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ORIGINAL ARTICLE

A 1-day acceptance and commitment therapy workshop leads to reductions in emotional eating in adults

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Abstract

Purpose Emotional eating has been defined as the tendency to overeat in response to negative emotions and is a symptom of emotion dysregulation. Interventions for emotional eating have been developed based on acceptance and commitment therapy (ACT). However, these interventions only address emotional eating in the context of weight loss programs and are therefore not available in a weight neutral context.

Methods The present study aimed to test the feasibility and acceptability of a 1-day ACT workshop that taught skills to reduce emotional eating, without promoting weight loss. The workshop was delivered in a single day and aimed to reduce emotional eating by improving values clarification and commitment, acceptance, and mindfulness. Follow-ups were conducted at 2 weeks and 3 months post-intervention.

Results Results suggest feasibility and acceptability of the 1-day workshop; participants described appreciating the brevity of the program and its applicability to their everyday lives. Improvements in emotional eating were found at 2 weeks ($t(31) = 5.80$, $p < 0.001$) and 3 months ($t(29) = 6.96$, $p < 0.001$). A repeated measures MANOVA revealed a significant main effect of time ($F(14, 96) = 4.98$, $p < 0.001$, partial $\eta^2 = 0.421$), with follow-up ANOVAs indicating that this effect held for all variables.

Conclusion The results from this study can be used to inform a larger-scale randomized controlled trial to determine the efficacy of the program in a larger sample and eventually disseminate it in other real-world settings.

Trial registration ClinicalTrials.gov, NCT03744780.

Level of evidence Level IV, evidence obtained from multiple time series with the intervention.

Keywords Emotional eating · Eating behavior · Acceptance and commitment therapy · Weight neutral · Health at Every Size®

Emotional eating, emotion dysregulation, and associated concerns

Overarchingly, emotional eating has been shown to be an ineffective coping mechanism to respond to negative emotions such as anxiety or sadness. According to the affect regulation model [1], individuals who experience increased negative emotions use eating as a coping mechanism in an attempt to decrease these emotions. However, emotional eating does not effectively regulate emotions, with negative emotions persisting after emotional eating episodes [2, 3]. The ineffectiveness of emotional eating may be the combined result of guilt associated with overeating [2], as well as emotional eating serving to avoid rather than accept the experience of negative emotions [4]. Given that emotional eating is ineffective in regulating negative emotions, emotional eaters may benefit from interventions that help them to more effectively cope with negative emotions and reduce emotional eating.

From a symptom reduction perspective, it is also important to address emotional eating as a symptom of emotion dysregulation that is associated with both physical and mental health concerns [5–7]. Emotional eating has often been

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studied in the context of weight concerns, such as weight gain over time [8, 9] and difficulties with weight loss [8, 10]. However, emotional eating contributes to an unhealthy diet through increased consumption of high calorie foods [11, 12], and there is increasing evidence that unhealthy dietary habits are better predictors of physical health than weight or BMI [13, 14]. This emphasizes the need to target emotional eating itself beyond or separately from its contribution to weight gain. In addition to weight concerns, emotional eating is also a symptom of both affective disorders and eating disorders [2, 15–19]. Thus, addressing emotional eating and the emotion dysregulation that underlies it may help to reduce these symptoms to help alleviate mental health concerns such as eating and affective disorders.

