

*Original Article*

## Comparison of the Effectiveness of Acceptance and Commitment Therapy and Mindfulness Therapy on Increasing Psychological Well-Being and Weight Control in People with Type 2 Diabetes

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### Abstract

**Background and Aim:** Type 2 diabetes is a chronic and complex disease that requires constant medical and psychological care. Therefore, this study aimed to compare the effectiveness of acceptance and commitment therapy and mindfulness therapy on increasing psychological well-being and weight control in people with type 2 diabetes.

**Materials and Methods:** The research method was semi-experimental with pre-test-post-test design and two-month follow-up with the control group. The statistical population of this study included men with type 2 diabetes and overweight in Tehran. 60 patients were selected by purposive sampling method and randomly divided into three groups, including experimental group A (acceptance and commitment therapy), experimental group B (mindfulness therapy), and control group (no intervention). Data collection tools in this study were Reef Psychological Well-Being Questionnaire, and calculation of BMI for weight control. Data were analyzed using repeated measures analysis of variance.

**Results:** The results showed that there was a significant difference between the mean scores of psychological well-being and weight control of the acceptance and commitment therapy group and the control group ( $P < 0.001$ ). Also, there was a significant difference between the scores of psychological well-being and weight control of the mindfulness therapy group and the control group ( $P < 0.05$ ).

**Conclusion:** It can be concluded that both therapies, especially the therapy based on acceptance and commitment therapy are effective methods in reducing the psychological and physical problems of patients with type 2 diabetes.

**Keywords:** Psychological well-being, Acceptance and commitment therapy, Type 2 diabetes, Mindfulness, Weight control

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## Introduction

**D**iabetes is a chronic disease that occurs when the body no longer produces enough insulin or cannot use the insulin that produces effectively (1). Diabetes is a common disease and one of the biggest health problems in all countries worldwide, thus, the World Health Organization calls it as a silent epidemic (2, 3). Diabetes is also a major cause of blindness, kidney failure, heart attacks, stroke, and lower limb amputation (4, 5). In 2014, the International Diabetes Federation reported that one death occurs every 7 seconds due to diabetes (6). The prevalence of diabetes is increasing worldwide, and it is predicted that by 2035, the number of people with diabetes will exceed 600 million (7). Diabetes reduces psychological well-being by decreasing health and quality of life (8, 9). In this regard, research shows that patients with type 2 diabetes suffer from serious problems in psychological well-being (10). Psychological well-being is a good way of life and a combination of good feeling and effective performance (11); Also, well-being is emotional experiences (positive and negative emotions) and evaluating people's lives (life satisfaction) (12). In patients with diabetes, psychological well-being structures are associated with better outcomes, including better disease control and reduced mortality. Moreover, promoting psychological well-being in patients with type 2 diabetes increases self-efficacy and self-care motivation (13). People with obesity are more likely to develop type 2 diabetes (14). According to research, central obesity is an important factor associated with type 2 diabetes, so that in people with high waist circumference, the risk of diabetes is 32 times higher in women and 22 times higher in men than in people with normal waist circumference (15). Therefore, weight control is vital in people with diabetes. Because overweight causes insulin resistance (14), and this makes it difficult to control blood sugar (16). Weight control is an activity in which eating and drinking are done in such a way that a person usually loses weight. Of course, in some cases, weight control is used to gain weight or regulate nutrient intake (17). The Body Mass Index (BMI), is a method for determining obesity and is useful for people over the age of 20, regardless of gender. This

index was invented between 1830 and 1850 by the Belgian scientist Lambert Adolphe Jacques Quetelet (18). To determine the body mass index, weight should be divided in kilograms by height squared in meters and the result should be examined; if the number obtained is above 30, it indicates obesity (19). Diabetes is related to lifestyle, and it have a negative effect on the patients' quality of life (20, 21). Controlling diabetes and preventing its progression is effective in preventing physical and psychological complications in patients (2). Therapies that are effective in this area include therapies based on acceptance and commitment therapy and mindfulness therapy. Acceptance and commitment therapy is a combination of awareness and acceptance strategies with commitment and behavior change strategies to increase flexibility and uses psychological acceptance. The goal of commitment-based therapy is to help people relate to their experiences in a variety of ways and to be able to fully engage with meaningful, value-based living (22). Psychological flexibility increases a person's ability to make practical choices about the most appropriate decisions when it comes to decision making. It also increases a person's ability to fully communicate with the present and change or maintain behavior (23). Mindfulness therapy is considered as one of the third generation cognitive-behavioral therapies. This method teaches people to learn with purpose and focus, at any time and without any judgment (24). During therapy, clients learn mind management skills that lead to metacognition, the acceptance of negative thought patterns, and the ability to respond with skill. It also teaches that it decentralizes negative thoughts and feelings and allows the mind to move from spontaneous thought patterns to a conscious emotional process (25). These therapies can affect the psychological well-being and weight control of patients with type 2 diabetes to control diabetes and delay the onset of physical and psychological complications in patients; Therefore, the aim of this study was to determine the comparison of the effectiveness of acceptance and commitment therapy and mindfulness therapy on increasing psychological well-being and weight control in people with type 2 diabetes.

