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Acceptance and commitment therapy can reduce emotional eating behavior in Turkish adults: A randomized controlled trial

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ABSTRACT

Purpose: Emotional eating (EE) is a significant clinical feature of eating disorders. Acceptance and Commitment Therapy (ACT) is an effective treatment approach for eating disorders. However, the effectiveness of ACT on EE remains unclear. This study aims to develop a new ACT-based intervention and evaluate its effectiveness on EE.
Methods: Forty-five females participated and were randomly assigned to either the ACT group (n = 46) or the control group (n = 45). All participants completed validated measures of emotional eating, psychological flexibility, emotion regulation difficulty, and mindful eating at two points: baseline and post-treatment. At one-month follow-up, participants in the ACT group also completed the baseline measures.
Results: Post-intervention, EE and psychological inflexibility were significantly reduced, while psychological flexibility and mindful eating were significantly increased in the ACT group compared to the control. At follow-up, the ACT group continued to show significantly lower EE levels.
Conclusion: To date, only one study has investigated ACT's effectiveness in addressing EE, using a one-day workshop format, which was considered inadequate for developing acceptance and value clarification skills. This study is the first to adapt traditional ACT practices specifically for EE, with sufficient treatment duration. It is also the first to assess the intervention's impact on psychological flexibility. The results provide preliminary evidence of the potential of an ACT-based approach to reduce EE.
Level of evidence: Level I, Evidence obtained from at least one properly designed randomized controlled trial, systematic reviews, and meta-analyses; experimental studies.

1. Introduction

Emotional eating (EE), the urge to eat in response to emotional states rather than physical hunger, has been widely documented as a maladaptive emotion regulation strategy (Bongers & Jansen, 2016; Evers et al., 2010; Garaulet et al., 2012; Macht & Simons, 2000). It may offer temporary relief from distress but is associated with long-term risks such as obesity and eating disorders (Ganley, 1989; Konttinen et al., 2010; Lattimore, 2020). Difficulties in emotion regulation are consistently linked to increased vulnerability to EE and eating-related psychopathology (Moulton et al., 2015; Yurtsever & Sütçü, 2017), with individuals at risk struggling to identify, accept, and respond adaptively to emotional experiences (Barnhart et al., 2021; Braden et al., 2018). These challenges often lead to experiential avoidance and impulsive eating when no alternative regulation strategies are in place (Sairanen et al., 2017; Wolz et al., 2015). As such, interventions that promote emotional awareness, acceptance, and value-consistent behavior may be effective in reducing EE. Acceptance and Commitment Therapy (ACT), a third-wave behavioral approach, targets these very mechanisms by fostering psychological flexibility.

ACT is one of the third-wave cognitive behavioral therapies that target emotional avoidance and ineffective control strategies (Hayes & Pankey, 2002; Hayes & Pierson, 2005). Previous studies have examined the effectiveness of ACT and mindfulness-based interventions for treating eating disorders and promoting weight loss (Fogelkvist et al., 2020; Lattimore, 2020; Warren et al., 2017; Weineland et al., 2012; Yaraghchi et al., 2019). To better understand why ACT may be beneficial in this context, it is important to consider how psychological inflexibility contributes to EE through several mechanisms. First, it often involves experiential avoidance, where individuals attempt to suppress or escape

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negative emotions by using an approach that can sustain EE and increase the risk of obesity and related problems (Finger et al., 2020; Manlick et al., 2013). Second, individuals with high psychological inflexibility may experience cognitive fusion, becoming entangled with distressing thoughts and emotions, which can lead to impulsive eating behaviors. ACT addresses this by promoting cognitive defusion techniques, enabling individuals to observe their thoughts without reacting automatically (Anna et al., 2022; Finger et al., 2020). Third, low mindfulness or weak contact with the present moment may further intensify EE. ACT interventions emphasize mindfulness to foster present-moment awareness and more intentional eating choices (Finger et al., 2020; Ratcliffe, 2024). Given these mechanisms, ACT may reduce EE by increasing emotional awareness and acceptance, allowing individuals to break the link between distress and eating (Kudlek et al., 2023; Sudana & Bintari, 2019). Additionally, ACT promotes the use of alternative strategies, including mindfulness, acceptance, and values-based action, to replace maladaptive coping. Participants in ACT-based programs have reported using preparation and substitution techniques to manage emotional triggers more effectively (Frayn et al., 2020; Kudlek et al., 2023). Finally, clarifying personal values and committing to value-driven behaviors may decrease reliance on food as an emotional regulator, contributing to long-term behavior change (Frayn et al., 2020). However, only one study has specifically examined ACT-EE (Frayn et al., 2020). This current study is distinct from the earlier one (Frayn et al., 2020).

First, unlike previous studies using a single-session format (e.g., Frayn et al., 2020), this protocol implemented acceptance and values-based practices across three sessions. Second, all ACT components and metaphors were specifically adapted to target EE-related themes uniquely. Third, this is the first ACT study to assess changes in psychological flexibility as an outcome in the context of EE. Fourth, the intervention was designed for individuals across the weight spectrum, not only those with obesity, emphasizing sustainable dietary habits rather than weight loss. Finally, this is also the first ACT-based EE intervention conducted in a Turkish sample. Besides, prior interventions have used CBT and DBT to address EE (Glisenti & Strodl, 2012; Öz & Dönmez, 2023). While these approaches focus on modifying dysfunctional cognitions (CBT) or developing skills for emotional regulation and distress tolerance (DBT), ACT adopts a distinct theoretical stance. Rather than aiming to reduce or control aversive internal experiences, ACT promotes psychological flexibility by encouraging individuals to accept such experiences without judgment and to commit to value-consistent behaviors, even in the presence of psychological discomfort. In the context of EE, this distinction is particularly relevant. Attempts to avoid or suppress negative emotions often underlie maladaptive eating behaviors. By helping individuals acknowledge emotional experiences without engaging in avoidance or control strategies, ACT facilitates more adaptive responses, such as choosing behaviors aligned with personally meaningful goals, such as health, vitality, and self-care (Hayes & Fletcher, 2005). Given this context, the current study aimed to develop an ACT-based intervention and evaluate its effectiveness on EE. The primary hypothesis was that the ACT group would score lower on EE than the control group in the post-test. The secondary hypothesis was that, compared to the control group, the ACT group would show improvements in psychological flexibility, mindful eating, and emotion regulation difficulties.