Interventions related to emotional eating

Acceptance and commitment therapy [20] may be a useful approach to address emotional eating because of its focus on tolerance of emotions as a means to reduce engagement in ineffective coping mechanisms, such as eating [21]. ACT focuses on commitment to values and emphasizes relationships, personal growth, and engagement in meaningful life activities even when faced with negative emotions [22]. It has been theorized that ACT's focus on: (1) acceptance of negative emotions (i.e., distress tolerance), (2) mindfulness (i.e., present moment awareness), and (3) value clarification addresses challenges relevant to emotional eaters [21]. Together, difficulties with these processes represent "psychological inflexibility", which is associated with binge eating, depression, anxiety, and stress in those with overweight and obesity [23]. First, emotional eaters struggle with tolerating negative emotions and thus turn to food to soothe these emotions. Therefore, by increasing their ability to accept and tolerate negative emotions, it follows that they would be less likely to use food as a coping mechanism. For example, past research has found that individuals who are more accepting of cravings are less likely to act on these cravings by eating [24]. Second, emotional eating has been associated with reduced mindful awareness of hunger and satiety cues [2]. Thus, emotional eaters may benefit from interventions that incorporate mindfulness, such as ACT, to increase awareness of physical and emotional cues related to food and eating. Indeed, interventions derived from mindfulness have been shown to reduce emotional eating [25, 26]. Third and finally, in the presence of negative emotions, emotional eaters often fail to attend to their values, or reasons for wanting to change their behavior [21]. Therefore, these values do not guide their eating in favor of healthier choices [21]. Improving values clarification and commitment has been shown to motivate healthier eating in past studies [27]. Thus, ACT may be used to reduce emotional eating through increases in acceptance of negative emotions, mindfulness, and value clarification.

As such, emotional eating has been targeted in previously developed ACT intervention programs where weight loss has been the primary outcome [28, 29]. In these interventions, ACT techniques such as acceptance, mindfulness, and value clarification have been used as a means to target emotional eating, thereby reducing calorie intake and increasing weight loss. A recent meta-analysis and systematic review compared ACT and mindfulness interventions to standard behavioral treatment (e.g., counseling on diet and exercise habits) on weight loss [30]. It found a small effect size (Hedge's $g = 0.30$) for ACT and mindfulness interventions and then to lead to significantly more weight loss than standard behavioral treatments [30]. In their study on behavioral treatments for obesity, Forman et al. [28] found in post hoc analyses that the ACT-based treatment resulted in greater weight loss among those with high as opposed to low emotional eating. However, at 36-month follow-up, both the ACT and standard care groups showed similar weight regain, suggesting a lack of efficacy for long-term weight loss maintenance [31]. Lillis et al. [29] also found that ACT was more beneficial for producing weight loss for participants higher in emotional eating than for those lower in emotional eating at up to 24 month follow-up. However, longer-term weight loss maintenance (i.e., >24 months) was not assessed [29].

We believe that there are two main benefits to using ACT to address emotional eating in a weight-neutral context: (1) mitigating risks associated with dieting, especially for this population, and (2) improving intervention efficacy for healthy eating behaviors by focusing on emotional eating rather than weight loss. As such, the purpose of the present study was to test the feasibility and efficacy of an ACT workshop for emotional eating that does not address weight loss as a target.

First, weight loss dieting is associated with a host of negative causes and consequences such as weight cycling, binge eating, negative body image, eating disorders, and weight stigma [13, 32–34]. These consequences are all specifically implicated in emotional eating, with emotional eaters being more susceptible to body image concerns, binge eating, and other eating disorders [15, 17–19]. Thus, it is contraindicated to promote weight loss for emotional eaters, as this may trigger or exacerbate concerns that they are already experiencing or are at risk of experiencing. Instead, using ACT to focus on reductions in emotional eating may help to manage this risk and encourage better outcomes for emotional eaters.

Second, weight loss maintenance is difficult to achieve due to physiological mechanisms that encourage weight regain following weight loss [35, 36] and interventions that have been effective, such as the Diabetes Prevention Program (DPP) [37], require extensive resources to deliver.

Further, encouraging weight loss as a value may detract from promoting values such as health and wellness that could better motivate participants to engage in behavior change to improve their eating behaviors [38]. However, ACT has been shown to be efficacious in improving other eating behaviors relevant to emotional eating; it has been effectively used to treat binge eating [39], anorexia and bulimia nervosa [40], and to improve healthy eating behaviors in brief contexts, such as e-health interventions [41]. Thus, targeting emotional eating with ACT may promote positive dietary changes such as reduced consumption of high fat, high sugar, high calorie foods [41]. Such changes have been shown to improve health (e.g., improve cardiovascular and diabetic outcomes) through metabolic and endocrine changes, even in the absence of weight loss [42–44]. Given the negative consequences associated with dieting, and benefits of focusing on eating behaviors rather than weight, especially for emotional eaters, ACT may be better suited for reducing emotional eating in a weight-neutral context.