## Methods

The present study was a semi-experimental with pre-test, post-test and two-month follow-up and had two independent variables (therapy based on acceptance and commitment therapy and mindfulness therapy), and two dependent variables (psychological well-being and weight control). The statistical population of this study consisted of men with type 2 diabetes and overweight in Tehran in 2021. 20 people were in experimental group A, 20 people in experimental group B and 20 people in control group. Experimental group A received 8 sessions of 90 minutes (one session per week), based on acceptance and commitment therapy and group B received 10 sessions of 90 minutes (one session per week) of mindfulness

and overweight based on BMI, male gender, no psychiatric illness and no use of psychiatric drugs, minimum diploma education, no admission any similar training program before and during the interventions and obtaining informed consent to participate in the study. Exclusion criteria were: Absence from more than one session in training sessions and unwillingness to continue participating in the research. Also, the mean age of participants in experimental groups A, B and control were 57.3, 56.9 and 55.3 years, respectively. The mean duration of the disease in experimental groups A, B and control were 12.9, 12.1 and 11.1 years, respectively.

**Table 1:** Body Mass Index (BMI) Table.

Classification	BMI
Weight loss	$\leq 18.5$
Normal weight	24.9 – 18.6
weight gain	29.9 – 25
1degree obesity	34.9 – 30
2degree obesity	39.9 – 35
3degree obesity	$\leq 40$

**Table 2:** Summary of acceptance and commitment therapy sessions.

Session	Content
<b>First</b>	Establishing a therapeutic relationship, explaining diabetes, executing pre-test questionnaires, and concluding a treatment contract
<b>Second</b>	Creates a desire to change behavior, change and understand the concept of control and present homework
<b>Third</b>	Identifying and clarifying values, goals, and barriers, explaining the concept of acceptance in diabetes and presenting homework
<b>Fourth</b>	Continues the discussion of clarifying values and behavioral commitment and presenting homework
<b>Fifth</b>	Improving patients' communication style, introducing, and understanding the concept of self-conceptualization and cognitive fault, performing exercises to strengthen cognitive fault and self-observer, and presenting homework
<b>Sixth</b>	Commitment and self-observation, mindfulness training, focus on improving social relationships, and homework
<b>Seventh</b>	Mindfulness training, listing the most important values of the subjects and possible obstacles in following them, summarizing the previous sessions, and presenting homework
<b>Eighth</b>	Understanding the nature of commitment, identifying behavioral plans in accordance with values and creating a commitment to act on them, reviewing the life story and committed action, ending treatment, and taking a post-test

therapy; However, members of the control group did not receive any intervention. The subjects were divided into experimental and control groups through simple random sampling. In other words, in the first stage, purposive sampling was used, but in the second stage, individuals were randomly assigned to one of the experimental and control groups. Inclusion criteria were: type 2 diabetes and HbA1c more than 7, obesity

