the means, standard deviations (SD), and Kolmogorov-Smirnov normality tests for the study variables at pretest and posttest.

Table 2. Demographic characteristics of the participants.

Variable		Control (%N)	Experimental (%N)	P Value (chi-Square)
Gender	Male	6 (60.00)	7 (66.67)	0.688
	Female	6 (40.00)	5 (33.33)	
Education	High School	5 (33.33)	4 (26.67)	0.679
	College Education	7 (66.67)	8 (73.33)	

Table 3. Means, standard deviations (SD), and Kolmogorov-Smirnov tests for perceived stress and depression

Variable	Group	Pretest Mean (SD)	Posttest Mean (SD)	P (within group)	Kolmogorov-Smirnov	
					Z	P
Perceived Stress	Experimental	32.17 (4.36)	16.42 (3.52)	0.001	0.21	0.200
	Control	37.08 (5.23)	34.92 (4.03)	0.269	0.20	0.106
Depression	Experimental	32.42 (4.52)	13.83 (3.48)	0.001	0.17	0.098
	Control	34.42 (4.03)	34.58 (6.12)	0.940	0.15	0.200

As evident in Table 3, the means of the study variables in the experimental groups exhibited changes from pretest to posttest ($P < 0.001$), while no significant changes were observed in the control group.

Levene's test was utilized to assess the homogeneity of variance assumption (uniformity of variances between the experimental and control groups). The results indicated homogeneity of variance for both perceived stress ($F = 0.34$, $P = 0.568$) and depression ($F = 2.42$, $P = 0.134$). Based on the aforementioned findings, ANCOVA was deemed appropriate for the analysis. Subsequently, ANCOVA was employed to compare the experimental and control groups based on their posttest scores, controlling for the effect of pretest scores. The posttest results are presented in Table 4.

As presented in Table 4, the calculated effect sizes indicate that 0.83% and 0.77% of the total variance in perceived stress and depression in the experimental and control groups, respectively, were attributable to the effect of cognitive self-compassion training. A significant difference was observed between the mean pretest and posttest scores for perceived stress after controlling for the effect of pretest scores ($F = 95.78$, $P < 0.001$). This suggests that cognitive self-compassion training had a positive impact on perceived stress reduction in patients with T2DM. Similarly, a significant difference was found between the mean pretest and posttest scores for depression after controlling for the effect of pretest scores ($F = 66.08$, $P < 0.001$). This indicates that cognitive self-compassion training had a beneficial effect on alleviating depression symptoms in patients with T2DM.

Table 4. Results of ANCOVA on posttest scores of perceived stress and depression

Variables	SS	df	MS	F	P	η^2	Power
Perceived stress	1362.11	1	1362.11	95.78	0.001	0.83	1.00
Depression	1781.89	1	1781.89	66.08	0.001	0.77	1.00

Discussion

The present study aimed to investigate the effectiveness of cognitive self-compassion training on perceived stress and depression in patients with T2DM employed in the education system of Mashhad, Iran. The findings revealed that cognitive self-compassion training was significantly effective in improving both perceived stress and depression in patients with T2DM.

The first key finding of this study is that cognitive self-compassion training was effective in reducing perceived stress among patients with T2DM. This aligns with the findings of Sheikholeslami and Mohammadi (29), who demonstrated the positive impact of cognitive self-compassion training on the mental health (somatization, anxiety, social dysfunction, depression) of female heads of households. To explain the positive impact of cognitive self-compassion training on perceived stress in patients with T2DM, it is crucial to recognize the detrimental effects of stress on this patient population. In light of these potential health risks, incorporating stress management techniques into the daily lives of patients with T2DM is of paramount importance. Cognitive self-compassion training emerges as a valuable tool in this regard, empowering individuals to better understand and manage their stress through enhanced self-awareness and emotional regulation. Sadeghi et al. (23) reported that through cognitive self-compassion training, individuals can identify and adopt personalized stress-coping strategies, fostering self-understanding and emotional well-being. Additionally, this form of training promotes the recognition and modification of negative thought patterns and maladaptive beliefs. Overall, cognitive self-compassion training equips individuals with positive thinking strategies to effectively navigate life's stressors, leading to enhanced mental resilience, emotional well-being, and overall quality of life (29).

