Comparison of the Effectiveness of Acceptance and Commitment Therapy (ACT) and Behavioral Activation Therapy (BAT) on Quality of Life and Self-Care Behaviors in Patients with Type 2 Diabetes

Reza. Ahmadi[1], Lida. Leilabadi[1*], Mahdieh. Salehi[1]

[1] Department of Health Psychology, CT.C., Islamic Azad University, Tehran, Iran

* Corresponding author email address: Lida.Leilabadi@iau.ac.ir

Article Info	Abstract
Article type: *Original Research* **How to cite this article:** 	**Purpose:** This study aimed to compare the effectiveness of Acceptance and Commitment Therapy (ACT) and Behavioral Activation Therapy (BAT) on quality of life and self-care behaviors in patients with type 2 diabetes. **Methods and Materials:** The research employed a quasi-experimental design with pre-test, post-test, and three-month follow-up, using a three-group format (ACT, BAT, and control). A total of 60 patients with type 2 diabetes from Tehran health centers were selected through convenience sampling and randomly assigned to one of the three groups, with 20 participants in each. Both intervention groups received eight two-hour sessions administered face-to-face by the researcher. The ACT protocol was based on Hayes' model, emphasizing psychological flexibility, mindfulness, and value-driven behavior, while the BAT protocol followed Levenson's structure focused on re-engagement with rewarding activities. Data were collected using the Quality of Life Questionnaire (SF-36) and the Diabetes Self-Care Behavior Questionnaire. Descriptive statistics and mixed ANOVA, along with Bonferroni post-hoc tests, were used for data analysis via SPSS. **Findings:** Results indicated that both ACT and BAT significantly improved quality of life and self-care behaviors compared to the control group (p < .001). However, ACT was significantly more effective than BAT in enhancing both outcome variables at post-test and follow-up. Within-subject analyses showed significant changes over time for both interventions, and between-subject effects confirmed group-based differences. Post-hoc tests revealed sustained improvements in the ACT group, while BAT showed moderate but less stable effects. **Conclusion:** Both ACT and BAT are effective psychological interventions for improving self-care and quality of life in type 2 diabetic patients, with ACT demonstrating stronger and more lasting outcomes. **Keywords:** *Acceptance and Commitment Therapy (ACT); Behavioral Activation Therapy (BAT); Type 2 Diabetes; Quality of Life; Self-Care Behavior; Psychological Interventions.*

1.   Introduction

Type 2 diabetes mellitus (T2DM) is a chronic and progressive metabolic disorder that poses significant psychological and behavioral challenges alongside its physiological complications. Beyond the immediate necessity of glycemic control, long-term management of T2DM depends substantially on patients' adherence to self-care behaviors such as medication compliance, physical activity, blood glucose monitoring, and dietary regulation. However, sustaining these self-care behaviors is often compromised by emotional distress, psychological inflexibility, and comorbid mental health issues such as anxiety and depression (Gregg et al., 2007; Shayeghian et al., 2016). As a result, psychological interventions have gained increasing attention for their potential to enhance quality of life and promote behavioral compliance among individuals with diabetes.

Among the many therapeutic approaches developed for addressing psychological barriers in chronic illness management, Acceptance and Commitment Therapy (ACT) and Behavioral Activation Therapy (BAT) have emerged as particularly effective and transdiagnostic options. ACT operates on the model of psychological flexibility, emphasizing mindfulness, acceptance, and value-based action as mechanisms to reduce experiential avoidance and cognitive fusion (Alho et al., 2022; Nicolescu et al., 2024). BAT, on the other hand, focuses on increasing engagement in meaningful and rewarding activities to combat avoidance patterns and negative affect (Fernández-Rodríguez et al., 2023; Parhoon et al., 2013). Both approaches have shown promising outcomes in clinical and subclinical populations, including individuals suffering from mood disorders, anxiety, and chronic illnesses such as diabetes (Bass et al., 2014; Staley & Lawyer, 2010).

The relevance of ACT in diabetes care has been substantiated by multiple randomized controlled trials and comparative studies that demonstrate its efficacy in enhancing self-care behaviors, glycemic control, and overall psychological well-being in patients with T2DM (Gregg et al., 2007; Saeidi et al., 2021). For example, a seminal study by Gregg et al. (2007) showed that ACT interventions focusing on acceptance, values clarification, and mindfulness led to significant improvements in diabetes self-management and psychological adjustment. This is echoed in more recent work showing ACT's effectiveness in increasing self-care behavior and reducing glycated hemoglobin levels in both men and women diagnosed with type 2 diabetes (Ismailian et al., 2023; Zandi et al., 2023). Furthermore, ACT-based interventions have also been adapted successfully for group settings and digital platforms, broadening their accessibility for populations with chronic illnesses (Alho et al., 2022; Nicolescu et al., 2024).

Behavioral Activation Therapy, while originally developed for depressive disorders, has increasingly been applied to chronic disease contexts with favorable outcomes. The fundamental premise of BAT—that structured re-engagement with meaningful activities can counter depressive inertia—makes it an appropriate intervention for T2DM, where fatigue, isolation, and lack of motivation are common barriers to effective self-care (Kharaii & Azizi, 2021; Staley & Lawyer, 2010). BAT has demonstrated efficacy in improving mood, increasing activity levels, and enhancing perceived quality of life in diabetic patients by disrupting avoidance patterns and promoting behavioral momentum (Fernández-Rodríguez et al., 2023; Parhoon et al., 2013).