## Materials

**Table 3:**Summary of mindfulness therapy sessions.

Session	Content
<b>First</b>	Establishing a relationship therapy, defining mindfulness, meditation as well as the purpose and benefits of mindfulness and the relationship between mindfulness and diabetes, performing a body scan for 30 minutes and providing homework
<b>Second</b>	The difference between thoughts and feelings, doing meditation while sitting and doing homework
<b>Third</b>	Practice walking, smiling, seeing, and hearing, practice three minutes of breathing space. Learn the technique of consciously eating raisins and discuss it and homework.
<b>Fourth.</b>	Four-dimensional sitting meditation training, discussing stress responses and alternative behaviors, doing mindful walking exercises, and doing homework
<b>Fifth.</b>	Do sitting meditation, practice to reduce stress quickly, strengthen motivation, relax, and strengthen patience, practice to get rid of negative emotions and do homework
<b>Sixth</b>	Practice three minutes of breathing space, enjoy the moment and see from a positive angle, do four conscious meditation and yoga exercises for one hour in a row and do homework
<b>Seventh</b>	Training to fight automatic thoughts, use mindfulness to deal with anxiety and provide homework
<b>Eighth</b>	Perform a combination of four-dimensional meditation exercises, awareness of everything that comes to mind in the moment, three-minute breathing space and homework
<b>Ninth</b>	Do a body scan meditation, discuss the benefits of mindfulness, and finally do homework
<b>Tenth</b>	Doing body scan meditation, learning to use what they have learned so far, practicing 3 minutes of breathing space, discussing ways to cope with the obstacles of meditation, and finally performing a post-test

### ***Psychological Welfare Questionnaire***

This questionnaire was developed by Reef in 1989 and revised in 2002. This questionnaire has 18 questions and 6 subscales including independence (questions 9, 12 and 18), mastery of the environment (questions 1, 4 and 6), personal growth (questions 7, 15 and 17), positive communication with others (Questions 3, 11 and 13), purpose in life (questions 5, 14 and 16) and self-acceptance (questions 2, 8 and 10). The sum of the scores of the subscales represents the overall score of psychological well-being of individuals. Respondents answer each question on a 6-point scale from strongly disagree (1) to strongly agree (6). The lower limit is 18 to 36, the average is 37 to 72 and the upper is 73 to 108. Questions 1, 4, 5, 9, 10, 13 and 17 are scored in reverse (23). In the study(27), the results of one-group confirmatory factor analysis showed that in the whole sample and in both females and males, the six-factor pattern of this scale has a good fit. Internal consistency of this scale using Cronbach's alpha in six factors of self-acceptance, mastery of the environment, positive communication with others, purposefulness in life, personal growth and independence are equal to 0.51, 0.76, 0.75, 0.52, 0.73, 0.72 and for the whole scale were 0.71 (24). Reliability obtained in the research (28), in six factors of self-acceptance, mastery of the environment, positive communication with others, purposefulness

in life, personal growth and independence are equal to 0.69, 0.79, 0.67, 0.79, 0.65, 0.75 and for the whole questionnaire is 0.71 (25).

### ***Body Mass Index (BMI)***

Body mass index is calculated by dividing weight (kilograms) by height squared (meters) (16). In the present study, weight was measured using a digital scale with a sensitivity of 100 g and height was measured using an inelastic tape measure with an accuracy of 0.5 cm.

### ***Acceptance and Commitment Therapy Sessions***

Protocol of therapy sessions of experimental group A, which was based on acceptance and commitment, was from the book of acceptance and commitment of Hayes et al. (29); in 8 sessions of 90 minutes and in 8 consecutive weeks. The summary of the sessions is as follows.

### ***Content of mindfulness therapy sessions***

The protocol of therapy sessions of group B was taken from the protocol of mindfulness training of Segal, Williams, and Teasdale (30); which were held in 10 sessions of 90 minutes for 10 consecutive weeks. The summary of the sessions is as follows.

In the present study, in order to test the research hypotheses, inferential statistics and analysis of variance with repeated measures of multivariate were used and the results were analyzed by SPSS-24 software.

## Results

The mean and standard deviation of research variables in the experimental and control groups in the pre-test, post-test and follow-up stages are presented in Table 4.

According to Table 4, which shows the mean and standard deviation of the studied groups in the three stages of pre-test, post-test and follow-up, the average scores of psychological well-being in post-test (69.10), and follow-up (66.20), compared to pre-test (39.25), increased in experimental group 1 who were undergoing therapy based on commitment and

which were treated with mindfulness, increased slightly. The mean scores of psychological well-being in the control group who did not receive any intervention, were not much different in pre-test (42.95), post-test (45.20), and follow-up (44.00). In addition, the mean scores of weight control in the post-test (28.50), and follow-up (29.80), compared to the pre-test (35.10), in experimental group 1, which was treated with commitment and acceptance (ACT), decreased; indicating an improvement in weight control of the post-test and follow-up stages. Also, weight control scores in post-test (30.03), and follow-up (31.28), compared to pre-test (35.29), in

**Table 4:** Mean and standard deviation of pre-test, post-test, and follow-up of research variables by experimental and control groups.