Cognitive self-compassion training has emerged as a valuable tool in the context of stress management, promoting stress reduction through enhanced self-awareness and emotional regulation (23). This training empowers individuals to gain a deeper understanding of themselves and their emotions. By fostering self-acceptance and self-kindness, it equips them to identify and challenge negative thought patterns and maladaptive

beliefs, ultimately building resilience in the face of stress (22). As Al-Refae et al. (24) report, cultivating self-compassion allows individuals to treat themselves with understanding and empathy, particularly during challenging situations. This approach stands in stark contrast to self-criticism and judgment, which can exacerbate stress and hinder effective coping mechanisms. Furthermore, cognitive self-compassion training encourages individuals to explore and adopt personalized stress-management strategies. By identifying their unique strengths and vulnerabilities, individuals can develop tailored approaches for effectively managing stress.

A second key finding of this study is the effectiveness of cognitive self-compassion training in alleviating depressive symptoms among patients with T2DM. This aligns with research by Farhadi et al. (19), who demonstrated similar benefits for depression in students. Depression in T2DM patients manifests in diverse ways, including feelings of hopelessness, diminished motivation, reduced enjoyment of activities, fatigue, anxiety, stress, impaired concentration and memory, and sleep disturbances (14). Sheikholeslami et al. (29) suggest that cognitive self-compassion training addresses these challenges by fostering self-acceptance, self-kindness, and mindfulness (29). This approach counteracts negative self-perceptions and critical self-talk often associated with depression, promoting a more positive and compassionate inner dialogue. As reported by Han et al. (30), cultivating self-compassion allows individuals to treat themselves with understanding and empathy, particularly during difficulties (30). This shift in perspective can alleviate depressive symptoms and promote emotional well-being.

Cognitive self-compassion training emerges as a promising intervention in depression management, promoting symptom reduction and overall well-being. This training equips individuals with enhanced self-awareness, emotional regulation skills, and stronger interpersonal relationships, ultimately leading to improved mental health outcomes (29). By fostering a deeper understanding of themselves and their emotions, participants gain the ability to identify and challenge negative thought patterns and maladaptive beliefs associated with depression (29).. This process cultivates

self-acceptance, self-kindness, and empathy, promoting resilience in the face of emotional challenges.

For patients with T2DM, cognitive self-compassion training offers a particularly valuable approach to managing depression. The chronic nature of diabetes and its associated health complications can exacerbate depressive symptoms, creating a detrimental cycle that negatively impacts quality of life (14). Our findings suggest that cognitive self-compassion training empowers patients with T2DM to better understand and manage their emotions. This improved self-awareness, self-acceptance, and potentially stronger interpersonal relationships may contribute to a reduction in depressive symptoms, leading to enhanced emotional well-being and a better overall quality of life.

Several limitations of this study should be acknowledged. Firstly, the study's generalizability is limited due to the small sample size and the specific recruitment source. The participants were solely T2DM patients employed in the education system of Mashhad, Iran. This recruitment method limits the findings' applicability to patients from different professions, geographical locations, or cultural backgrounds. Secondly, the study did not examine gender differences in the effects of cognitive self-compassion training. This limits the understanding of how the intervention may impact men and women differently. Thirdly, the study relied on self-report measures, which are susceptible to social desirability bias. This bias may lead participants overreporting positive experiences or underreporting negative ones, potentially affecting the accuracy of the findings. Finally, the study did not include a follow-up assessment, which prevents the evaluation of the long-term effects of cognitive self-compassion training.

Conclusion

In conclusion, this study demonstrates the significant positive impact of cognitive self-compassion training on perceived stress and depression in patients with T2DM. These findings suggest that cognitive self-compassion training holds promise as a valuable intervention for promoting mental well-being. Further research is warranted to elucidate the underlying mechanisms, explore long-term effects, and refine the application of cognitive self-compassion training for diverse populations.

Further research comparing cognitive self-compassion training to other established interventions for stress and depression management would provide valuable insights into its relative effectiveness. Additionally, investigating

the effectiveness of cognitive self-compassion training with more diverse populations and across different cultural contexts would enhance the generalizability of these findings.

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Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Authors' contributions

Conceptualization, Resources, Writing– Original Draft Preparation, Project Administration: MJ, Methodology, Data Curation, Validation, Writing– Review & Editing, Supervision: PE, Formal Analysis: SB, Investigation, Visualization: FH, Funding Acquisition: No fund

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