Mental Health and Lifestyle Journal

Year 2025
Volume 3
Issue 3

Comparison of the Effectiveness of Cognitive Behavioral Therapy and Acceptance and Commitment Therapy on Death Anxiety and Feelings of Loneliness in Patients with Type 2 Diabetes

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Article type:
Original Research

Article history:
Received 22 May 2025
Revised 20 August 2025
Accepted 28 August 2025
Published online 01 September 2025

ABSTRACT

The present study aimed to determine the difference in the effectiveness of Cognitive Behavioral Therapy (CBT) and Acceptance and Commitment Therapy (ACT) on death anxiety and feelings of loneliness in patients with Type 2 diabetes. The present study employed a quasi-experimental pretest–posttest design with two experimental groups and one control group. The statistical population consisted of all female patients with Type 2 diabetes who were members of the Diabetes Association of Tehran in 2026. From among them, a sample of 45 eligible individuals was selected through convenience sampling and randomly assigned, while considering the inclusion and exclusion criteria, into three groups of 15 participants each (Cognitive Behavioral Therapy group, Acceptance and Commitment Therapy group, and control group). Data collection instruments included the Collett–Lester Death Anxiety Questionnaire (Collett & Lester, 1969), the Loneliness Questionnaire developed by Dehshiri et al. (Dehshiri et al., 2008), Cognitive Behavioral Therapy sessions (6 sessions of 60 minutes each), and Acceptance and Commitment Therapy sessions (8 sessions of 90 minutes each). Analysis of covariance (ANCOVA) was used to examine the research hypotheses. The findings indicated that both Cognitive Behavioral Therapy and Acceptance and Commitment Therapy significantly reduced death anxiety and feelings of loneliness in patients with Type 2 diabetes ($P < 0.05$). Furthermore, the results demonstrated that Acceptance and Commitment Therapy was more effective than Cognitive Behavioral Therapy in reducing death anxiety and feelings of loneliness ($P < 0.05$). It appears that ACT, by emphasizing acceptance of internal experiences, reduction of experiential avoidance, and enhancement of psychological flexibility, can facilitate patients' psychological adjustment to the chronic conditions of the disease. Based on these findings, it can be concluded that the use of acceptance- and commitment-based interventions alongside medical care can play an effective role in improving the mental health of patients with Type 2 diabetes.

Keywords: Cognitive Behavioral Therapy, Acceptance and Commitment Therapy, Death Anxiety, Feelings of Loneliness, Type 2 Diabetes

How to cite this article:
Soleimani, P., Shiri, Z., Farmanian, S., Zeinali, S., & Faraji Zadkohan, A. (2025). Comparison of the Effectiveness of Cognitive Behavioral Therapy and Acceptance and Commitment Therapy on Death Anxiety and Feelings of Loneliness in Patients with Type 2 Diabetes. *Mental Health and Lifestyle Journal, 3*(3), 1-14. https://doi.org/10.61838/mhlj.249

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Introduction

Type 2 diabetes is considered one of the most prevalent chronic metabolic disorders worldwide and has become a major public health challenge due to its progressive nature, long-term complications, and psychological consequences. The increasing prevalence of diabetes has imposed substantial economic, social, and psychological burdens on healthcare systems and affected individuals (1). Beyond the physiological complications associated with blood glucose dysregulation, individuals with Type 2 diabetes frequently experience a wide range of psychological difficulties, including depression, anxiety, hopelessness, loneliness, and fear of death. Chronic illnesses often confront individuals with concerns about physical deterioration, dependency, disability, and mortality, all of which can intensify emotional distress and negatively affect psychological adjustment (2, 3).

The relationship between chronic physical diseases and psychological disturbances has been repeatedly emphasized in recent years. Studies have demonstrated that emotional disorders and maladaptive psychological reactions not only reduce quality of life but also interfere with treatment adherence, self-care behaviors, and disease management among patients with diabetes (4). Psychological distress may impair motivation for dietary adherence, medication compliance, physical activity, and glycemic monitoring, thereby worsening the course of the disease. In this regard, depression and anxiety have been identified as important predictors of poor health outcomes in diabetic patients (5, 6). Consequently, psychological interventions have become increasingly important as complementary approaches alongside medical treatment for patients with chronic illnesses.