Movements such as Health at Every Size® (HAES®) focus on the pursuit of health through such a weight-neutral lens, acknowledging the limitations of weight as a marker of health [13, 45]. HAES® interventions focus on changing diet and exercise habits while fostering self-acceptance and well-being, rather than explicitly promoting weight loss [45]. A recent systematic review of 14 HAES® interventions found this approach to be efficacious in improving eating behaviors, quality of life, and psychological well-being, as well as increasing physical activity and improving physiological outcomes such as blood pressure [46]. In the majority of the interventions reviewed, these changes occurred in the absence of weight loss [46]. Thus, there is increasing evidence to show that interventions that focus on changing eating behaviors themselves, rather than encouraging weight loss, can lead to improvements in physical and mental health outcomes.

One-day ACT interventions

Another limitation of previous ACT interventions that have targeted emotional eating is their lengthy and resource-intensive delivery, with sessions conducted over a 1-year period. Conversely, 1-day ACT workshops have been shown to be effective in facilitating health behavior change. One-day ACT workshops follow the same ACT principles as longer interventions; however, these are tailored for delivery in a brief setting [22]. In-session exercises and metaphors can be used to elucidate specific skills, such as using a chocolate tasting exercise to encourage mindfulness. Because ACT focuses on behavior change, it is well suited for condensing into brief sessions where participants can practice skills necessary to help them achieve their goals, in this case, learning strategies to reduce emotional eating. The intervention manual for the present study can be found in the electronic supplementary materials and an outline of the intervention has been provided in Table 1.

Specifically, previous research has examined the effects of a 1-day ACT workshop on improving acceptance and mindfulness in those seeking to lose weight [47]. The study

Table 1 Workshop summary

Theme	Time allotted	Example exercises
1—Introduction to emotional eating (EE) and core ACT processes	1 h	Introduced EE and discussed how it presents itself in participant's lives Introduced the three ACT processes and how these can be used to reduce EE
2—Values	1 h	Discussed core values related to wanting to reduce EE Used the choice-point model to highlight value-consistent and value-inconsistent decisions Introduced BOLD (breath, observe, listen, decide) for making value-consistent decisions in the face of EE
3—Acceptance/distress tolerance	1 h	Used the tug-of-war metaphor experientially to highlight the process of acceptance and its benefits compared to trying to fight emotions Introduced urge surfing and steps to use this to avoid emotional eating
LUNCH BREAK	1 h	
4—Mindful eating	1 h	Conducted a modified version of the raisin exercise using chocolate to practice mindful eating in vivo Discussed what participant's experience of this exercise was like and how they could apply mindful eating to their everyday lives
5—Establishing habits and commitment to values	1 h	Reviewed the three ACT processes taught during the workshop with time for discussion and questions Discussed ways to use values to motivate continued behavior change in the face of potential setbacks or barriers Had participants complete a summary card with their values and how they can use these to guide their eating

found improvements in quality of life, distress tolerance, and acceptance 3 months post-intervention. However, emotional eating was not targeted or assessed as part of the intervention. Brief ACT interventions have also shown efficacy in improving outcomes related to chronic pain [23], migraines [48], diabetes [49], and cardiovascular disease [50].

The present study

The study was a single-arm feasibility study that used a pre–post design to examine: (1) changes in emotional eating and related ACT processes (i.e., values clarification/commitment, acceptance/distress tolerance, mindfulness) from baseline to 2 weeks and 3 months post-intervention and, (2) treatment acceptability and feasibility, assessed through both quantitative and qualitative measures. Following the workshop, participants were asked to provide their feedback on the perceived usefulness of the workshop in reducing their emotional eating, as well as input pertaining to the 1-day format. Based on past ACT research examining emotional eating, it was hypothesized that the intervention would lead to reductions in emotional eating, as well as improvements in the three underlying ACT processes (values clarification, acceptance/distress tolerance, and mindfulness) at 2 weeks and 3 months post-intervention.