2. Methods

This study uses a randomized controlled group design with a pre-test, a post-test, and a one-month follow-up test. Participants provided written informed consent.

2.1. Participants

Participants were recruited from Ibn Haldun University Psychotherapy and Research Center. A total of 91 participants (46 in the ACT group, 45 in the control group) were randomized in the study. The sample size for the study was determined using the G*Power 3.1.9.4 software program (Faul et al., 2007). The G*Power software automatically provides the conventional effect size values suggested by Cohen (Kang, 2021). For a two-way mixed repeated measures ANOVA, the significance level was set at.05, the effect size at.25, and the power at.95. According to the results of the power analysis, a total of at least 36 participants (18 in each group) were required. The final sample size exceeded this threshold, indicating sufficient statistical power to detect medium-sized effects (see Fig. 1). Inclusion criteria were: (a) aged $\geq$18, (b) scored $>$11 or above on the Emotional Eating Scale. Exclusion criteria were: (a) meeting DSM-5 criteria for schizophrenia, schizophreniform disorder, schizoaffective disorder, and delusional disorder, (b) being in an active manic episode, (c) possessing a mental disorder that interferes with completing measures or understanding the exercises conducted during sessions, and (d) having a severe chronic illness that impacts appetite and weight status.

The literature indicates that EE is not limited to overweight or obese individuals, as it is also prevalent among those with a normal weight (Lattimore, 2020). Therefore, body mass index (BMI) was not used as an exclusion criterion in the present study. Pi-Sunyer (2000) defines individuals with a BMI between 19 and 24.9 kg/m^2 as normal weight, those with a BMI between 25 and 29.9 kg/m^2 as overweight, and those with a BMI of $\geq$30 kg/m^2 as obese. This classification was used in the present study. Detailed demographic information for participants who attended and completed the interventions is available in results section.

2.2. Randomization and procedure

It was announced that an online group therapy for emotional eating would be held at the Ibn Haldun University Psychotherapy and Research Center. The announcement was disseminated through the university's official website, the center's website, and its social media platforms. Informational flyers were also prepared and shared online, describing the study and inviting individuals who frequently eat in response to negative emotions to participate. The announcement included a registration link and the contact information of the center's administrative office.

At the initial stage, to avoid the issue of participants not completing the questionnaires due to the high number of items, only the sociodemographic form and the Emotional Eating Scale were administered. This step took approximately 6 min for participants to complete, and 139 individuals (131 women, 8 men) expressed their willingness to participate in the program. At this point, participants were informed that their eligibility would be assessed based on inclusion criteria, and those deemed suitable would proceed to the pre-test phase. The applications were evaluated by the researchers according to inclusion and exclusion criteria. Fifteen individuals did not meet the inclusion criteria: four were excluded for being under the age of 18, and eleven were excluded due to having low emotional eating scores that did not meet the required threshold. Individuals whose applications were not approved were contacted via email. They were referred to individual therapy at Ibn Haldun University Psychotherapy and Research Center. The remaining 124 individuals were invited to participate in the pre-test phase, and baseline assessments were distributed. However, 18 participants did not complete the baseline assessments due to time conflicts, and 15 participants withdrew because they were no longer interested in participating in the study. As a result, 91 individuals completed the baseline assessments. From the 91 approved applicants, 46 were randomly assigned to the ACT group and the remaining 45 to the control group via simple random sampling using a computerized random number generator in SPSS (Arifin, 2012). There were no significant differences between the two groups across any of the variables assessed.

In the ACT group, ten participants dropped out before the intervention began, and 30 attended three or more sessions. Ultimately, 24