Among the psychological difficulties experienced by individuals with chronic diseases, death anxiety represents a fundamental existential concern. Death anxiety refers to feelings of fear, apprehension, and distress associated with awareness of death and the dying process. Chronic illnesses, particularly those requiring lifelong management such as diabetes, may increase awareness of vulnerability and mortality, thereby intensifying concerns related to death (7). Patients with chronic diseases often experience uncertainty regarding the progression of their illness, possible complications, and future quality of life, all of which may contribute to heightened death anxiety (2). Research has indicated that elevated death anxiety is associated with increased emotional distress, reduced psychological well-being, impaired coping abilities, and lower adherence to treatment recommendations (3). Furthermore, death anxiety has been linked with depressive symptoms and emotional dysregulation, suggesting that it plays a significant role in the psychological functioning of individuals with chronic illnesses (8).

Another important psychological issue among individuals with chronic diseases is loneliness. Loneliness is a distressing subjective experience resulting from perceived inadequacy in social relationships and emotional connectedness. Chronic medical conditions may reduce social engagement, increase dependency on others, and create feelings of social isolation, thereby increasing vulnerability to loneliness (9). Patients with diabetes may experience loneliness due to physical limitations, lifestyle restrictions, fear of stigma, and reduced participation in social activities. Persistent loneliness has been associated with emotional distress, depression, reduced life satisfaction, and poor psychological adjustment (10). Moreover, loneliness may negatively affect self-care behaviors and increase psychological vulnerability among individuals coping with chronic diseases.

Recent evidence suggests that loneliness and death anxiety are interconnected constructs that mutually reinforce one another. Individuals who experience chronic loneliness may become more preoccupied with existential concerns and feelings of vulnerability, thereby intensifying fears related to death and uncertainty (9). Similarly, awareness of mortality may increase social withdrawal and emotional isolation, particularly among patients with chronic illnesses. Therefore, interventions that target both death anxiety and loneliness may have substantial implications for improving the psychological health of individuals with Type 2 diabetes.

Cognitive Behavioral Therapy (CBT) has long been recognized as one of the most effective psychological interventions for emotional disorders and maladaptive cognitions. CBT is based on the assumption that dysfunctional thoughts and beliefs contribute to emotional distress and maladaptive behaviors. By identifying and modifying distorted cognitions, CBT seeks to reduce psychological symptoms and improve emotional functioning. Previous studies have demonstrated the effectiveness of CBT in reducing anxiety, depressive symptoms, rumination, and social difficulties across different populations (11). In the context of chronic illness, CBT has been found to improve coping strategies, psychological adjustment, and emotional well-being. Research has also indicated that CBT can reduce loneliness and social withdrawal among vulnerable populations (10). Similarly, group-based CBT interventions have been shown to decrease death anxiety among patients with chronic neurological disorders (12). These findings suggest that CBT may provide individuals with effective cognitive and behavioral strategies to manage fears related to illness, mortality, and social disconnection.

Despite its effectiveness, CBT has certain limitations, particularly in addressing experiential avoidance and rigid attempts to control internal emotional experiences. Some individuals continue to struggle with distressing thoughts and emotions despite attempts to challenge or modify cognitions. In response to these limitations, third-wave behavioral therapies such as Acceptance and Commitment Therapy (ACT) have emerged as alternative approaches emphasizing psychological flexibility, acceptance, and mindfulness-based processes (13). ACT aims to help individuals accept unpleasant internal experiences rather than avoid or suppress them, while simultaneously encouraging engagement in meaningful and value-driven behaviors.

Acceptance and Commitment Therapy is grounded in contextual behavioral science and focuses on six core therapeutic processes, including acceptance, cognitive defusion, present-moment awareness, self-as-context, values clarification, and committed action. Rather than attempting to eliminate distressing thoughts or emotions, ACT seeks to alter individuals' relationships with their internal experiences and reduce experiential avoidance (14). This therapeutic approach has demonstrated effectiveness in treating a wide range of psychological disorders, including anxiety disorders, depression, obsessive-compulsive disorder, and emotional dysregulation (13, 14).