Variable	Group	pretest		Posttest		Follow up	
		mean	Standard deviation	mean	Standard deviation	mean	Standard deviation
Psychological wellbeing	Experimental1 (ACT)	39.25	3.70	69.10	4.26	66.20	4.61
	Experimental2 (mindfulness)	41.05	3.77	55.10	4.19	51.00	3.19
	control	42.95	3.85	45.20	3.33	44.00	3.37
Weight control	Experimental1 (ACT)	35.10	2.86	28.50	1.49	29.80	2.87
	Experimental2 (mindfulness)	35.29	3.67	30.03	2.56	31.28	1.83
	control	34.80	3.43	35.40	3.92	33.98	2.71

**Table 5:** Results of repeated measures analysis of variance for intergroup effects of time-group interaction on research variables.

variable	source	Test	amount	IndicatorF	Assumed degree of freedom	Error degree of freedom	Significance level	Eta square
Well-being	Time measurement	Wilks Lambda	0.36	96.84	2	56	*0.001	0.89
Psychology	Time and group interaction	Wilks Lambda	0.44	396.25	4	112	*0.001	0.85
control	Time measurement	Wilks Lambda	0.35	80.63	2	56	*0.001	0.93
weight	Time and group interaction	Wilks Lambda	0.42	258.69	4	112	*0.001	0.89

acceptance (ACT). Also, the scores of psychological well-being in post-test (55.10), and follow-up (51.00), compared to pre-test (41.05), in experimental group 2,

experimental group 2, which was treated with mindfulness, decreased slightly, indicating a slight improvement in weight control of the post-test and

**Table 6:** Summary of test results for intra-group and inter-group effects using analysis of variance with repeated measures on research variables.

effects	variable	Difference source	Total squares	Freed om degree	Mean square	Indicat or F	Significa nce level	Eta coefficient
intra	Psychologica l well-being	Time measurement	1306.97	1.33	982.69	391.51	*0.001	0.93
group		Time × Group	1759.12	2.65	663.82	305.74	*0.001	0.94
		error	89.56	59.15	1.51			
Intergr oup	Psychologica l well-being	Constant amount	260584.80	1	260584.80	773.34	*0.001	0.95
		group	4897.53	2	2448.76	19.79	*0.001	0.58
		error	2082.91	57				
intragr oup	control	Time measurement	1142.39	1.33	775.13	268.90	*0.001	0.94
	weight	Time × Group	1510.84	2.65	829.59	295.38	*0.001	0.93
		error	71.17	59.15	1.47			
	control	Constant amount	201255.61	1	201255.61	603.45	*0.001	0.93
Intergr oup	weight	group	3182.99	2	1972.43	66.29	*0.001	0.56
		error	1892.87	57				

\* P&lt;0.001

follow-up phase. The mean scores of weight control in the control group who did not receive any therapy, were not much different in pre-test (34.80), post-test (35.40), and follow-up (33.98). In order to use the analysis of variance test with repeated measures of multivariate to test the research hypothesis, the assumptions of this test were examined and all were confirmed. In other words, all assumptions were valid and there was no obstacle for using the analysis of variance method; therefore, analysis of variance can be used. The hypothesis of the present study is: There is difference between the effectiveness of acceptance, commitment therapy and mindfulness on increasing psychological well-being and weight control in people with type 2 diabetes. To test this hypothesis, repeated measures analysis of variance was used. The results of examining these hypotheses are presented in the following tables.

The results of Table 5 show that the effect of time and group interaction on psychological well-being variable ( $P<0.001$ ,  $F = 396.25$ ), is significant. Eta squared also shows that for psychological well-being, 85% of the variance in group scores is related to group

membership. Also, the results of Table 5 shows that the effect of time and group interaction on weight control variable ( $P<0.001$ ,  $F = 258.69$ ), is significant. Eta squared also shows that for weight control, 89% of the variance of group scores is related to group membership. Therefore, according to the results of the table above, repeated measures analysis of variance can be used to evaluate the effectiveness of acceptance and commitment-based therapy and mindfulness therapy on weight control. Table 6 shows the effects of acceptance and commitment therapy (ACT), and mindfulness therapy on psychological well-being and weight control. Based on these results, the effects of measurement time within the group ( $P<0.001$ ,  $F = 391.51$ ), time and group interaction ( $P<0.001$ ,  $F = 30.74$ ), and intergroup effects ( $P<0.001$ ,  $F = 69.79$ ), for psychological well-being variable shows that there is a significant difference in psychological well-being scores between at least one or both experimental groups based on acceptance and commitment and mindfulness therapy with the control group. Eta squared values also indicates the effect size of intragroup at the time of measurement ( $\eta^2 = 0.93$ ), the interaction between time