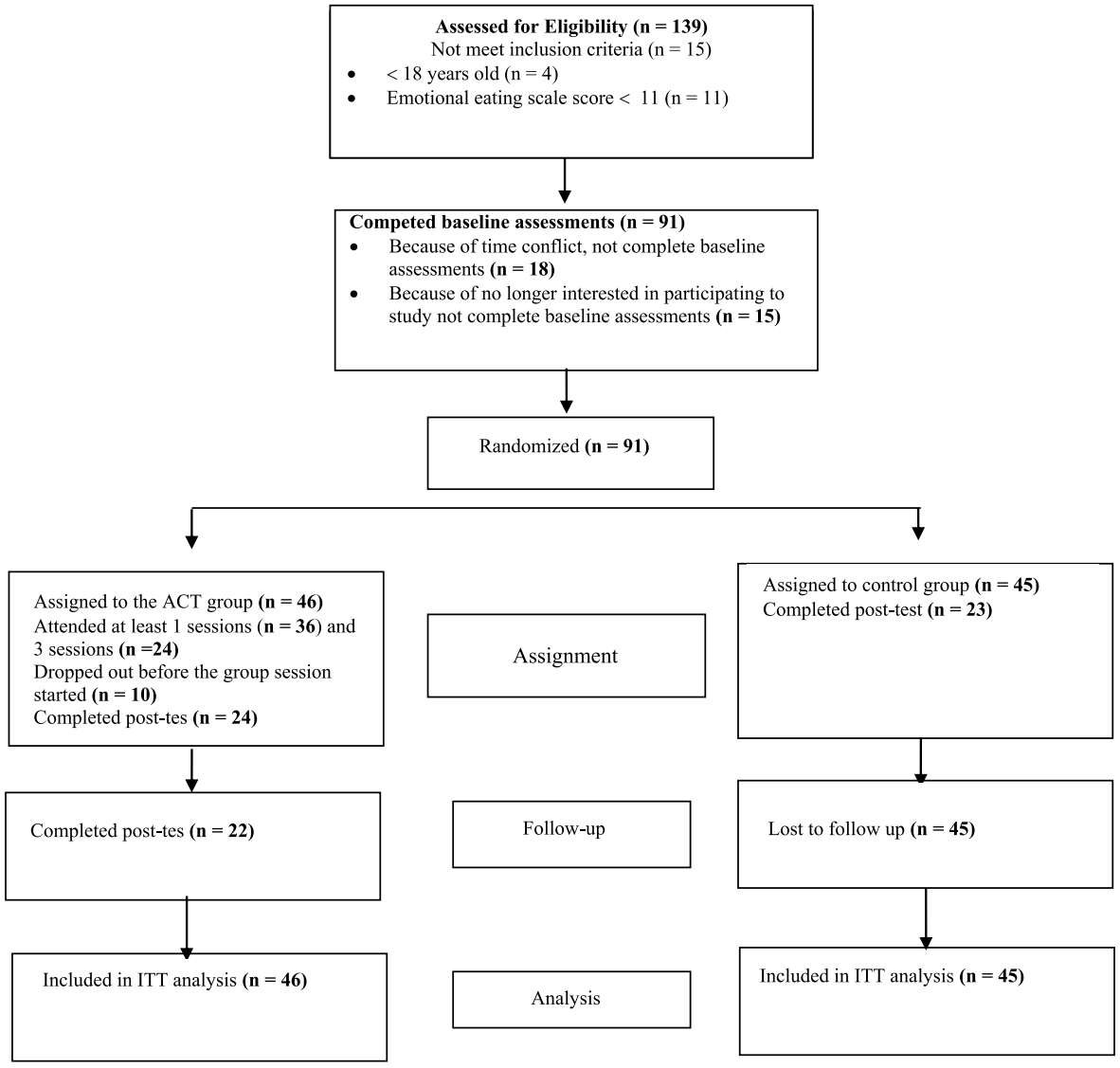

Fig. 1. Participant flow diagram.

participants in the ACT group and 23 in the control group completed the post-test assessments. At follow-up, 22 participants were lost to follow-up in the ACT group. The pre-test data were collected in September 2021, followed by the post-test data immediately after the six-week intervention period. The follow-up data were collected one month later, in December 2021. Intention-to-treat (ITT) analyses were conducted with all randomized participants: 46 in the ACT group and 45 in the control group.

At the end, 22 participants in the ACT group completed a one-month follow-up. Although a one-month follow-up was conducted with participants in the ACT group, no follow-up data were collected from the control group. This decision was based on ethical and practical considerations. The study was conducted at a university-affiliated psychotherapy center that provides psychological services to individuals from various regions. Since the control group did not receive any intervention and participants had voluntarily applied to the center seeking psychological support, it was not ethically appropriate to ask them to wait without receiving any assistance for an extended period. Therefore, to meet ethical obligations, the control group was offered a one-day ACT workshop (comprising four 90-min sessions) immediately after the post-test assessment. Because this workshop was delivered directly following the post-test, no follow-up data were collected from the control group.

At the end of the study, the primary analysis was an intent-to-treat (ITT) approach, which included all participants who were randomized.

2.3. Measures

2.3.1. Emotional eating

The Emotional Eater Questionnaire (EEQ; Garaulet et al., 2012) is a 10-item questionnaire that measures the function of the relation between food intake and emotions using three subscales: Disinhibition, type of food, and guilt. These subscales have good internal consistency (Cronbach's alpha = .77 for the "Disinhibition",.65 for the "Type of food", and.61 for the "Guilt". Higher scores indicate greater EE (all possible subscale ranges: 0–3). The total score ranges from 0 to 30, with higher scores indicating greater emotional eating. The scale score ranges are as follows: 0–5 (non-emotional eater), 6–10 (low-level emotional eater), 11–20 (emotional eater), and 21–30 (highly emotional eater). The Turkish reliability and validity of the scale was conducted by (Arslantaş et al., 2020) with university students (Cronbach's alpha = .84).

2.4. Psychological flexibility

The Acceptance and Action Questionnaire- Version 2 (AAQ-2; Bond et al., 2011) is a 7-item questionnaire that measures experiential avoidance and psychological inflexibility. The total score ranges from 7 to 49. The Turkish reliability and validity of the scale were conducted by (Yavuz et al., 2016) (Cronbach's alpha = .84). Higher scores indicate greater experiential avoidance and psychological inflexibility.

2.5. Difficulty in emotion regulation

The Difficulty in Emotion Regulation Scale (DERS; Bjureberg et al., 2016) is 16 item questionnaire that measures the level of difficulty in emotion regulation using five subscales: non-acceptance of negative emotions, inability to engage in goal-directed behaviors when distressed, difficulties controlling impulsive behaviors when distressed, limited access to emotion regulation strategies perceived as effective, and lack of emotional clarity. This scale is a five-point Likert scale from 1 (*almost never*) to 5 (*almost always*). The Turkish reliability and validity of the scale were conducted by Yiğit & Yiğit, 2017 (Cronbach's alpha = .88). The total score ranges from 16 to 80. Higher scores indicate greater difficulty in emotion regulation.

2.6. Mindful eating questionnaire

The Mindful Eating Questionnaire (MEQ; Framson et al., 2009) is a 30-item questionnaire that measures the level of mindful eating using five subscales: Disinhibition, awareness, external cues, emotional response, and distraction. The Turkish reliability and validity of the scale were conducted by (Köse et al., 2016) (Cronbach's alpha = .73). This scale consists of 30 items with seven subscales: Disinhibition, emotional eating, control of eating, eating discipline, mindfulness, interference, and focusing. The total score ranges from 30 to 150. Higher scores indicate a greater level of mindful eating.

2.7. Intervention

The main purpose of ACT is to increase psychological flexibility through six core ACT processes: Defusion, acceptance, contact with the present moment, values, committed action, and self as context (Hayes & Fletcher, 2005). The current treatment protocol is designed to improve psychological flexibility in six once-weekly, 90-min group sessions. In addition, there is a focus on eating awareness and self-compassion, which are important in the context of EE. A detailed outline of the sessions has been provided in Table 1.

Table 1
Outline of ACT-based intervention.