One of the most important therapeutic advantages of ACT is its applicability to chronic medical conditions and existential concerns. Chronic illnesses often involve ongoing uncertainty, pain, and emotional distress that cannot be entirely eliminated. Consequently, interventions that emphasize acceptance and adaptive coping may be particularly beneficial for these patients. Studies have shown that ACT can significantly improve mental health and quality of life among patients with chronic illnesses and cancer (15). Moreover, ACT-based interventions have demonstrated positive effects on emotional regulation and psychological adaptation among older adults and medically vulnerable populations (16, 17).

Several studies have specifically examined the relationship between ACT and death anxiety. A systematic review and meta-analysis conducted by Landstra et al. demonstrated that ACT significantly reduces death anxiety and improves existential coping across different clinical populations (18). Similarly, research on older adults and patients with chronic illnesses has reported that ACT effectively reduces death anxiety while enhancing resilience, happiness, and psychological well-being (19, 20). Studies involving patients with emotional disorders and chronic diseases have also shown that ACT reduces experiential avoidance and improves psychological hardiness in the face of mortality-related concerns (21). More recent evidence suggests that ACT may be effective in reducing death anxiety among individuals with multiple sclerosis and cancer patients experiencing fear and existential distress (22, 23).

ACT has also demonstrated effectiveness in addressing loneliness and social isolation. By increasing psychological flexibility and reducing self-critical and avoidant patterns, ACT may help individuals engage more meaningfully in interpersonal relationships. Zarling et al. reported that online ACT interventions reduced loneliness among older adults and improved social connectedness (24). Likewise, comparative studies have shown that ACT is effective in decreasing loneliness and emotional isolation among older populations (25). Compassion-focused ACT interventions have further demonstrated beneficial effects on emotional regulation and self-acceptance, which may indirectly improve interpersonal functioning and reduce feelings of loneliness (26).

Although previous studies support the effectiveness of CBT and ACT in reducing psychological distress, limited research has directly compared these two therapeutic approaches among patients with Type 2 diabetes, particularly with respect to death anxiety and loneliness. Most previous investigations have focused either on general anxiety and depression or on older adult populations rather than individuals coping with chronic metabolic disorders. Furthermore, the psychological experiences of women with Type 2 diabetes may differ due to gender-related emotional, familial, and social factors, highlighting the importance of targeted interventions for this population. Since women with chronic illnesses often experience greater emotional burden, caregiving responsibilities, and social stressors, interventions addressing existential anxiety and loneliness may be especially valuable.

Given the increasing prevalence of Type 2 diabetes and the substantial psychological burden associated with the disease, identifying effective psychological interventions remains an important clinical and research priority. CBT and ACT represent two evidence-based therapeutic approaches with distinct theoretical foundations and mechanisms of action. While CBT primarily focuses on modifying dysfunctional cognitions and maladaptive beliefs, ACT emphasizes acceptance of internal experiences and the cultivation of psychological flexibility. Comparing the effectiveness of these interventions may provide valuable insights into the most appropriate psychological strategies for reducing death anxiety and loneliness among women with Type 2 diabetes.

Therefore, the present study aimed to compare the effectiveness of Cognitive Behavioral Therapy and Acceptance and Commitment Therapy on death anxiety and feelings of loneliness among women with Type 2 diabetes.

Methods and Materials

Study Design and Participants

The present study employed a quasi-experimental design with a pretest–posttest structure including two experimental groups and one control group. The statistical population consisted of all women diagnosed with Type 2 diabetes who were members of the Diabetes Association of Tehran in 2026. The sample size was determined based on the minimum sample size recommended for experimental studies (Quinn & Keough, 2002). A total of 45 eligible participants were selected through convenience sampling and randomly assigned into three groups of 15 participants each, including a Cognitive Behavioral Therapy (CBT) group, an Acceptance and Commitment Therapy (ACT) group, and a control group, while considering the inclusion and exclusion criteria. The inclusion criteria consisted of having a confirmed diagnosis of Type 2 diabetes by a physician, at least six months having passed since diagnosis, being between 23 and 72 years of age, living with family members, not suffering from disabling diabetes-related complications such as kidney failure or blindness, having the ability to communicate verbally and use a mobile phone, and willingness to participate in the study. The exclusion criteria included incomplete completion of questionnaires and absence from the intervention sessions. Initially, all three groups completed the pretest measures of death anxiety and loneliness. Subsequently, the first experimental group received Cognitive Behavioral Therapy in six 60-minute sessions, while the second experimental group received Acceptance and Commitment Therapy in eight 90-minute sessions. No therapeutic intervention was administered to the control group. Following completion of the intervention sessions, posttests were administered to all three groups.