Methods

The study was approved by the Research Ethics Board at the author's university. Participants provided written informed consent prior to commencing the intervention. The trial was registered on ClinicalTrials.gov, identification number NCT03744780. CONSORT guidelines for trial reporting were followed.

Trial design

The present study was a single-arm feasibility study conducted from November 1, 2018 to March 5, 2019. Participants were all assigned to a 1-day ACT workshop designed to reduce emotional eating. All outcomes were assessed at baseline and both 2 weeks and 3 months post-intervention. The present study aimed to recruit approximately 30 participants, as recommended for feasibility studies [51]. The trial ended upon reaching the determined sample size and no harms or unintended effects occurred.

Participants

Participants included 32 adults over the age of 18 years who engaged in emotional eating, as assessed by a score of 3.25 or higher on the Dutch Eating Behavior Questionnaire, which has been found to represent the 80th percentile for emotional eating (DEBQ) [52]. The sample consisted of 28 female participants and 4 male participants.

Study procedures

Participants were recruited through both posters and an email newsletter directed toward staff at the university. They were told that an intervention was being offered to help reduce emotional eating using ACT techniques and were asked to contact the researchers if interested. Those who expressed interest to participate were assigned a participant ID number and asked to complete a brief pre-screen questionnaire to determine their eligibility based on the criteria described above. Eligible participants were offered a date to participate in the workshop and were enrolled based on their preference. A total of three workshops were held, each with 9 to 12 participants.

Participants completed a battery of questionnaires at baseline, 2 weeks, and 3 months post-intervention. Baseline questionnaires were completed upon enrollment in a specific workshop time slot, approximately 2 weeks or less prior to the workshop. Participants were sent the survey link via email and completed the questionnaires online via SurveyMonkey. Participants were informed that the questionnaires would take approximately 10–15 min to complete and were instructed to complete the 2-week and 3-month questionnaires within 48 h of receipt. The rate of attrition is 6%, with 94% of participants completing follow-up questionnaires at 3 months post-intervention.

Randomization and blinding

Participants were all assigned to the ACT workshop; therefore, there was no randomization or blinding.

Intervention

The workshops were held over the course of a single day (i.e., 6 h) and participants were taught techniques to reduce their emotional eating. Three overarching skills were introduced over the course of the ACT workshops: (1) values clarification and commitment, (2) acceptance/distress tolerance, and (3) mindfulness [21]. The intervention was developed based on ACT principles [21] and previous weight loss interventions that used ACT to facilitate changes in eating behaviors [28, 53].

An outline of the intervention has been provided in Table 1 and the full-length intervention manual and participant handouts can be found as electronic supplementary materials. During the first hour of the workshop, participants were provided with an overview of emotional eating and

introduction to the three ACT skills that were to be taught to help reduce it. The remainder of the workshop time as divided evenly among the three ACT skills. Participants were first taught values clarification and commitment techniques, where they reflected on their reasons for reducing emotional eating and how this could improve their quality of life through group discussion [54]. Next, participants were taught to increase distress tolerance in the face of negative emotions that typically led to emotional eating. As a first line, they were asked to come up with alternative activities to engage into address negative emotions, such as obtaining social support from a friend, or engaging in breathing exercises. Participants were also taught acceptance techniques (e.g., dropping the rope metaphor, urge surging) to use when experiencing triggering emotions or cravings without acting on them [55]. Lastly, participants were trained in mindful eating, to increase awareness of hunger and satiety cues and avoid eating when not physically hungry [56]. Finally, the end of the workshop was dedicated to reviewing the three ACT skills taught over the course of the day and answering any questions that arose for participants.