Session 1: Values and awareness of control strategies.	**1. Aim:** Gaining awareness of values, revealing values; realizing that control is the problem, not the solution; and doing EE formulation. Practice: Illusion of control; compass metaphor; chocolate cake metaphor; behavior analysis worksheet Home practice: Life compass worksheet
Session 2: Creative hopelessness and values.	**2. Aim:** Psychoeducation; examining how avoidance and safety behaviors maintain and increase EE; realizing that previously tried solutions to difficulties and pain fail, creative hopelessness; determining values-oriented actions. **Practice:** MasterChef on the ship metaphor; the sweet spot **Home practice:** Value-based goal-setting form.
Session 3: Acceptance, values, and contact with the present moment.	**3. Aim:** Increasing body awareness; distinguishing the difference between the hunger-fullness signal in the body and the emotion signal; making room and acceptance practices **Practice:** Acceptance of emotions worksheet; urge surfing; clipboard metaphor **Home practice:** Making room worksheets.
Session 4: Defusion, acceptance, and contact with the present moment.	**4. Aim:** Moving from cognitive fusion to defusion; realizing how controlling thoughts prevent living in line with values; making room for painful emotions and thoughts; increasing mindfulness; mindful eating **Practice:** Name the story; notice meditation on the snacks I eat most frequently **Home practice:** Getting hooked worksheet.
Session 5: Acceptance, self-compassion, self as context, and contact with the present moment".	**5. Aim:** Increasing awareness of the self as context; self-compassion **Practice:** Sky and weather metaphor, three chairs exercise **Home practice:** Continue the mindfulness exercises, and when doing these exercises, pay attention to who is noticing them.
Session 6: Matrix, contact with the present moment, committed action, and relapse prevention.	**6. Aim:** Maintaining value-oriented behaviors by making room for painful emotions and thoughts; sharing group experiences; summary of EE and relapse prevention **Practice:** Eightieth birthday metaphor; matrix; relapse prevention exercise

3. Therapist

H.T.K, a member of the Turkish Association for Contextual Sciences and Psychotherapies and an educator providing ACT training in the country, supervised the group therapy, with B.K. delivering the group therapy under his supervision. B.K is an experienced therapist trained in CBT and ACT, who applied a unique, structured ACT-based treatment protocol specifically developed for EE in this study.

3.1. Data analysis

All analyses were conducted in SPSS version 22. The primary analysis was an intent-to-treat (ITT) approach, including all randomized participants. Data suitability for parametric testing was analyzed. Independent sample t-tests and Pearson chi-square tests were conducted to test baseline differences between ACT groups and control groups. A two-way mixed repeated measures ANOVA was conducted to examine the differences between pre-test and post-test scores in the ACT and control groups on outcome variables. For the effect size, the partial eta-squared value was calculated.

3.2. Ethical considerations

All procedures involving human subjects were approved by the Ethics Committee of Ibn Haldun University (decision number 2021/07-4). Written informed consent was obtained from all subjects.

4. Results

4.1. Baseline characteristics

The research included 91 participants in total, consisting of 86 females and 5 males. Among them, 46 participants (including 44 females and 2 males) were assigned to the ACT group, and 45 participants (including 42 females and 3 males) to the control group. There were no significant differences in baseline characteristics (Table 2).

There were no significant differences between groups at baseline regarding dependent variables (Table 3), indicating that randomization was overall successful. Additionally, the internal consistency of the measures was acceptable to excellent, with Cronbach's α coefficients

Table 2
Baseline characteristics.

	ACT (n = 46) M (SD)	Control (n = 45) M (SD)	t (p)
Age	30.54 (9.35)	29.44 (7.35)	.624 (.534)
BMI	28.18 (5.81)	27.73 (7.35)	.396 (.693)
	n (%)	**n (%)**	**χ2 (p)**
Gender			
Male	2 (4.3)	3 (6.7)	.236 ($627^{\chi 2}$)
Female	44 (95.7)	42 (93.3)	
Marital status			
Married	23 (50.0)	24 (53.3)	2.028 ($.402^{F}$)
Single	23 (50.0)	19 (42.2)	
Divorced	0 (0)	2 (4.4)	
Widow	0 (0)	0 (0)	
Education			
Primary school graduate	1 (2.2)	1 (2.2)	2.830 ($.635^{F}$)
Secondary school graduate	0 (0)	0 (0)	
High school graduate	8 (17.4)	6 (13.3)	
University graduate	23 (50.0)	24 (53.3)	
Postgraduate	4 (8.7)	8 (17.8)	
Undergraduate	10 (21.7)	6 (13.3)	
Previous request for mental health care			
Yes	35 (76.1)	27 (60.0)	2.711 ($.100^{\chi 2}$)
No	11 (23.9)	18 (40.0)	
Doing physical activity			
Yes	7 (15.2)	14 (31.1)	3.237 ($.072\ ^{\chi 2}$)
No	39 (84.8)	31 (68.9)	
Diet trial			
Never been on a diet	3 (6.5)	2 (4.4)	3.849 ($.438^{F}$)
1–3 times	16 (34.8)	11 (24.4)	
4–6 times	5 (10.9)	9 (20.0)	
7–10 times	4 (8.7)	8 (17.8)	
More than 10	18 (39.1)	15 (33.3)	
Diet success			
Never	9 (19.6)	4 (8.9)	2.616 ($.654^{F}$)
Seldom	15 (32.6)	15 (33.3)	
Sometimes	17 (37.0)	19 (42.2)	
Often	3 (6.5)	5 (11.1)	
Always	0 (0)	0 (0)	
Never been on a diet	2 (4.3)	2 (4.4)	

BMI = Body mass index, χ2 = Pearson chi-square test, F = Fisher exact test, t = independent sample *t*-test.

Table 3
Comparing groups regarding baseline for outcome variables.