Data Collection

Death anxiety was assessed using the Collett–Lester Death Anxiety Scale developed by Robert Collett and David Lester in 1969. This instrument is a self-report measure designed to evaluate fear and anxiety related to death. The questionnaire consists of 32 items rated on a five-point Likert scale ranging from 1 (not important) to 5 (very much). Total scores range from 32 to 160, with higher scores indicating greater levels of death anxiety. The revised version of the scale was first implemented in Iran by Esmaeili on a sample of 200 students from the Islamic Azad University of Ahvaz in 2008. The reliability coefficients obtained through Cronbach's alpha and split-half methods were reported as 0.89 and 0.68, respectively, and the concurrent validity of the scale with the Templer Death Anxiety Scale was reported as 0.57. In the present study, the reliability of the questionnaire was confirmed using Cronbach's alpha, which yielded a coefficient of 0.79.

Feelings of loneliness were measured using the Loneliness Questionnaire developed and validated by Dehshiri et al. in 2008 among Iranian university students. The instrument consists of 38 items and includes three dimensions: loneliness resulting from family relationships (16 items), loneliness related to friendships and social communication (11 items), and emotional symptoms of loneliness (10 items) (Sadri Damirchi & Ramezani, 2016). The questionnaire is scored on a five-point Likert scale ranging from 0 to 4. In some items, responses are scored from "very high" to "very low," whereas a number of items are reverse scored. Dehshiri et al. reported a Cronbach's alpha coefficient of 0.92 for the scale. The convergent and divergent validity of the instrument were established through correlations with the Russell Loneliness Scale and the Oxford

Happiness Questionnaire, yielding coefficients of 0.60 and 0.68, respectively. Furthermore, construct validity of the scale was confirmed through factor analysis.

Intervention

Acceptance and Commitment Therapy (ACT) was implemented across eight 90-minute sessions based on the protocol proposed by Bond et al. (Bond et al., 2011). During the first session, participants became acquainted with one another and established a therapeutic relationship, while the general principles and rules of ACT were introduced. The second session focused on describing thoughts and symptoms related to loneliness and death anxiety using metaphors such as the "hungry tiger" and "chocolate cake" to emphasize the problematic nature of excessive control. In the third session, the concept of acceptance and its distinction from denial, hopelessness, and resistance were discussed, and the "guest metaphor" was introduced. The fourth session addressed cognitive defusion and helped participants observe thoughts, beliefs, feelings, and judgments as internal events rather than attempting to suppress or control them, using metaphors such as "passengers on the bus" and the "bad cup." The fifth session focused on identifying personal values, distinguishing values from goals, and discussing internal and external barriers to value-oriented living. In the sixth session, participants learned self-as-context concepts and practiced mindfulness-based exercises such as mindful breathing and walking to increase awareness of ongoing experiences. The seventh session emphasized present-moment awareness and mindfulness techniques, and participants recorded instances in which they were able to observe their thoughts nonjudgmentally. Finally, the eighth session addressed value-based living and committed action, during which participants reflected on essential life questions regarding their desires, meaningful activities, and long-term personal values. The intervention concluded with a final review and termination of sessions.