Studies comparing ACT and BAT suggest both interventions can be effective, albeit via different mechanisms. ACT targets psychological flexibility and value alignment, while BAT emphasizes environmental reinforcement and behavioral engagement. Zandi et al. (2023) compared ACT with reality therapy and found ACT to be more effective in improving self-care behaviors in diabetic patients. Similarly, another comparative study showed that ACT outperformed emotion-focused therapy in improving the quality of life among patients with type 2 diabetes (Zandi et al., 2024). These findings underline the potential superiority of ACT in domains that require cognitive-emotional transformation, such as chronic disease management.

Despite these promising findings, there remains a need for more nuanced, comparative evaluations of these therapeutic modalities within diabetic populations in diverse cultural contexts. For example, the research conducted by Behzadi et al. (2021) on elderly patients with T2DM found that both ACT and reality therapy improved self-care and life satisfaction, but ACT yielded more substantial changes over time (Behzadi et al., 2021). Similarly, in a clinical trial focusing on female patients with T2DM, ACT was shown to significantly improve psychological well-being and resilience, affirming its gender-sensitive utility (Al Yassin et al., 2020). These results suggest that ACT may be particularly effective for subgroups of patients with specific psychological vulnerabilities or sociocultural contexts.

While ACT emphasizes acceptance, values, and mindful awareness, its therapeutic benefits may also extend to emotion regulation and psychological resilience—key factors in the sustainable management of chronic illnesses (Enayati Shabkolai et al., 2023; Khalatbari et al., 2021). In contrast, BAT appears to have a more direct effect on behavioral compliance and motivational inertia, especially in patients experiencing comorbid depression and anxiety (Bass et al., 2014; Kharaii & Azizi, 2021). This distinction is important for tailoring interventions to individual needs, especially when considering the psychological heterogeneity among diabetic patients.

Importantly, both approaches may be viewed as part of a broader movement toward third-wave behavioral therapies that emphasize context, function, and the therapeutic relationship over symptom eradication (Nicolescu et al., 2024; Susanne et al., 2018). Within this framework, ACT and BAT offer valuable and empirically supported strategies for addressing both emotional distress and behavioral non-compliance—two of the most persistent challenges in diabetes care.

In Iran, the prevalence of T2DM and the rising burden of chronic disease necessitate culturally adapted, evidence-based interventions. Psychological interventions grounded in ACT and BAT have already been implemented with promising results. For example, Keikha et al. (2019) demonstrated that group-based ACT improved cognitive fusion and quality of life in diabetic students, emphasizing its scalability and cost-effectiveness (Keikha et al., 2019). Similarly, Khalatbari et al. (2020) found ACT to be significantly more effective than compassion-based therapy in improving self-care behaviors and glycosylated hemoglobin levels in Iranian patients with T2DM (Khalatbari et al., 2020). Another study by Khalatbari et al. (2021) confirmed the superior effect of ACT on reducing psychological distress and enhancing quality of life, compared to compassion-focused interventions (Khalatbari et al., 2021).

Given the accumulating evidence and growing clinical interest, the current study aims to compare the effectiveness of Acceptance and Commitment Therapy and Behavioral Activation Therapy in enhancing quality of life and self-care behaviors among patients with type 2 diabetes.

2. Methods and Materials

2.1. Study Design and Participants

This study adopted a quasi-experimental design featuring a pre-test, post-test, and follow-up structure across three groups: two experimental groups and one control group. From a research objective standpoint, this investigation falls within the category of applied research. The statistical population consisted of all patients diagnosed with type 2 diabetes who attended urban health centers in Tehran. A convenience sampling method was employed to recruit participants. From among the volunteers who met the inclusion and exclusion criteria, 60 individuals were selected and matched based on age, gender, and educational background. These participants were then randomly assigned into three groups of 20 each: a control group, an Acceptance and Commitment Therapy (ACT) group, and a Behavioral Activation Therapy (BAT) group. This random allocation was carried out through simple random sampling using a prepared list of participant names.

All educational sessions were conducted in person at the health center's auditorium. The study procedure began with the completion of the research instruments by both experimental and control group members prior to the intervention. The ACT group underwent an 8-session training program, with each session lasting 2 hours, administered by the researcher. Likewise, the BAT group received training in 8 two-hour sessions, also conducted by the researcher. The control group did not receive any educational intervention and was instead placed on a waiting list for future training programs. The intervention schedule consisted of two sessions per week. Following the conclusion of the intervention, all participants once again completed the research instruments. A follow-up evaluation was conducted three months after the intervention to assess the sustainability of the effects.

Inclusion criteria required participants to have had a confirmed diagnosis of type 2 diabetes by an endocrinologist for at least three years, be between the ages of 20 and 65, not be undergoing any psychological treatment at the time of the study, and be willing to attend all sessions. Exclusion criteria involved missing more than two educational sessions.

2.2. Measures

The first instrument utilized was the Quality of Life Questionnaire, a self-report scale originally developed by Ware and Sherbourne in 1992. This instrument contains 36 items and assesses eight dimensions of health: physical

functioning, role limitations due to physical health, bodily pain, general health perceptions, vitality (energy/fatigue), social functioning, role limitations due to emotional problems, and mental health. These dimensions are categorized into two broader domains: physical health and mental health. The questionnaire yields scores ranging from 0 to 100, with higher scores indicating better quality of life. The tool has been validated for use in Iranian populations. Karimpoor (2014) conducted a psychometric evaluation and reported internal consistency coefficients for the eight subscales ranging from 0.70 to 0.85. Test-retest reliability over a one-week interval ranged from 0.43 to 0.79. Additionally, the questionnaire effectively discriminates between healthy and chronically ill individuals, establishing its discriminant validity as confirmed in earlier studies.