	Cronbach's α (Pre-test)	ACT (n = 46) M (SD)	Control (n = 45) M (SD)	t	p
EEQ	.81	19.89 (4.76)	19.87 (5.61)	.023	.982
AAQ	.90	31.35 (9.40)	30.73 (10.42)	.296	.768
DERS	.94	34.50 (15.21)	33.71 (15.45)	.245	.807
MEQ	.68	84.65 (10.10)	82.16 (10.69)	1.145	.255

Abbreviation: t = independent sample *t*-test, EEQ = Emotional Eater Questionnaire, AAQ = Acceptance and Action Questionnaire- Version 2, DERS = Difficulty in Emotion Regulation Scale, MEQ = Mindful Eating Questionnaire.

ranging from.68 (MEQ) to.94 (DERS), supporting the reliability of the instruments used in this study (see Table 3).

None of the baseline measures differed significantly across BMI categories (all p > .05). While descriptive trends suggested slightly higher emotional eating scores in the obese group, these differences did not reach statistical significance. These findings indicate that BMI-related differences are unlikely to have influenced the observed treatment effects (see Table 4).

4.2. Intervention effects on outcome variables

Individual-level trajectories for all significant outcomes are illustrated using spaghetti plots (see Fig. 2).

Table 4
Baseline comparisons of emotional eating and psychological measures across BMI categories.

	Normal Weight (n = 27) M (SD)	Overweight (n = 35) M (SD)	Obese (n = 29) M (SD)	F	p
EEQ	18.96 (5.37)	19.29 (5.17)	21.45 (4.78)	2.038	.136
AAQ	29.96 (11.10)	30.97 (9.86)	32.14 (8.84)	.336	.715
DERS	35.96 (17.63)	31.09 (15.79)	36.03 (11.73)	1.121	.330
MEQ	83.52 (10.02)	86.03 (11.45)	80.17 (8.75)	2.599	.080

Abbreviation: p = One Way Anova, EEQ = Emotional Eater Questionnaire, AAQ = Acceptance and Action Questionnaire- Version 2, DERS = Difficulty in Emotion Regulation Scale, MEQ = Mindful Eating Questionnaire, BMI categories were defined according to Pi-Sunyer (2000): 19.0–24.9 kg/m^2 = normal weight; 25.0–29.9 kg/m^2 = overweight; ≥30.0 kg/m^2 = obese.

The results showed that the main effect of time on EE was significant, F (2, 178) = 16.09, p < .001, η2 = .153. The EE scores in both the ACT and control groups were higher in the pre-test (ACT Group: M = 19.89, SD = 4.76; Control Group: M = 19.87, SD = 5.61) than in the post-test (ACT Group: M = 16.17, SD = 5.05; Control Group: M = 19.60, SD = 5.76). As expected, the Group × Time interaction was also significant, F (2, 178) = 12.43, p < .001, η2 = .123. This indicates that the change in EE scores from pre-test to post-test was greater in the ACT group than in the control group, showing that the ACT group improved more over time. Post hoc Bonferroni comparisons confirmed significant reductions between pre- and post-test ($p < .001$) and between pre-test and follow-up ($p < .001$), but not between post-test and follow-up ($p = .730$), indicating sustained improvement. (see Table 5 and Fig. 3A).

A significant Group × Time interaction was also found for mindful eating, $F\,(2, 178) = 13.707$, $p < .001$, $\eta^2 = .133$. Participants in the ACT group demonstrated increased MEQ scores from pre-test (M = 84.65, SD = 10.10) to post-test (M = 91.09, SD = 10.74) and follow-up (M = 92.50, SD = 11.82), while the control group showed no notable change across time. Bonferroni-adjusted comparisons indicated significant improvements from pre-test to post-test ($p = .006$) and from pre-test to follow-up ($p = .003$), with no difference between post-test and follow-up ($p = .798$) (see Table 5 and Fig. 3D).

In contrast, no significant Group × Time interaction effects were observed for AAQ, $F\,(2, 178) = 3.195$, $p = .066$, $\eta^2 = .035$, or for DERS, $F\,(2, 178) = 2.146$, $p = .137$, $\eta^2 = .024$. Additionally, neither the main effects of group nor time reached significance for these variables. These findings suggest that while ACT significantly improved behavioral outcomes related to eating, such as reducing emotional eating and enhancing mindful eating, its effects on more abstract psychological constructs like experiential avoidance and emotion regulation were not statistically significant within the time frame assessed (see Table 5, Fig. 3B and 3C).

5. Discussion

To our knowledge, this study is the first randomized controlled trial evaluating the effectiveness of a novel online ACT group intervention that aims to reduce EE and to improve ME and PF. The findings reflect between-group differences, indicating that Group × Time interactions demonstrated that the EE-focused ACT intervention resulted in a greater reduction in EE in the ACT group compared to the control group. The same analysis revealed that significant increases in MEQ scores were achieved in the intervention group after the EE-focused ACT intervention. Although there was a decrease in AAQ and DERS scores for the intervention group, this difference was not statistically significant. Additionally, there was a persistent decrease in emotional eating reported among the ACT group during the one-month follow-up after the intervention.

In the current study, most of the participants were women, so gender-related interpretations are not possible. However, it is supported