Cognitive Behavioral Therapy (CBT) was administered in six 60-minute sessions based on the protocol developed by Asghari et al. (Asghari et al., 2019). In the first session, participants were introduced to the principles of CBT, including the relationship between thoughts, emotions, and behaviors. Group rules, confidentiality, and the importance of homework assignments were discussed, and relaxation techniques were introduced and practiced. The second session focused on reviewing homework assignments and identifying cognitive distortions associated with loneliness and death anxiety, while participants practiced relaxation exercises and completed cognitive-behavioral diagrams related to emotional situations. During the third session, the therapist explained how thoughts contribute to emotional and behavioral consequences, particularly withdrawal from social interactions and increased feelings of loneliness. The downward arrow technique was introduced to identify core beliefs such as "I am alone" and "death is catastrophic." In the fourth session, participants continued practicing the downward arrow technique to identify maladaptive schemas related to sadness, loneliness, and fear of death, while also categorizing their core beliefs. The fifth session focused on examining supporting and contradictory evidence for maladaptive thoughts related to loneliness and death anxiety, challenging negative cognitions, and practicing relaxation techniques. In the sixth and final session, participants explored previously abandoned activities, learned the advantages-and-disadvantages technique for evaluating dysfunctional beliefs, practiced mental imagery, and were encouraged to challenge negative beliefs regarding loneliness and death anxiety. Assertiveness training and expression of personal needs were also taught to help participants request greater emotional support

and social interaction from family members and others. At the end of the intervention, participants completed the loneliness and death anxiety questionnaires again, and the sessions concluded with appreciation and closure.

Data Analysis

Descriptive statistics, including means and standard deviations, were used to summarize the data. Inferential data analysis was conducted using analysis of covariance (ANCOVA) to evaluate the effectiveness of the interventions while controlling for pretest scores. All statistical analyses were performed using the IBM SPSS Statistics software package.

Findings and Results

Table 1 presents the descriptive statistics, including the means and standard deviations of the research variables in the pretest and posttest phases across the Acceptance and Commitment Therapy (ACT), Cognitive Behavioral Therapy (CBT), and control groups.

Table 1. Descriptive Findings

Phase	Variable	Component	ACT Group M (SD)	CBT Group M (SD)	Control Group M (SD)
Pretest	Loneliness	Loneliness due to family relationships	46.47 (2.85)	48.07 (2.90)	47.81 (2.64)
Pretest	Loneliness	Loneliness due to communication with friends	33.73 (3.77)	34.29 (3.25)	33.56 (2.76)
Pretest	Loneliness	Emotional symptoms of loneliness	30.80 (2.27)	31.21 (2.23)	29.81 (1.72)
Pretest	Death Anxiety	Total score	98.33 (11.03)	103.57 (13.94)	102.50 (12.18)
Posttest	Loneliness	Loneliness due to family relationships	23.87 (2.36)	34.71 (1.86)	44.00 (3.63)
Posttest	Loneliness	Loneliness due to communication with friends	20.93 (3.37)	24.93 (6.21)	30.94 (4.40)
Posttest	Loneliness	Emotional symptoms of loneliness	20.60 (4.03)	24.14 (2.18)	27.38 (3.44)
Posttest	Death Anxiety	Total score	68.80 (9.65)	87.64 (18.82)	96.75 (11.23)

As shown in Table 1, the mean scores of death anxiety and all components of loneliness decreased substantially in both intervention groups from pretest to posttest, whereas only minor changes were observed in the control group. The greatest reductions were observed in the ACT group across all dependent variables. In particular, the ACT group demonstrated a marked decline in loneliness due to family relationships, emotional symptoms of loneliness, and death anxiety compared with both the CBT and control groups. These descriptive findings suggest that both therapeutic interventions were effective in improving the psychological status of women with Type 2 diabetes, although the ACT intervention appeared to produce stronger effects.

Before conducting the multivariate analysis of covariance (MANCOVA), the assumptions underlying the statistical procedure were examined. The normality of data distribution was assessed using the Shapiro–Wilk test, and the results indicated that the data were normally distributed ($P > 0.05$). The homogeneity of error variances was examined using Levene's test, and the findings confirmed equality of variances across groups ($P > 0.05$). The equality of variance–covariance matrices was assessed using Box's M test, which indicated violation of this assumption ($M = 40.158$, $F = 1.72$, $P = 0.023$). Given the lack of homogeneity in

the covariance matrices, Pillai's Trace was considered the most appropriate multivariate statistic according to the recommendation of Meyers and Guarino.