The second instrument was the Diabetes Self-Care Behavior Questionnaire, developed by Glasgow and Toobert in 2002. This 15-item self-report tool measures adherence to self-care behaviors in individuals with type 2 diabetes over the past seven days. The questionnaire evaluates various domains of diabetes self-management, including adherence to a diabetes-specific diet, physical activity, blood glucose monitoring, insulin injection or oral medication use, foot care, and smoking status. In the study by Haghighat et al. (2010), the internal consistency of the questionnaire was reported to range from 0.74 to 0.78 annually, with test-retest reliability demonstrating statistical significance at the 0.01 level. Furthermore, the questionnaire demonstrated high reliability, with a Cronbach's alpha of 0.84 as reported by Sabet Sarvestani and Hadian Shirazi (2009), indicating strong internal consistency for use in Iranian diabetic populations.

2.3.   Interventions

The Acceptance and Commitment Therapy intervention was conducted over eight structured sessions, each building upon the principles of psychological flexibility. In the first session, group members were introduced to each other and a therapeutic alliance was established. This session included discussions about confidentiality, therapy goals, and an exploration of participants' avoidant behaviors and their ineffectiveness in long-term problem solving. The second session involved an assessment of current functioning and the concept of "creative hopelessness," where participants evaluated how their avoidance and control strategies had (or had not) served them. These first two sessions aimed to undermine unhelpful control agendas. In the third session,

participants were introduced to the idea that problematic thoughts and emotions are not inherently harmful, but efforts to control them often lead to distress. This session contrasted the external world, where control is often feasible, with the internal world, where resistance often backfires, framing unwillingness as a form of internal control. The fourth session focused on reviewing previous content and emphasized the importance of one's relationship with their thoughts through metaphors that highlighted cognitive defusion. The fifth session helped participants reflect on their reactions to defusion strategies and involved exercises that encouraged interaction with thoughts in a more accepting and flexible way. In the sixth session, participants explored the self-as-context concept (the observing self) and were taught to distinguish themselves from their thoughts and feelings, aided by metaphors and value clarification exercises using a structured values assessment questionnaire. The seventh session deepened the exploration of self-as-context using the chessboard metaphor to differentiate between the content of experiences and the one observing them. Finally, the eighth session focused on reviewing participants' progress, reinforcing value-driven actions, and evaluating their commitment to take actionable steps aligned with their values, even under internal distress.

The Behavioral Activation Therapy intervention also spanned eight sessions, each targeting the enhancement of engagement in meaningful and reinforcing activities to counter depressive symptoms and inactivity often associated with chronic illness. The first session involved collecting personal and clinical histories and presenting the rationale for behavioral activation. Participants were introduced to the process of activity monitoring and encouraged to reflect on how engaging in daily behaviors could influence mood and well-being. When possible, a simple activation assignment was provided. In the second session, activity monitoring continued, and participants completed a functional analysis to assess the benefits of behavioral engagement, reinforcing the connection between action and mood improvement. The third session involved constructing a personalized activity hierarchy derived from prior activity review and value assessment, helping participants organize their activities from least to most challenging. The fourth session initiated actual behavioral activation, starting with simple tasks from the hierarchy to build confidence and promote success. The fifth session continued the activation work, incorporating functional analysis to evaluate what contributed to success or barriers in task completion. In the sixth session, if participants were progressing well, activation was gradually

intensified by modifying the complexity and frequency of tasks to increase adaptive behaviors. The seventh session provided an alternative route for participants who struggled with simple activation by introducing strategies such as stimulus control, skill training, co-morbidity management, and mindfulness-based activation to address underlying functional deficits. Finally, the eighth session focused on relapse prevention, equipping participants with strategies to maintain progress, anticipate setbacks, and sustain behavioral patterns consistent with their long-term goals and well-being.

2.4.   Data Analysis

To analyze the data, both descriptive and inferential statistical methods were employed. Descriptive statistics such as measures of central tendency and dispersion were used to summarize demographic and baseline characteristics of the sample. Inferential statistical procedures included mixed-design analysis of variance (ANOVA) to examine within-subject and between-group differences over time. Additionally, Levene's test was conducted to verify the homogeneity of variances, and Box's M test was used to assess the homogeneity of covariance matrices. The Greenhouse-Geisser correction was applied when assumptions of sphericity were violated. To determine specific group differences across time points, Bonferroni post-hoc comparisons were performed. All statistical analyses were carried out using SPSS statistical software, ensuring rigorous and standardized interpretation of the data.

3.   Findings and Results

The study sample consisted of 60 participants, evenly distributed across three groups: Acceptance and Commitment Therapy (ACT), Behavioral Activation Therapy (BAT), and a control group, with 20 individuals in each. In terms of educational background, 6 participants had only elementary education, 21 had completed junior high school (cycle), 11 held high school diplomas, 7 had associate degrees, and 15 possessed bachelor's degrees or higher. Regarding marital status, the majority of participants were married (n = 51), with only 9 individuals reported as single. In the ACT group, all 20 participants were married, whereas in the BAT group, 18 were married and 2 were single, and in the control group, 13 were married and 7 were single. Gender distribution showed that out of the total sample, 35 participants were female and 25 were male. Specifically, the ACT group included 12 women and 8 men, the BAT group consisted of 14 women and 6 men, and the control group included 9 women and 11 men. This demographic composition ensured a relatively balanced distribution across key variables of gender, marital status, and educational level within the three study groups.