and group ( $\eta^2 = 0.94$ ), and intergroup ( $\eta^2 = 0.58$ ), are acceptable ( $\eta^2 > 0.14$ ). Also, according to Table 6, intra-group effects of measurement time ( $P < 0.001$ ,  $F = 268.90$ ), time-group interaction ( $P < 0.001$ ,  $F = 295.38$ ), and intergroup effects ( $P < 0.001$ ,  $F = 66.29$ ), for the weight control variable shows that there is a significant difference in weight control scores between at least one or both experimental groups based on acceptance and commitment and mindfulness therapy with the control group. Eta squared values also indicates the effect size of intragroup at the time of measurement ( $\eta^2 = 0.94$ ), the interaction between time and group ( $\eta^2 = 0.93$ ) and intergroup ( $\eta^2 = 0.56$ ), are acceptable ( $\eta^2 < 0.14$ ).

The results of Table 7 show a pairwise comparison of the effectiveness of therapeutic interventions based on acceptance and commitment (ACT), and mindfulness therapy on psychological well-being and weight control in three phases of pre-test, post-test, and follow-up. Based on the results of this table, psychological well-being scores in post-test ( $P < 0.001$ ), and follow-up ( $P < 0.001$ ), are significantly increased compared to pre-test. There is no significant difference between psychological well-being in post-test and follow-up ( $P < 0.05$ ); this indicates that therapeutic interventions have increased psychological well-being in the experimental groups and these changes remained stable during the follow-up period. Also, based on the results of this table, BMI index scores, which are the criteria for weight control,

weight control). There is no significant difference between weight control in post-test and follow-up ( $P < 0.05$ ); This indicates that therapeutic interventions have increased weight control in the experimental groups and these changes remained stable during the follow-up period. To evaluate the difference between the effectiveness of interventions on psychological well-being and weight control, Bonferroni post hoc test was used, the results of which are presented in Table 8. Table 8 shows the results of pairwise comparison of the mean scores of psychological well-being and weight control between the experimental and control groups. The results show that there is a significant difference between the mean scores of psychological well-being of the acceptance and commitment treatment group with the control group ( $P < 0.001$ ). Also, there is a significant difference between the psychological well-being scores of the mindfulness therapy group and the control group ( $P < 0.05$ ). This means that both therapies are effective and efficient in increasing psychological well-being. However, the effectiveness of acceptance and commitment therapy is greater than mindfulness therapy, this difference remained constant in the follow-up period. Also, the results show that there is a significant difference between the mean weight control scores of the acceptance and commitment therapy group with the control group ( $P < 0.001$ ). Also, there is a significant difference between the weight control scores of the mindfulness therapy group and the control group ( $P < 0.05$ ). This means that both treatments are effective

**Table 7:** Bonferroni post hoc test results for pairwise comparison of mean scores in pre-test, post-test, and follow-up for research variables.

variable	Base group	Compare group	Mean difference	Standard error	Significance level
Psychological well being	pretest	posttest	29.85-	1.37	*0.001
		Follow up	28.42-	1.33	*0.001
	posttest	pretest	29.85	1.37	*0.001
		Follow up	3.76	0.49	0.09
	Follow up	pretest	28.42	1.33	*0.001
		posttest	3.76-	0.49	0.09
Weight control	pretest	posttest	5.93	0.59	*0.001
		Follow up	4.65	0.57	*0.001
	posttest	pretest	5.93-	0.59	*0.001
		Follow up	1.27-	0.17	0.10
	Follow up	pretest	4.65-	0.57	*0.001
		posttest	1.27	0.17	0.10

\*  $P < 0.001$

have a significant decrease in post-test ( $P < 0.001$ ), and follow-up ( $P < 0.001$ ), compared to pre-test (increase in

and efficient for increasing weight control; however, the effectiveness of acceptance and commitment