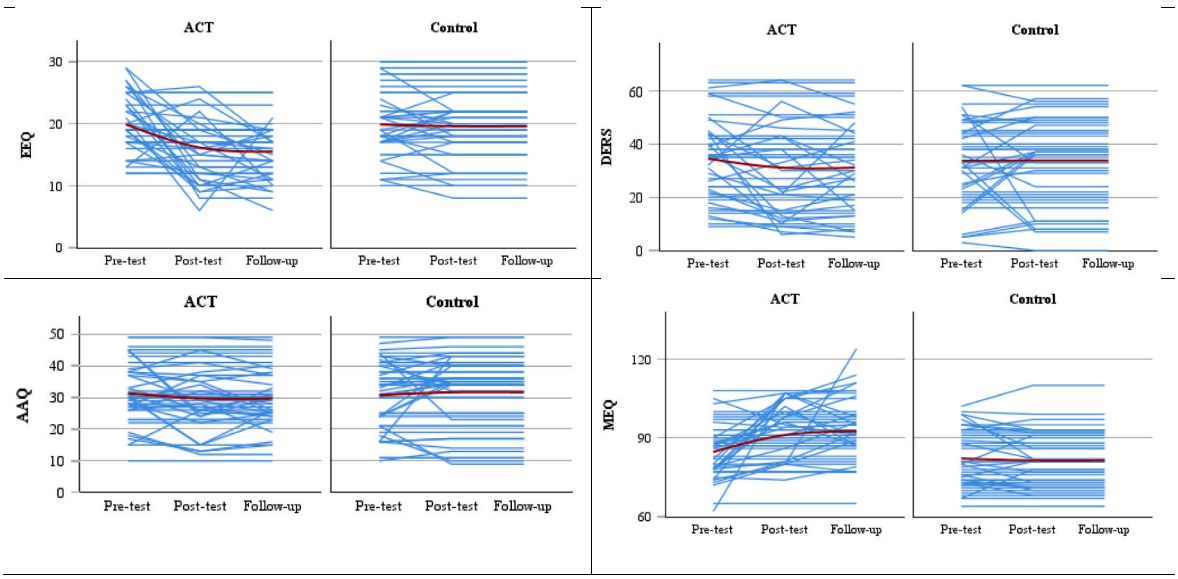

Fig. 2. Spaghetti plots of outcomes.
Note. N = 91 (ACT = 46, Control = 45). Blue lines represent individual participant trajectories from pre-test to post-test and one-month follow-up. Red lines indicate the group mean trajectories. The distribution of the lines illustrates the heterogeneity in participant responses over time.

Table 5
Results of pre-test and post-test measures, and effectiveness of the ACT compared to the control group.

		Pre-test measures[1]		Post-test measures[2]		Follow-up measures[3]		Group × Time interaction*			Other p-values	
		M	SD	M	SD	M	SD	df	p	n^2	Group	Time
ITT Analysis **(n = 91)**	**EEQ**[a]											
	ACT	19.89	4.76	16.17	5.05	15.50	4.63	12.431	<.001	.123	.012	<.001
	Control	19.87	5.61	19.60	5.76	19.60	5.76					
	AAQ[b]											
	ACT	31.35	9.40	29.74	10.16	29.70	9.39	1.284	.066	.035	.597	.673
	Control	30.73	10.42	31.64	10.93	31.64	10.93					
	DERS[c]											
	ACT	34.50	15.21	31.13	17.27	31.15	16.50	1.383	.137	.024	.631	.156
	Control	33.71	15.45	33.82	15.77	33.82	15.77					
	MEQ[d]											
	ACT	84.65	10.10	91.09	10.74	92.50	11.82	1.567	<.001	.133	<.001	<.001
	Control	82.16	10.69	81.47	10.50	81.47	10.50					
Completer Analysis **(n = 45)**	**EEQ**											
	ACT	21.67	4.68	14.54	5.35	–	–	14.889	<.001	.257	–	<.001
	Control	19.33	3.41	18.86	3.53	–	–					
	AAQ											
	ACT	31.50	8.98	28.42	10.30	–	–	2.674	.109	.059	–	.583
	Control	29.62	11.90	31.14	12.90	–	–					
	DERS											
	ACT	34.25	13.79	27.79	17.22	–	–	2.531	.119	.056	–	.190
	Control	31.67	18.41	32.24	19.02	–	–					
	MEQ											
	ACT	82.21	9.94	94.54	10.58	–	–	20.767	<.001	0326	–	.002
	Control	83.29	10.10	81.48	8.81	–	–					

Abbreviation: n^2 = effect size, df = Degrees of freedom, EEQ = Emotional Eater Questionnaire, AAQ = Acceptance and Action Questionnaire- Version 2, DERS = Difficulty in Emotion Regulation Scale, MEQ = Mindful Eating Questionnaire.
The Intention-to-Treat (ITT) analysis includes all randomized participants, with missing post-test data imputed using the Last Observation Carried Forward (LOCF) method.
The Completer analysis includes only participants who completed both pre- and post-assessments, without any imputation, and attended at least three of the six ACT sessions in the intervention group.
* P-values of group by time interaction derived from two-way mixed repeated measures ANOVA.
A Bonferroni adjustment was applied for multiple comparisons.
a: 1 > 2, $p < .001$; 1 > 3, $p < .001$; 2 = 3, $p = .730$.
b: 1 = 2, $p = 1.000$; 1 = 3, $p = 1.000$; 2 = 3, $p = 1.000$.
c: 1 = 2, $p = .442$; 1 = 3, $p = .455$; 2 = 3, $p = 1.000$.
d: 1 < 2, $p = .006$; 1 < 3, $p = .003$; 2 = 3, $p = .798$.

that women participate more often in eating-related studies than men. This could be due to three factors. First, EE is higher in women (Arslantaş et al., 2021; Bemanian et al., 2021; Konttinen et al., 2010; Soylu et al., 2021; Spoor et al., 2007; Van Strien et al., 2012). Second, societal expectations of beauty for women (Arslantaş et al., 2021) may be one of the reasons why women show greater interest in these studies

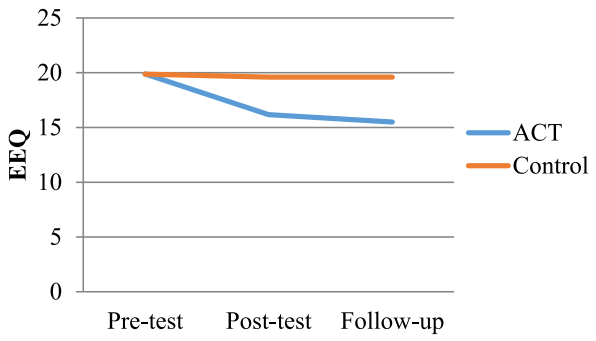

Fig. 3A. Comparing conditions over time on EEQ.