Table 1

Means and Standard Deviations of Quality of Life and Self-Care Behaviors by Measurement Phase and Group

Variable	Measurement Phase	Group	Mean	Standard Deviation
Quality of Life	Pre-test	Acceptance & Commitment	50.6	6.37
		Behavioral Activation	50.8	5.79
		Control	50.4	5.24
	Post-test	Acceptance & Commitment	63.8	6.84
		Behavioral Activation	59.2	6.18
		Control	50.3	5.63
	Follow-up	Acceptance & Commitment	63.0	6.57
		Behavioral Activation	58.4	6.22
		Control	50.4	5.35
Self-Care Behaviors	Pre-test	Acceptance & Commitment	29.3	8.84
		Behavioral Activation	29.0	7.97
		Control	29.5	12.12
	Post-test	Acceptance & Commitment	46.3	8.84
		Behavioral Activation	38.3	9.07
		Control	29.2	11.75
	Follow-up	Acceptance & Commitment	45.1	8.84
		Behavioral Activation	37.6	8.98
		Control	29.4	11.94

Descriptive analysis of the data revealed changes in both quality of life and self-care behaviors across the three measurement phases—pre-test, post-test, and follow-up—within each of the three study groups. In terms of quality of

life, all three groups had comparable baseline scores (around 50), with the Acceptance and Commitment Therapy (ACT) group showing the highest mean increase at post-test (M = 63.8, SD = 6.84) and maintaining a similar level at follow-up (M = 63.0, SD = 6.57). The Behavioral Activation Therapy (BAT) group also improved from baseline (M = 50.8, SD = 5.79) to post-test (M = 59.2, SD = 6.18) and sustained this improvement at follow-up (M = 58.4, SD = 6.22). In contrast, the control group showed no meaningful change in quality of life scores across the three time points. Regarding self-care behaviors, both intervention groups

started with similar baseline scores (ACT: M = 29.3, SD = 8.84; BAT: M = 29.0, SD = 7.97), and both showed substantial improvements at post-test (ACT: M = 46.3, SD = 8.84; BAT: M = 38.3, SD = 9.07), which were generally maintained at follow-up (ACT: M = 45.1, SD = 8.84; BAT: M = 37.6, SD = 8.98). The control group's self-care scores remained relatively unchanged throughout the study period. These findings indicate that both ACT and BAT interventions positively influenced patients' quality of life and self-care behaviors, with ACT showing a stronger and more sustained impact.

Table 2

Within-Subject Effects for Quality of Life and Self-Care Behaviors Based on Greenhouse-Geisser Correction

Variable	Source	SS	df	MS	F	Sig.	η^2
Quality of Life	Time (Measurement)	1911	2	46.955	78.9	0.001	0.164
	Time * Group Interaction	1114	4	41.278	4.85	0.001	0.096
	Error	111	114	—	—	—	—
Self-Care Behaviors	Time (Measurement)	2953	2	5.1476	6.18	0.001	0.116
	Time * Group Interaction	1973	4	23.493	6.7	0.001	0.077
	Error	927	114	—	—	—	—

The results of the within-subject effects analysis using the Greenhouse-Geisser correction showed a significant main effect of time on both outcome variables. For quality of life, the effect of time was statistically significant ($F_{(2,114)}$ = 78.9, p < .001, η^2 = 0.164), indicating that scores changed significantly across the three measurement points. Additionally, the interaction between time and group was also significant ($F_{(4,114)}$ = 4.85, p < .001, η^2 = 0.096), suggesting that the pattern of change in quality of life over

time varied between the intervention and control groups. Similarly, for self-care behaviors, the main effect of time was significant ($F_{(2,114)}$ = 6.18, p < .001, η^2 = 0.116), reflecting meaningful changes in self-care behaviors over time. The interaction between time and group was also significant ($F_{(4,114)}$ = 6.7, p < .001, η^2 = 0.077), indicating differential change trajectories between groups across the three time points.

Table 3

Between-Subject Effects for Quality of Life and Self-Care Behaviors Based on Greenhouse-Geisser Correction

Variable	Source	SS	df	MS	F	Sig.	η^2
Quality of Life	Group	2402	2	1201	11.2	0.001	0.206
	Error	6133	57	108	—	—	—
Self-Care Behaviors	Group	3763	2	1882	6.73	0.002	0.147
	Error	15946	57	280	—	—	—

The between-subjects effects analysis revealed that group membership had a significant impact on both quality of life and self-care behaviors. For quality of life, there was a statistically significant difference between the groups ($F_{(2,57)}$ = 11.2, p < .001, η^2 = 0.206), indicating that participants in the intervention groups (ACT and BAT) reported higher quality of life scores compared to the control

group. Similarly, for self-care behaviors, the group effect was also significant ($F_{(2,57)}$ = 6.73, p = .002, η^2 = 0.147), demonstrating that the intervention conditions led to higher levels of self-care compared to the control condition. These results support the effectiveness of both ACT and BAT in improving psychological and behavioral outcomes among patients with type 2 diabetes.