**Table 8:** Results of Bonferroni post hoc test for pairwise comparison of mean scores of research variables.

Variable	Base group	Compare Group	Mean difference	Standard error	Significance level
Psychological well being	ACT	Mindfulness therapy	14.00	3.13	*0.035
		Control	23.90	3.86	**0.001
	Mindfulness therapy	ACT	14.00-	3.13	*0.035
		Control	9.90	2.74	*0.01
	Control	ACT	23.90-	3.86	**0.001
		Mindfulness	9.90-	2.74	*0.01
	ACT	Mindfulness therapy	1.53-	0.18	*0.04
		Control	6.90-	1.33	**0.001
Weight control	Mindfulness therapy	ACT	1.53	0.18	*0.04
		Control	5.37-	1.27	**0.02
	control	ACT	6.90	1.33	**0.001
		Mindfulness	5.37	1.27	**0.02

\* P&lt; 0.05. \*\* P&lt; 0.001

therapy is greater than mindfulness therapy, this difference remained constant in the follow-up period. According to these results, the research hypothesis was confirmed; In other words, there is a difference between the effectiveness of acceptance and commitment-based therapy and mindfulness on increasing psychological well-being and weight control in people with type 2 diabetes.

## Discussion

The results showed that both acceptance and commitment therapy and mindfulness therapy were effective and efficient to increase psychological well-being and weight control. However, the effectiveness of acceptance and commitment therapy was greater than mindfulness therapy; this difference remained constant during the follow-up period; therefore, the research hypothesis was confirmed. Regarding the effectiveness of mindfulness therapy on psychological well-being, the results of the present study was in line with the findings of Hosseini *et al.* (22), Iturb *et al.* (31), Demehri *et al.* (32), Etefaghi *et al.* (33), Iturb *et al.* (31) and Dunn *et al.* (34). Explaining the effectiveness of mindfulness therapy on psychological well-being, it can be said that mindfulness therapy helps patients learn how to become aware of their physical feelings, thoughts and emotions (35), and indirectly reduce stress by adaptive responding to the signs and

symptoms of the disease (34). Doing mindfulness exercises promotes the growth of factors such as observation, non-judgmental, non-reactive, action with awareness and ultimately the development of psychological well-being, stress reduction and psychological symptoms (36). Indeed, as the mindfulness increases, so does the ability to stand back and observe states such as anxiety (37); As a result, one can free oneself from automatic behavioral patterns and no longer be controlled by states such as anxiety and fear through perception and re-perception; Rather, it can use the information arising from these states, be associated with emotions, and as a result, improve its psychological well-being (38). In other words, individuals who engage in negative rumination of symptoms while experiencing the effects of diabetes largely lose the ability to focus on present experiences with a non-judgmental perspective, mindfulness as a metacognitive variable helps regulate emotion by stopping conceptual processes, thereby increasing psychological well-being. In addition, according to the results of the present study, mindfulness increases weight control; Explaining this finding, it can be said that one of the characteristics of mindfulness therapy is that the client becomes familiar with the etiology of his disorders and its physical and psychological mechanism. This awareness reduces the level of anxiety and increases the level of focus on his conscious thoughts and desires, and finally enables the person to



decide not to use these strategies and their repetitive or ruminant strategies again to alleviate negative emotional states, especially anxiety (36). In addition, mindfulness meditation can be effective in reducing the frequency of overeating and thus lead to weight loss (34). Overweight and obese individuals do not experience a positive feeling about eating because of unconscious eating behaviors, and at the same time suffer from the negative consequences of these poor eating patterns and habits. This cycle helps keep obesity going. Just as changing attitudes and behavioral patterns of eating can affect the choice and amount of food consumed, and thus connect the person with the experience of eating and enjoying food. In other words, eating consciously can improve the experience of eating and enjoying food. In conscious eating, a person consciously pays attention to taste and composition while eating food and carefully monitors his emotions before, during and after eating. Also, this full attention separates eating from the practice of simply putting food in the mouth and swallowing it, and the person gradually separates himself from eating without being aware of his thoughts, feelings, and emotions, and this leads to weight loss. Regarding the effectiveness of acceptance and commitment-based therapy on psychological well-being, the results of the present study are in line with the findings of Hosseini *et al.* (22), KhosravaniShayan (39), BahramiAbdolmaleki *et al.* (40), Iturb *et al.* (31), and Aziz *et al.* (41). Regarding weight control, the results of the present study are consistent with the findings of Yaraghchi *et al.* (42), Ashrafi *et al.* (43), Iturb *et al.* (31) and Carl *et al.* (44). Explaining the effectiveness of acceptance and commitment-based therapy on psychological well-being, it can be stated that the acceptance and commitment approach leads to psychological flexibility in patients with type 2 diabetes, which leads to changes in patients' psychological well-being and quality of life (22). Acceptance and commitment therapy has some processes. One of the most important treatment techniques based on acceptance and commitment is to specify values and committed actions (45). Encouraging patients with type 2 diabetes to identify values and set goals, actions, and ultimately a commitment to take actions to achieve goals and move in the direction of values despite the