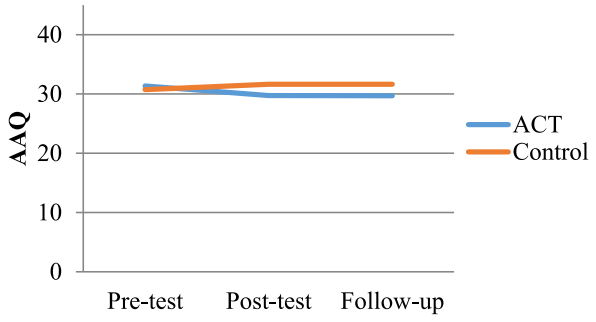

Fig. 3B. Comparing conditions over time on AAQ.

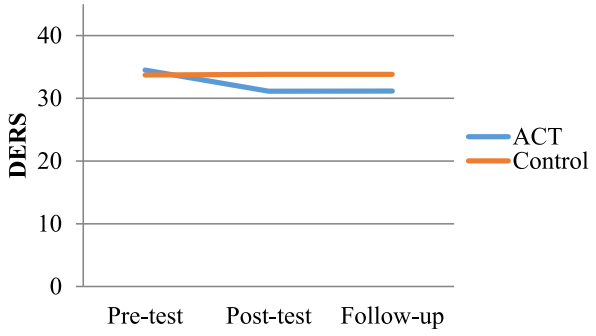

Fig. 3C. Comparing conditions over time on DERS.

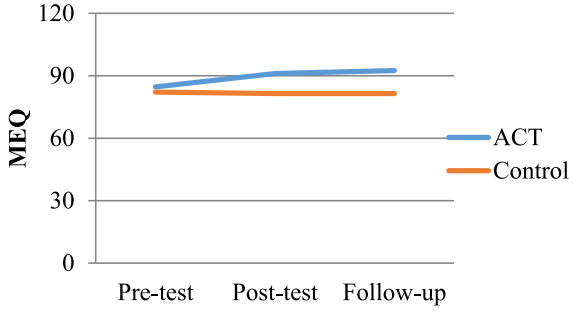

Fig. 3D. Comparing conditions over time on MEQ.

(Alberts et al., 2012; Daubenmier et al., 2011; Fogelkvist et al., 2020; Palmeira et al., 2019). Third, it could relate to Turkish women's openness and willingness to express themselves and share their experiences.

When EE is examined regarding BMI, studies differ. Some previous studies state EE is more common in people with a high BMI (Blair et al., 1990; Braden et al., 2018; Dohle et al., 2014; Jones et al., 2019; Van Strien et al., 2012). Similarly, EE has been identified in individuals who have a normal weight (Frayn et al., 2018). The present study supports this conclusion. Based on BMI, in the current study, 27 participants fell into the "normal weight" range, 35 were within the "overweight" range, and 29 were in the "obese" range. It could be related to the following factors identified among individuals with EE but who have a normal BMI: some compensatory behaviors (Frayn et al., 2018), higher rates of physical activity (Dohle et al., 2014), and fasting, vomiting, or restricted eating (Lepage et al., 2008).

ACT was found to be successful in reducing EE in the current study. These results are consistent with previous research (Frayn et al., 2020). Additionally, the ACT group reported significant reductions in EE at one-month follow-up. However, the previous study failed to produce improvements at the three-month follow-up (Frayn et al., 2020). It could be related to the fact that a one-day study may be insufficient to improve ACT components, including acceptance, value-oriented action, and contact with the present moment (Frayn et al., 2020). The duration of the treatment protocol designed in the present study is adequate for developing these skills. There is limited evidence to support the efficacy of ACT in reducing EE. However, studies have indicated that increasing mindfulness and non-judgmental awareness of the present moment may have a positive impact on EE (Lattimore, 2020; Levoy et al., 2017). As individuals' mindfulness and acceptance skills improved with the ACT intervention, their value-oriented actions increased. As a result, there was a reduction in EE and a significant increase in mindful eating, as previous studies showed (Alberts et al., 2010, 2012; Dalen et al., 2010; Daubenmier et al., 2011; Lattimore, 2020).

EE is often considered a reaction to negative emotional experiences in the absence of physiological hunger. However, not only negative emotions but also positive emotions affect eating behavior (Bongers & Jansen, 2016; Braden et al., 2018; Cardi et al., 2015; Moynihan et al., 2015; Van Strien et al., 2013). In the current study, some participants also reported EE in the absence of any adverse emotional states. Therefore, it is recommended to examine the relationship between EE and positive emotions and to enhance the intervention content in this domain.

The present study was the first to examine the effect of ACT for EE on PF. PF is an essential part of ACT (Bond et al., 2011). It involves the ability to openly experience one's negative thoughts and emotions without judgment, while also continuing to engage in behaviors that are consistent with one's values even in the presence of psychological discomfort (Bond et al., 2011). This can be attained by reacting mindfully to experiences rather than making direct adjustments to thoughts and emotions (Ciarrochi et al., 2010). Previous studies have identified the impact of ACT on PF (Deval et al., 2017; Fledderus et al., 2013; Lloyd et al., 2013; Wersebe et al., 2018). Earlier studies have shown that higher psychological inflexibility (PI) is associated with eating disorders (Ganson, 2023; Koushiou et al., 2021; Merwin et al., 2010).

Common measures of experiential avoidance include the AAQ-II (Bond et al., 2011) and the Multidimensional Experiential Avoidance Questionnaire (MEAQ) (Gámez et al., 2011). The AAQ-II is commonly conceptualized as a measure of psychological flexibility, while the MEAQ aims to assess a broad range of experiential avoidance behaviors. However, some studies suggest that while the MEAQ effectively captures experiential avoidance, the AAQ-II may primarily reflect neuroticism or general distress (Rochefort et al., 2018). In light of these concerns, although a decrease in AAQ-II scores was observed in the current study, it did not reach statistical significance. Future research may consider using more process-specific measures, such as the MEAQ, to further clarify intervention effects.