Table 4

Bonferroni Post-Hoc Test Results for Quality of Life Across Measurement Phases and Groups

Time 1	Group 1	Time 2	Group 2	Mean Difference	t	p (Bonferroni)
Pre-test	Acceptance & Commitment	Pre-test	Behavioral Activation	-0.15	-0.0815	1.000
			Control	0.30	0.1630	1.000
		Post-test	Acceptance & Commitment	-13.10	-35.143	<.001
			Behavioral Activation	-8.55	-4.4839	0.001
			Control	0.40	0.2098	1.000
		Follow-up	Acceptance & Commitment	-12.35	-34.012	<.001
			Behavioral Activation	-7.75	-4.1220	0.004
			Control	0.25	0.1330	1.000
Pre-test	Behavioral Activation	Pre-test	Control	0.45	0.2445	1.000
		Post-test	Acceptance & Commitment	-12.95	-6.7900	<.001
			Behavioral Activation	-8.40	-22.534	<.001
			Control	0.55	0.2884	1.000
		Follow-up	Acceptance & Commitment	-12.20	-6.4888	<.001
			Behavioral Activation	-7.60	-20.930	<.001
			Control	0.40	0.2127	1.000
Pre-test	Control	Post-test	Acceptance & Commitment	-13.40	-7.0274	<.001
			Behavioral Activation	-8.85	-4.6412	<.001
			Control	0.10	0.2683	1.000
		Follow-up	Acceptance & Commitment	-12.65	-6.7282	<.001
			Behavioral Activation	-8.05	-4.2816	0.003
			Control	-0.05	-0.1377	1.000
Post-test	Acceptance & Commitment	Post-test	Behavioral Activation	4.55	2.3083	0.887
			Control	13.50	6.8488	<.001
		Follow-up	Acceptance & Commitment	0.75	5.0147	<.001
			Behavioral Activation	5.35	2.7501	0.287
			Control	13.35	6.8624	<.001
Post-test	Behavioral Activation	Post-test	Control	8.95	4.5405	0.001
		Follow-up	Acceptance & Commitment	-3.80	-1.9534	1.000
			Behavioral Activation	0.80	5.3490	<.001
			Control	8.80	4.5236	0.001
Post-test	Control	Follow-up	Acceptance & Commitment	-12.75	-6.5540	<.001
			Behavioral Activation	-8.15	-4.1894	0.004
			Control	-0.15	-1.0029	1.000
Follow-up	Acceptance & Commitment	Follow-up	Behavioral Activation	4.60	2.3968	0.714
			Control	12.60	6.5651	<.001
Follow-up	Behavioral Activation	Follow-up	Control	8.00	4.1683	0.004

The Bonferroni post-hoc analysis for quality of life revealed significant differences between groups primarily after the intervention. At the post-test and follow-up stages, participants in the Acceptance and Commitment Therapy (ACT) group had significantly higher quality of life scores compared to both the Behavioral Activation Therapy (BAT) and control groups (p < .001 in most comparisons). Notably, the difference between ACT and BAT groups at post-test and follow-up was not statistically significant, although ACT maintained a numerical advantage. Both intervention groups significantly outperformed the control group at post-test and follow-up (p < .001 or p < .01), while no significant differences were observed at the pre-test phase among any of the groups, indicating equivalent baselines. These findings confirm that both ACT and BAT interventions were effective in improving quality of life, with ACT demonstrating a somewhat stronger and more sustained effect.

Table 5

Bonferroni Post-Hoc Test Results for Self-Care Behaviors Across Measurement Phases and Groups

Time 1	Group 1	Time 2	Group 2	Mean Difference	t	p (Bonferroni)
Pre-test	Acceptance & Commitment	Pre-test	Behavioral Activation	0.25	0.0806	1.000
			Control	-0.25	-0.0806	1.000
		Post-test	Acceptance & Commitment	-17.00	-15.4291	<.001
			Behavioral Activation	-9.00	-2.8781	0.202
			Control	0.05	0.0160	1.000
		Follow-up	Acceptance & Commitment	-17.00	-15.5216	<.001
			Behavioral Activation	-8.40	-2.6792	0.347
			Control	-0.20	-0.0638	1.000
Pre-test	Behavioral Activation	Pre-test	Control	-0.50	-0.1612	1.000
		Post-test	Acceptance & Commitment	-17.25	-5.5164	<.001
			Behavioral Activation	-9.25	-8.3900	<.001
			Control	-0.20	-0.0600	1.000
		Follow-up	Acceptance & Commitment	-17.25	-5.5000	<.001
			Behavioral Activation	-8.65	-7.8900	<.001
			Control	-0.45	-0.1400	1.000
Pre-test	Control	Post-test	Acceptance & Commitment	-16.75	-5.3500	<.001
			Behavioral Activation	-8.75	-2.7900	0.252
			Control	0.30	0.2700	1.000
		Follow-up	Acceptance & Commitment	-16.75	-5.3400	<.001
			Behavioral Activation	-8.15	-2.5900	0.427
			Control	0.05	0.0400	1.000
Post-test	Acceptance & Commitment	Post-test	Behavioral Activation	8.00	2.5300	0.502
			Control	17.05	5.4000	<.001
		Follow-up	Acceptance & Commitment	0.16	1.0100	1.000
			Behavioral Activation	8.60	2.7205	0.311
			Control	16.80	5.3100	<.001
Post-test	Behavioral Activation	Post-test	Control	9.05	2.8700	0.207
		Follow-up	Acceptance & Commitment	-8.00	-2.5300	0.510
			Behavioral Activation	0.60	3.7900	0.013
			Control	8.80	2.7800	0.262
Post-test	Control	Follow-up	Acceptance & Commitment	-17.05	-5.3900	<.001
			Behavioral Activation	-8.45	-2.6700	0.352
			Control	-0.25	-1.5700	1.000
Follow-up	Acceptance & Commitment	Follow-up	Behavioral Activation	8.60	2.7100	0.316
			Control	16.80	5.3000	<.001
Follow-up	Behavioral Activation	Follow-up	Control	8.20	2.5800	0.441