Table 2. Results of Analysis of Covariance for Posttest Scores of the Research Variables after Controlling for Pretest Scores

Source of Variation	Dependent Variable	Sum of Squares	df	Mean Square	F	Sig.	Eta Squared
Group	Loneliness due to family relationships	2814.058	2	1407.029	205.898	0.000	0.916
Group	Loneliness due to communication with friends	885.351	2	442.676	22.756	0.000	0.545
Group	Emotional symptoms of loneliness	323.996	2	161.998	16.545	0.000	0.465
Group	Death anxiety	4637.234	2	2318.617	19.602	0.000	0.508

The results presented in Table 2 indicate significant differences among the ACT, CBT, and control groups in posttest scores of death anxiety and all components of loneliness after controlling for pretest scores ($P < 0.05$). The obtained F values demonstrate that the interventions significantly affected loneliness due to family relationships, loneliness related to communication with friends, emotional symptoms of loneliness, and death anxiety. Furthermore, the effect sizes, as indicated by eta squared values, revealed strong intervention effects, particularly for loneliness due to family relationships ($\eta^2 = 0.916$). These findings suggest that both ACT and CBT significantly improved psychological outcomes among women with Type 2 diabetes, with a considerable proportion of variance in posttest scores attributable to group membership.

Table 3. Bonferroni Post-Hoc Test Results for Pairwise Comparisons among Groups

Dependent Variable	Group	Comparison Group	Mean Difference	Sig.
Loneliness due to family relationships	ACT	CBT	-11.162	0.001
	ACT	Control	-20.883	0.001
	CBT	Control	-9.721	0.001
Loneliness due to communication with friends	ACT	CBT	-5.215	0.015
	ACT	Control	-11.660	0.001
	CBT	Control	-6.445	0.002
Emotional symptoms of loneliness	ACT	CBT	-3.180	0.043
	ACT	Control	-7.056	0.000
	CBT	Control	-3.876	0.008
Death anxiety	ACT	CBT	-15.580	0.003
	ACT	Control	-26.757	0.000
	CBT	Control	-11.177	0.033

The Bonferroni post-hoc comparisons shown in Table 3 revealed significant differences between all groups across the dependent variables ($P < 0.05$). Specifically, both ACT and CBT groups demonstrated significantly lower scores in death anxiety and loneliness components compared with the control group. Additionally, the ACT group showed significantly lower posttest scores than the CBT group in all variables, indicating greater therapeutic effectiveness. The largest mean differences were observed in death anxiety and loneliness due to family relationships, favoring the ACT intervention. Overall, these findings indicate that although both therapeutic approaches were effective in reducing psychological distress among women with Type 2 diabetes, Acceptance and Commitment Therapy produced superior outcomes compared with Cognitive Behavioral Therapy.

Discussion and Conclusion

The present study aimed to compare the effectiveness of Cognitive Behavioral Therapy (CBT) and Acceptance and Commitment Therapy (ACT) on death anxiety and feelings of loneliness among women with Type 2 diabetes. The findings demonstrated that both therapeutic interventions significantly reduced death anxiety and all dimensions of loneliness, including loneliness resulting from family relationships, loneliness related to communication with friends, and emotional symptoms of loneliness. Furthermore, the results indicated that ACT was more effective than CBT in reducing death anxiety and loneliness among participants. These findings highlight the importance of psychological interventions in improving the emotional functioning and mental health of patients with chronic illnesses, particularly women with Type 2 diabetes who frequently experience emotional distress, uncertainty, and social isolation.

One of the principal findings of the study was the significant reduction in death anxiety among participants receiving CBT and ACT interventions. This finding is consistent with previous studies emphasizing the effectiveness of psychological interventions in reducing existential fears and mortality-related concerns among individuals with chronic illnesses and psychologically vulnerable populations (19-22). Patients with Type 2 diabetes often confront concerns related to physical deterioration, disease progression, disability, and mortality. Persistent awareness of chronic illness may intensify existential vulnerability and increase emotional distress related to death and uncertainty (2, 3). Therefore, interventions that target maladaptive cognitions and emotional avoidance can substantially improve patients' psychological adaptation.