problems, while achieving goals and happiness, this group of patients get rid of the vicious cycle of negative emotions such as anxiety, stress, frustration and depression, which in turn exacerbate problems. In commitment and acceptance therapy, patients were trained to use their psychological resilience to face challenges. Patients with diabetes attending therapy sessions learned to accept their inner experiences (such as thoughts, emotions, and body feelings), without the need to defend themselves against them. They were taught that if they were open and receptive to their feelings, the upsetting and annoying factors would go away faster. In fact, by changing the way a person responds to problems, stress and tension are reduced, his avoidances are disappeared and accepted. In the therapy based on acceptance and commitment, improving the communication style, and increasing the enjoyable social experiences of patients with diabetes, are emphasized. Increasing pleasant experiences is one of the factors that increase patients' psychological well-being. In commitment and acceptance therapy, the mindfulness-based therapy approach increases the acceptance of inner experiences such as physiological thoughts, emotions, perceptions, and feelings that can reinforce and perpetuate many clinical dissatisfactions and problems. Commitment and acceptance therapy helps patients to contribute to psychological well-being by getting rid of thoughts and paying attention and being aware of the experiences that are currently going on. In addition, according to the results of the present study, acceptance and commitment-based therapy increases weight control; explaining this finding, it can be stated that in the therapy based on acceptance and commitment, it is believed that the thoughts are the product of a natural mind. What turns thoughts into beliefs is that one mixes them with the content of the thoughts; when a person acts according to the content of a thought, it means that eating is mixed with the content of that thought, and the result of this mixture is overeating, which is itself a model of experiential avoidance. Acceptance and commitment-based therapy, through cognitive-fault-based interventions, seeks to help clients not to submit to their own thoughts and mental rules, and instead, interact more effectively with the world in a way that directly experienced (43). Acceptance and commitment therapy teaches people to share their disturbing inner experiences while trying to

lose weight (such as feeling hungry, negative emotions, fatigue from activity and exercise, desire to eat, and instead of avoiding them, accept them and be open to them. They learn that any action to avoid or control these unwanted inner experiences is ineffective or even exacerbates them. Although eating relieves them in short term, but in the long run, the severity and impact of these experiences increase, and individuals must redouble their efforts to control them. Therefore, they learn to accept these experiences without any attempt to control or eliminate them. After that, this therapy focuses on identifying and internalizing the values and goals of a person's life, and by introducing committed action, commits the person to perform actions that are in line with values (such as health value), and goals (such as having proportionate weight). If a person has been eating to avoid thoughts and feelings until now, he is learning to eat for the sake of health. In addition, acceptance and commitment-based therapy by teaching mindfulness techniques helps clients meet their weight loss goals and eating behaviors when confronted with external and internal barriers (such as their annoying thoughts, feelings, desires, and physical emotions), and let them aware of it that leads to reduce unconscious eating behaviors and ultimately weight loss. The specificity of the study population to men with type 2 diabetes in Tehran, makes it necessary to be cautious in generalizing the results of the present study to women with diabetes, patients with other types of diabetes and patients living in other cities; Finally, due to the effectiveness of acceptance and commitment-based therapy and mindfulness on increasing psychological well-being and weight loss, it is recommended to use both treatments, especially acceptance and commitment-based therapy in reducing mental and physical problems in patients with type 2 diabetes.

## Conclusion

It can be concluded that, acceptance and commitment-based therapy is more effective treatment for patients with type 2 diabetes compared to mindfulness therapy.

In addition, behavioral change does not occur in the follow-up of therapy during following conditions. First, if individual does not find the necessary motivation in this field. Second, if the individuals do not understand the importance of the recommended behavior in managing his/her diabetes, and lastly if the individuals have not the necessary skills to create behavior. Acceptance and commitment-based therapy moves in these three areas; therefore, it is expected to have more lasting effects on individual behavior. Thus, using this method of treatment can help patients with diabetes to return to their normal lives and control the effects of diabetes and have greater psychological well-being and weight control.

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## Conflict of Interest

The authors declare that they have no conflict of interest.

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