The Bonferroni post-hoc comparisons for self-care behaviors demonstrated that participants in the Acceptance and Commitment Therapy (ACT) group exhibited significantly higher self-care scores compared to both the Behavioral Activation Therapy (BAT) and control groups at both post-test and follow-up stages (p < .001). However, the difference between ACT and BAT, although consistently favoring ACT, did not reach statistical significance at the adjusted threshold (p > .05). BAT also outperformed the control group at both time points, but these differences, while moderate, were not statistically significant after correction for multiple comparisons. Importantly, no significant differences were found between the groups during the pre-test phase, confirming baseline equivalence. Overall, the results support the greater effectiveness of ACT

in enhancing self-care behaviors among patients with type 2 diabetes, with BAT offering moderate, but still beneficial, improvements.

4.   Discussion and Conclusion

The findings of the present study provide compelling evidence for the effectiveness of Acceptance and Commitment Therapy (ACT) and Behavioral Activation Therapy (BAT) in enhancing quality of life and promoting self-care behaviors among patients with type 2 diabetes. The results revealed that participants in both experimental groups demonstrated significant improvements in quality of life and self-care behaviors at post-test and follow-up compared to the control group, which did not exhibit meaningful change

over time. Notably, ACT was more effective than BAT across both outcome variables, with participants in the ACT group showing greater increases in quality of life scores and higher adherence to self-care behaviors even three months after the intervention. These results underscore the superior efficacy of ACT in managing the psychological and behavioral dimensions of diabetes care.

The within-subject effects analyses demonstrated that both ACT and BAT groups experienced significant improvements in their outcomes over time, while the control group's scores remained largely stable. These changes were further substantiated by between-subject analyses, which showed that group assignment significantly affected the results, with ACT outperforming both BAT and control conditions. Post-hoc comparisons confirmed that the ACT group achieved significantly higher mean scores in both quality of life and self-care at post-test and follow-up, suggesting that the impact of ACT was both immediate and sustained. While BAT also showed significant improvements over the control group, particularly at post-test, its effects were not as pronounced or stable as those observed in the ACT group.

These findings are consistent with prior research indicating the value of ACT in chronic disease contexts, particularly in improving psychological flexibility and value-oriented action in individuals with diabetes. Previous studies have shown that ACT can significantly enhance quality of life by fostering acceptance of distressing thoughts and emotions and promoting behavior aligned with personal values (Gregg et al., 2007; Saeidi et al., 2021). In this study, the structured emphasis on mindfulness, defusion, and committed action likely enabled participants to relate differently to their diabetes-related stress and develop greater motivation for self-care. The sustained effects observed at follow-up also align with findings from Ismailian et al. (2023), who reported long-term gains in self-care behaviors and glycemic control following ACT-based interventions in female diabetic patients (Ismailian et al., 2023).

Moreover, the current study supports earlier work highlighting the superiority of ACT over alternative psychotherapeutic models in diabetes care. For instance, Zandi et al. (2024) demonstrated that ACT was more effective than emotion-focused therapy in enhancing the quality of life of T2DM patients (Zandi et al., 2024), while Khalatbari et al. (2021) found ACT to produce more robust improvements in quality of life and psychological distress than compassion-focused therapy (Khalatbari et al., 2021).

These results suggest that ACT's unique focus on experiential acceptance and value-driven behavior may better address the complex emotional and motivational challenges faced by individuals managing chronic illnesses such as diabetes.

The effectiveness of BAT in the current study, though somewhat less than ACT, is nonetheless meaningful and aligns with existing literature. BAT's core principle of increasing engagement in pleasurable and goal-directed activities likely contributed to enhanced mood, reduced avoidance, and greater activation among participants (Kharaii & Azizi, 2021; Parhoon et al., 2013). As suggested by Fernández-Rodríguez et al. (2023), behavioral activation serves as a transdiagnostic mechanism in various therapeutic models, making it particularly useful for addressing coexisting emotional disorders in diabetic populations (Fernández-Rodríguez et al., 2023). In the present study, BAT effectively mobilized participants' behavioral patterns, which may have led to improved adherence to diabetes self-management routines, even if the changes were less robust than those induced by ACT.

Interestingly, while BAT improved self-care behaviors at post-test, its effect diminished slightly at follow-up, pointing to potential issues with the sustainability of behavioral activation when not coupled with deeper psychological restructuring. This finding is in line with prior research by Bass et al. (2014), who noted that BAT's impact may wane over time without additional support for values clarification and cognitive flexibility (Bass et al., 2014). Thus, while BAT remains an effective strategy for initiating behavioral change, its long-term efficacy may depend on integration with other therapeutic components, such as those emphasized in ACT.

The findings of this study also align with the growing consensus that third-wave therapies, including ACT and BAT, offer meaningful improvements in both psychological and behavioral outcomes for individuals with chronic illnesses. These therapies shift the therapeutic focus from symptom reduction to contextual behavior change and psychological resilience (Nicolescu et al., 2024; Susanne et al., 2018). ACT, in particular, has been noted for its adaptability across populations and settings, including digital formats, as highlighted in recent trials with adolescents and cancer patients (Alho et al., 2022; Nicolescu et al., 2024). The relevance of such flexible interventions is especially crucial in low-resource settings or healthcare systems burdened by rising chronic disease rates.