The effectiveness of CBT in reducing death anxiety may be explained through its emphasis on identifying and modifying irrational beliefs, catastrophic interpretations, and dysfunctional cognitive schemas related to illness and mortality. Patients with chronic diseases often engage in maladaptive cognitive patterns characterized by hopelessness, exaggeration of threat, and fear of future complications. CBT helps individuals recognize these distorted thought patterns and replace them with more realistic and adaptive interpretations. Through cognitive restructuring, behavioral activation, and relaxation techniques, patients gradually develop more effective coping strategies and greater emotional control. Previous research has similarly demonstrated that CBT interventions significantly reduce anxiety, rumination, and maladaptive emotional responses across clinical populations (11). Additionally, group-based CBT has been shown to reduce death anxiety among patients with epilepsy and other chronic conditions (12). The findings of the present study therefore support the theoretical assumptions underlying CBT and confirm its applicability for patients with chronic metabolic disorders.

Another important finding of the study was the significant reduction in feelings of loneliness following both CBT and ACT interventions. Loneliness is considered a major psychological challenge among individuals with chronic diseases because ongoing health limitations, lifestyle restrictions, and emotional exhaustion may reduce social participation and interpersonal satisfaction (9). Women with Type 2 diabetes may be particularly vulnerable to loneliness due to emotional burden, caregiving roles, concerns about disease-related stigma, and reduced engagement in social activities. Persistent loneliness has been associated with lower quality of life, depression, emotional instability, and poor disease management (10). Therefore, reducing loneliness can play an important role in improving psychological well-being and treatment adherence among diabetic patients.

The reduction of loneliness through CBT may be attributed to improvements in cognitive appraisal and interpersonal functioning. Individuals experiencing loneliness frequently interpret social interactions negatively and develop maladaptive assumptions regarding rejection, inadequacy, or emotional disconnection. CBT assists individuals in challenging these dysfunctional beliefs and encourages more adaptive social behaviors and communication patterns. The intervention protocol used in the present study included assertiveness training, behavioral exercises, and cognitive restructuring related to social withdrawal and feelings of isolation, which likely contributed to improved interpersonal engagement. The findings are consistent with previous studies reporting the effectiveness of CBT in reducing loneliness among older women and emotionally distressed individuals (10, 11). These results suggest that modifying maladaptive cognitive schemas can positively influence social connectedness and emotional adjustment.

The findings also demonstrated that ACT was more effective than CBT in reducing death anxiety and loneliness. This result is highly consistent with previous literature emphasizing the unique role of ACT in addressing experiential avoidance, existential distress, and emotional suffering (13, 18). ACT differs from traditional cognitive approaches in that it does not primarily aim to eliminate distressing thoughts or emotions. Instead, it encourages individuals to accept unpleasant internal experiences while engaging in meaningful and value-based actions. Patients with chronic illnesses often experience persistent fears and uncertainties that cannot be entirely removed through cognitive disputation alone. Consequently, interventions emphasizing acceptance and psychological flexibility may be more suitable for helping individuals cope with chronic and uncontrollable stressors.

The superiority of ACT in reducing death anxiety may be explained through its focus on acceptance of mortality-related thoughts and reduction of experiential avoidance. Fear of death is often intensified when individuals attempt to suppress or control distressing thoughts related to illness and mortality. Such avoidance strategies paradoxically increase psychological distress and emotional rigidity. ACT teaches individuals to observe thoughts and emotions without judgment, thereby reducing cognitive fusion and emotional reactivity. Through mindfulness and acceptance-based techniques, patients gradually learn that distressing thoughts about death do not necessarily require avoidance or suppression. This process promotes psychological flexibility and decreases emotional suffering associated with existential concerns. Previous studies have similarly shown that ACT effectively reduces death anxiety among older adults, patients with emotional disturbances, individuals with multiple sclerosis, and cancer patients (19-23). The meta-analysis conducted by Landstra et al. also confirmed the significant effectiveness of ACT in reducing death anxiety across different clinical populations (18).

The greater effectiveness of ACT in reducing loneliness may also be interpreted within the framework of psychological flexibility and value-oriented living. Individuals experiencing loneliness often engage in avoidance behaviors due to fear of rejection, emotional pain, or negative self-evaluations. ACT encourages individuals to accept uncomfortable emotions associated with interpersonal vulnerability rather than withdrawing from social interactions. By helping participants identify personal values related to relationships, emotional intimacy, and social participation, ACT may motivate individuals to reconnect with others despite emotional discomfort. This mechanism likely contributed to the observed reduction in loneliness among participants in the ACT group. Previous studies have similarly demonstrated the effectiveness of ACT in reducing loneliness and improving emotional connectedness among older adults (24,

25). Furthermore, ACT-based interventions have been associated with improved emotional regulation, self-compassion, and psychological resilience, all of which may contribute to healthier interpersonal functioning (16, 26).