The effectiveness of ACT on emotion regulation has been previously examined (Sadeghnezhad et al., 2020; Spidel et al., 2018; Yaraghchi et al., 2019). In the present study, participants in the ACT group exhibited a decrease in emotion dysregulation scores, although this change did not reach statistical significance. Earlier research has identified a strong association between emotion regulation difficulties and maladaptive eating behaviors, including emotional eating (Barnhart et al., 2021; Brockmeyer et al., 2014; Karaoğlu & Erzi, 2019; Lavender & Anderson, 2010; Yurtsever & Sütçü, 2017). One possible explanation for the lack of statistical significance in the current study may relate to the conceptual differences between traditional emotion regulation approaches and ACT. Rather than aiming to reduce or control emotional experiences, ACT emphasizes psychological acceptance and value-consistent behavior in the presence of distress (Blackledge & Hayes, 2001). This process-oriented approach may influence emotion regulation in more subtle or delayed ways, which may not be fully captured within the study's time frame or sample size.

To the best of our knowledge, this is the first study in Turkey to develop and test an ACT-based intervention specifically targeting emotional eating. Although ACT interventions have previously been adapted to address a variety of psychological problems within Turkish populations, such as smoking cessation (Bal, Çakmak, Yılmaz, Tamam, & ve Karaytuğ, 2020), trauma-related symptoms (Gülay & Uysal, 2020), and psychosis (Yıldız, 2019), emotional eating has not previously been the focus of an ACT-based intervention. Additionally, prior Turkish studies have explored the associations between core ACT processes, such as psychological flexibility, and constructs like meaning in life (Demirci-Seyerk & Ersanlı, 2017), persecutory delusions (Burhan & Şafak, 2019), and burnout (Toprak et al., 2020), yet without direct intervention. The present study fills this gap by introducing a culturally adapted ACT protocol designed to improve emotion regulation and promote psychological flexibility in individuals with elevated emotional eating. This context-specific development not only contributes to the ACT literature in non-Western settings but also provides a foundation for future culturally sensitive interventions in eating-related problems.

The present findings suggest that an ACT-based intervention, when culturally adapted, may offer clinically meaningful benefits for individuals experiencing elevated emotional eating. While ACT's core processes are theoretically transdiagnostic and thus applicable across diverse settings, the effectiveness observed in this study may be partly attributed to the integration of culturally relevant materials and examples. Consequently, the generalizability of these results to other populations remains an open question. Future studies should examine whether similar outcomes can be replicated in different cultural and clinical contexts, thereby clarifying the extent to which these findings reflect setting-specific effects or broader therapeutic mechanisms.

5.1. Limitations and future directions

There are some limitations regarding the study's results. First, although intention-to-treat (ITT) analyses were employed using the Last Observation Carried Forward (LOCF) method to address missing post-test data, a substantial proportion of participants did not engage meaningfully with the intervention. Only those who attended at least three of the six ACT sessions were considered treatment completers, although all randomized participants were retained in the ITT analysis. Various contextual factors may have contributed to this attrition, including professional or caregiving responsibilities (e.g., teachers with limited availability, mothers needing to accompany their children), as well as discomfort with group-based therapy formats. Second, although male participants were included in the ITT analysis due to initial randomization, none of the men assigned to the ACT group ultimately received the intervention. All withdrew before attending any sessions. While their inclusion was consistent with ITT principles, their lack of treatment exposure may have attenuated the observed effects and introduced additional variability in outcome data. Third, the sample was composed entirely of adults who identified as female or were functionally retained as such in the analysis. Therefore, the findings cannot be generalized to males or more gender-diverse populations. Fourth, follow-up data were collected only from the ACT group. Due to ethical and logistical reasons, participants in the control group who had applied for psychological support were offered a one-day ACT workshop immediately after the post-test. As a result, no follow-up assessments could be conducted in this group, limiting between-group comparisons regarding the maintenance of treatment effects. Fifth, the follow-up period was limited to one month. Future research should incorporate longer follow-up durations to evaluate the sustainability of therapeutic outcomes. Sixth, several process-level variables that may influence treatment outcomes, such as self-compassion, engagement with home practice, or perceived adequacy of intervention components were not directly assessed. For example, the creative hopelessness component was delivered in only two sessions and reported as insufficient by some participants. Incorporating structured home exercises and audio-recorded mindfulness practices may improve accessibility and engagement in future studies. Finally, a key limitation of the study is its exclusive reliance on self-report measures, which may be subject to bias and thereby limit the objectivity of the findings. Future research should consider incorporating multi-method assessments. An ACT-trained therapist supervised the intervention, but there were no formal fidelity assessments. This limits conclusions regarding adherence to the treatment protocol.

Future research should consider several methodological refinements to enhance the validity and generalizability of findings in this area. First, strategies to improve retention and intervention adherence, such as flexible session scheduling, hybrid delivery formats, or brief orientation meetings to enhance group comfort, may help reduce dropout and increase participant engagement. Second, the inclusion of male and gender-diverse individuals in adequately powered samples is needed to assess whether ACT-based interventions produce comparable effects across different populations. Third, future studies should aim to collect follow-up data from both intervention and control groups to enable stronger inferences regarding the maintenance and specificity of treatment effects. In addition, it is recommended that key process variables, such as self-compassion, values-based action, and home practice engagement, be formally measured to clarify the mechanisms through which ACT influences emotional eating. The inclusion of structured home assignments and access to audio-guided mindfulness practices may enhance experiential learning and treatment impact. Finally, components such as creative hopelessness, which were delivered briefly in the current study, may benefit from extended implementation across sessions or supplemental materials that reinforce the therapeutic rationale.

6. Conclusion

In conclusion, despite this limitation, the study remains unique in its focus. The current study represents the first long-term ACT intervention (six sessions) targeting EE. It is the first and only ACT intervention for EE in Turkish adults and provides strong evidence that ACT can reduce EE. As the first study to address this issue, it lays the groundwork for future research and serves as a pioneering effort in the field.

CRediT authorship contribution statement

Büşra Kavla: Writing – review & editing, Writing – original draft, Visualization, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Yasin Kavla:** Writing – review & editing, Writing – original draft, Methodology. **Hasan Turan Karatepe:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Formal analysis, Data curation, Conceptualization.

Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Declarations of competing interest

The authors declare no conflicts of interest.

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