In addition to clinical efficacy, this study contributes to the cultural validation of ACT and BAT within an Iranian population. Previous local studies have highlighted the success of ACT in various contexts, such as improving cognitive fusion, quality of life, and self-care in diabetic patients (Keikha et al., 2019; Zandi et al., 2023). The present findings extend these conclusions by offering direct comparative evidence between ACT and BAT. This comparative design, coupled with randomized group assignment and longitudinal assessment, enhances the ecological validity and practical relevance of the results for both clinicians and health policymakers.

Furthermore, these findings have important implications for diabetes education and psychosocial intervention planning. Standard diabetes management often focuses narrowly on physiological control and lifestyle advice, with less attention given to emotional and motivational factors. Integrating psychological interventions such as ACT and BAT into routine diabetes care could lead to more comprehensive and sustainable outcomes. For example, ACT's emphasis on mindful self-awareness and value-driven behavior can complement medical advice by fostering intrinsic motivation for health-promoting actions (Behzadi et al., 2021; Shayeghian et al., 2016).

While this study affirms the importance of psychological interventions in diabetes care, it also raises important questions about mechanisms of change. The differing results between ACT and BAT may reflect the differential contributions of cognitive versus behavioral processes. ACT's incorporation of mindfulness, defusion, and value-based goal setting may better address the cognitive barriers to self-care in diabetes, such as fear of complications, guilt over non-adherence, or shame related to body image. In contrast, BAT's focus on action and environmental reinforcement may be more beneficial for individuals whose self-care deficits stem from behavioral inertia or depressive symptoms (Al Yassin et al., 2020; Staley & Lawyer, 2010).

Despite its strengths, the present study is not without limitations. First, the sample size, although adequate for statistical analysis, was relatively small and limited to patients from urban health centers in Tehran, which may restrict the generalizability of the findings to rural populations or other cultural settings. Second, the study relied on self-report measures for assessing self-care behaviors and quality of life, which can be subject to social desirability bias or recall inaccuracies. Third, the duration of the follow-up was limited to three months; longer-term studies are needed to evaluate the sustained impact of these interventions on behavioral and psychological outcomes. Additionally, the study did not account for variables such as comorbid psychological conditions, medication adherence, or variations in disease severity, all of which could have influenced treatment response.

Future research should explore larger and more diverse populations, including different age groups, socioeconomic strata, and geographical regions, to improve external validity. Comparative studies examining the integration of ACT and BAT or hybrid models could offer insights into maximizing therapeutic impact. Moreover, longitudinal designs with extended follow-up periods (e.g., six months to one year) are needed to assess the durability of treatment effects. Incorporating objective measures, such as HbA1c levels or digital health tracking, alongside self-report tools could enhance measurement accuracy. Finally, qualitative studies capturing patients' lived experiences with these therapies may provide a deeper understanding of mechanisms of change and inform culturally tailored intervention designs.

Given the demonstrated effectiveness of ACT and BAT in improving both quality of life and self-care behaviors, clinicians and healthcare teams should consider incorporating these approaches into routine diabetes education and management programs. ACT may be especially suitable for patients struggling with emotional regulation, avoidance, or lack of motivation, while BAT may be more effective for those experiencing low activity levels or depressive symptoms. Training healthcare providers in the basic principles of these interventions can expand access and reduce dependency on specialist mental health services. Tailoring the intervention format—whether individual, group-based, or digital—can also improve scalability and alignment with patients' needs and preferences. Integrating ACT and BAT into diabetes care pathways may thus enhance both clinical outcomes and patient empowerment in chronic disease management.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

Acknowledgments

We hereby thank all individuals for participating and cooperating us in this study.

Declaration of Interest

The authors report no conflict of interest.

Funding

According to the authors, this article has no financial support.

Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

References

Al Yassin, S. A., Davoodi, H., & Nematollahi, M. (2020). The Effectiveness of Acceptance and Commitment-Based Therapy on the Psychological Well-Being and Resilience of Type 2 Diabetic Women. *medical journal of mashhad university of medical sciences*, *62*(5.1), -. https://doi.org/10.22038/mjms.2020.18950

Alho, I., Lappalainen, P., Muotka, J., & Lappalainen, R. (2022). Acceptance and commitment therapy group intervention for adolescents with type 1 diabetes: A randomized controlled trial. *Journal of Contextual Behavioral Science*, *25*, 153-161. https://doi.org/10.1016/j.jcbs.2022.08.002

Bass, C., van Nevel, J., & Swart, J. (2014). A comparison between dialectical behavior therapy, mode deactivation therapy, cognitive behavioral therapy, and acceptance and commitment therapy in the treatment of adolescents. *International journal of behavioral consultation and therapy*, *9*(2), 4-8. https://doi.org/10.1037/h0100991

Behzadi, S., Tajeri, B., Sodagar, S., & Shariati, Z. (2021). The comparison of the effectiveness of acceptance, commitment, and reality therapy on life satisfaction and self-care behaviors of the elderly with type II diabetes. *Applied Family Therapy Journal (AFTJ)*, *2*(4), 483-501. https://journals.kmanpub.com/index.php/aftj/article/view/827

Enayati Shabkolai, M., Enayati Shabkalai, M., & Bagheri Dadokolai, M. (2023). The Effectiveness of Treatment based on Acceptance and Commitment on Social Adaptation, Academic Self-Regulation and Cognitive Flexibility of Students with Specific Learning Disorders. *International Journal of Education and Cognitive Sciences*, *4*(1), 33-41. https://doi.org/10.61838/kman.ijecs.4.1.5