Another important explanation for the superiority of ACT may involve the chronic and persistent nature of Type 2 diabetes. Unlike acute stressors that may be resolved through cognitive restructuring, chronic illnesses involve ongoing physical symptoms, uncertainty, and emotional challenges that cannot always be changed directly. ACT emphasizes living meaningfully despite the presence of discomfort and uncertainty, which may be particularly beneficial for patients facing long-term medical conditions. This perspective allows individuals to shift from a struggle-oriented approach toward a more adaptive and acceptance-based mode of coping. Studies examining ACT among patients with chronic diseases have similarly reported improvements in quality of life, mental health, emotional adaptation, and treatment engagement (15, 17). Therefore, the findings of the present study further support the growing evidence regarding the applicability of ACT for chronic medical populations.

The findings of the present study may also be interpreted in light of broader psychological processes associated with diabetes management. Chronic emotional distress, loneliness, and death anxiety may negatively influence self-care behaviors and disease control among patients with diabetes. Previous research has shown that psychological distress is associated with poor glycemic control, depressive symptoms, and reduced treatment adherence (5, 6). By reducing emotional distress and increasing psychological flexibility, interventions such as ACT and CBT may indirectly improve patients' motivation for self-management and adherence to medical recommendations. Effective psychological adjustment can therefore contribute not only to mental health outcomes but also to better physical disease management.

Moreover, the group-based format of the interventions may have contributed to the observed improvements in loneliness and emotional functioning. Participating in therapeutic groups allows individuals to share experiences, receive emotional support, and develop a sense of belonging with others facing similar challenges. Such interpersonal experiences may reduce feelings of isolation and normalize emotional reactions associated with chronic illness. Group therapy also provides opportunities for observational learning, emotional validation, and enhancement of communication skills, all of which may positively affect social connectedness and psychological well-being.

Overall, the findings of the present study emphasize the importance of integrating psychological interventions into the comprehensive care of patients with Type 2 diabetes. Both CBT and ACT were effective in reducing death anxiety and loneliness; however, ACT demonstrated greater therapeutic effectiveness across all measured variables. These findings suggest that interventions emphasizing acceptance, mindfulness, and psychological flexibility may be particularly useful for addressing existential distress and emotional isolation among individuals coping with chronic illnesses.

One of the limitations of the present study was the relatively small sample size and the restriction of participants to women with Type 2 diabetes from a single diabetes association in Tehran, which may limit the generalizability of the findings to other populations, genders, and cultural contexts. In addition, the absence of a long-term follow-up period prevented evaluation of the stability and persistence of treatment effects over time. Another limitation was reliance on self-report questionnaires, which may be influenced by response bias, social desirability, or participants' emotional states at the time of assessment.

Future research is recommended to examine the long-term effectiveness of CBT and ACT through follow-up assessments across broader time intervals. Researchers are also encouraged to investigate these interventions among male patients, different age groups, and individuals with other chronic medical conditions in order to improve generalizability. Comparative studies involving additional psychological approaches, such as compassion-focused therapy or mindfulness-based interventions, may further clarify the most effective therapeutic strategies for reducing death anxiety and loneliness in chronic illness populations. Moreover, future studies may benefit from examining mediating variables such as psychological flexibility, resilience, self-compassion, and social support.

From a practical perspective, the findings of the present study suggest that integrating structured psychological interventions into diabetes care programs may substantially improve the emotional well-being of patients with Type 2 diabetes. Healthcare providers and mental health professionals are encouraged to incorporate ACT- and CBT-based interventions alongside routine medical treatment in order to reduce emotional distress and improve patients' psychological adaptation. Training programs focused on emotional regulation, acceptance, interpersonal communication, and coping with chronic illness may help patients manage feelings of loneliness and fears related to death more effectively. Establishing supportive group-based counseling services within diabetes treatment centers may also provide patients with valuable opportunities for emotional support and social connection.

Acknowledgments

The authors express their deep gratitude to all participants who contributed to this study.

Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical 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.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

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