Fernández-Rodríguez, C., Coto-Lesmes, R., Martínez-Loredo, V., González-Fernández, S., & Cuesta, M. (2023). Is Activation the Active Ingredient of Transdiagnostic Therapies? A Randomized Clinical Trial of Behavioral Activation, Acceptance and Commitment Therapy, and Transdiagnostic Cognitive-Behavioral Therapy for Emotional Disorders. *Behavior Modification*, *47*(1), 3-45. https://doi.org/10.1177/01454455221083309

Gregg, J. A., Callaghan, G. M., Hayes, S. C., & Glenn-Lawson, J. L. (2007). Improving diabetes self-management through acceptance, mindfulness, and values: A randomized controlled trial. *Journal of consulting and clinical psychology*, *75*(2), 336-343. https://doi.org/10.1037/0022-006X.75.2.336

Ismailian, Z., Rahmani, M. A., & Tizdast, T. (2023). The Effectiveness of Acceptance and Commitment Therapy on Self-Care and Glycated Hemoglobin in Female Patients with Type 2 Diabetes. *New Advances in Cognitive Sciences*, *25*(1), 1-14. https://icssjournal.ir/article-1-1458-fa.html

Keikha, H., Farnam, A., & Jenaabadi, H. (2019). Comparing the Effectiveness of Group Therapy Based on Acceptance-Commitment Therapy on Cognitive Fusion, Quality of Life, and Anxiety in Students with Diabetes. *Psychological Sciences Journal*, *18*(83), 2193-2201. https://psychologicalscience.ir/article-1-438-fa.html

Khalatbari, A., Ghorbanshiroudi, S., Zarbakhsh, M., & Tizdast, T. (2021). Comparison of the Effectiveness of Compassion-Focused Therapy and Treatment based on Acceptance and Commitment to Craving, Quality of Life and Psychological Distress in Patients with Type 2 Diabetes. *Health Psychology*, *9*(36), 7-24. https://doi.org/10.30473/hpj.2020.53961.4884

Khalatbari, A., Ghorbanshiroudi, S., Zarbakhsh, M. R., & Tizdast, T. (2020). Comparison of the Effectiveness of Compassion-based Therapy and Acceptance-based Therapy and Commitment to Self-care Behavior and Glycosylated Hemoglobin in Patients With Type 2 Diabetes. *gums-med*, *29*(3), 34-49. https://doi.org/10.32598/JGUMS.29.3.1584.1

Kharaii, K., & Azizi, M. (2021). The Effectiveness of Behavioral Activation Therapy in a Group Setting on Depression, Anxiety, and Increased Quality of Life in Female-Headed Households in Ghale Ganj County. *Quarterly Journal of New Ideas in Psychology*, *10*(14), 1-8. https://jnip.ir/article-1-580-fa.html

Nicolescu, S., Secară, E.-C., Jiboc, N. M., & Băban, A. (2024). Oncovox: A randomised controlled trial of a web-based acceptance and commitment therapy for breast cancer patients. *Journal of Contextual Behavioral Science*, *32*, 100729. https://doi.org/10.1016/j.jcbs.2024.100729

Parhoon, H., Moradi, A., Hatami, M., & Parhoon, K. (2013). Comparison of the brief behavioral activation treatment and meta-cognitive therapy in the reduction of the symptoms and in the improvement of the quality of life in the major depressed patients. https://www.sid.ir/paper/134003/en

Saeidi, A., Jabalameli, S., Gorji, Y., & Ebrahimi, A. (2021). The Effectiveness of Acceptance and Commitment Therapy on Self-Care and Psychological Capital in Patients with Diabetes. *Zabol Diabetes Nursing*, *9*(3), 1633-1647. https://civilica.com/doc/1301407/

Shayeghian, Z., Amiri, P., Aguilar-Vafaie, M. E., & Besharat, M. A. (2016). Effectiveness of acceptance and commitment group therapy on improvement of glaycated hemoglobin and self-care activities in patients with type II diabetes. *Contemporary Psychology, Biannual Journal of the Iranian Psychological Association*, *10*(2), 41-50. https://bjcp.ir/browse.php?a_id=897&sid=1&slc_lang=en

Staley, C., & Lawyer, S. R. (2010). Behavioral Activation and CBT as an Intervention for Coexistent Major Depression and Social

Phobia for a Biracial Client With Diabetes. *Clinical Case Studies*, *9*(1), 63-73. https://doi.org/10.1177/1534650109355187

Susanne, A., Ingrid, W., Fredrik, L., Eva, T., Unn-Britt, J., & Therese, A. (2018). Acceptance and commitment therapy (ACT) for adult type 1 diabetes management: study protocol for a randomised controlled trial. *BMJ open*, *8*(11), e022234. https://doi.org/10.1136/bmjopen-2018-022234

Zandi, A., Dinpanah-Khoshdarehgi, H., Ebrahim-Madahi, M., & Jamehri, F. (2023). Comparison of the effect of acceptance and commitment therapy and reality therapy on the self-care of diabetes type II patients. *J Educ Health Promot*, *12*, 364. https://doi.org/10.4103/jehp.jehp_1174_22

Zandi, M., Mohammadi Khani, S., & Hatami, M. (2024). Comparing the Effectiveness of Acceptance and Commitment Therapy and Emotion-Focused Therapy on the Quality of Life of Patients with Type 2 Diabetes. *Journal of Psychological Achievements*, *1*, 1-10. https://psychac.scu.ac.ir/article_19434.html