The structure of the workshop followed a format in which topics were introduced and explained, followed by group discussion in which participants were asked to reflect on what they had just learned and how they could apply it to their everyday life. Experiential exercises were also engaged in, including the use of imagery to elucidate the tug-of-war metaphor, as well as a chocolate tasting to practice mindful eating. Workshop content was personalized to each participant as much as possible by encouraging them to focus on values most applicable to their lives, as well as choose distress tolerance strategies that resonated most with them. The intervention was delivered by a PhD candidate in clinical psychology who also has training in ACT.

Measures

Demographics

At baseline, participants reported basic demographic information including gender, age, ethnicity, marital status, education, employment status, and household income.

Emotional eating

Participants were pre-screened for emotional eating using the Dutch Eating Behavior Questionnaire emotional eating subscale (DEBQ-EE) [57]. The 13-item emotional eating subscale assesses the reported desire to eat under specific negative emotional conditions such as stress, anxiety, and depression. Participants are asked to rate the frequency with which they engage in particular eating behaviors, on a 5-point Likert-type rating scale from 1 (never) to 5 (very often). The DEBQ has high internal consistency and factorial validity [58]. Cronbach's alpha in this sample was 0.81.

Additional emotional eating items (developed by Frayn and Knäuper)

In addition to the DEBQ-EE, two items were administered to provide further information regarding participant's episodes of emotional eating. These assessed: (1) the number of times in the past week participants engaged in emotional eating and (2) instances in which participants begin to engage in emotional eating and were able to stop themselves. These items were added to better inform about the frequency of emotional eating and emotional eating attempts, given that the DEBQ-EE only looks at frequency from "never" to "very often", rather than a concrete number of instances.

Distress tolerance

The Distress Tolerance Scale (DTS) [58] is a brief, 15-item self-report measure that assesses one's ability to tolerate distressing emotions. Specifically, it asks individuals to indicate the extent to which they agree with statements aimed at assessing distress tolerance, absorption, appraisal, and regulation from 1 (strongly disagree) to 5 (strongly agree). Sample items include "Feeling distressed or upset is unbearable to me" and "I'll do anything to stop feeling distressed or upset." The DTS has high reliability, as well as high discriminant, convergent, and criterion validity [58, 59]. Cronbach's alpha in this sample was 0.94.

Acceptance and committed action

The Food Craving Acceptance and Action Questionnaire (FAAQ) [60] is a 10-item self-report questionnaire that examines the extent to which an individual is able to accept his or her food cravings or urges and their attempts to control or change these cravings or urges. Items are rated on a 6-point Likert-type rating scale from 1 (very seldom true) to 6 (always true). The FAAQ has been shown to have high internal consistency (Cronbach's alpha = 0.93) and acceptable test–retest reliability (ICC = 0.72) in past research [61]. Cronbach's alpha in the present study was acceptable (0.68).

Mindful eating

The Mindful Eating Questionnaire (MEQ) [61] is a 28-item self-report measure that assesses five domains of mindful eating: disinhibition, external cues, awareness, emotional response and distraction. Individuals are asked to indicate the extent to which extent they agree with each item from 1

("never"/"rarely") to 4 ("usually"/"always"). Sample items include: "I eat so quickly that I don't taste what I'm eating" and "When I'm eating one of my favorite foods, I don't recognize when I've had enough." The MEQ has been shown to have good validity and reliability [61]. Cronbach's alpha in this sample was 0.80.

Values application (developed by Frayn and Knäuper)

These four self-report items assessed to which extent an individual is able to use their values to reduce their emotional eating. Sample items included "My values motivate me to not engage in emotional eating" and "I reflect on my values before deciding whether or not to engage in emotional eating." Participants were asked to rate the extent to which they agreed with each item on a 5-point Likert-type rating scale from 1 (strongly disagree) to 5 (strongly agree).

Feasibility data

In addition to the questionnaires described above, feasibility data were collected and analyzed including: (1) recruitment rates (i.e., the overall number of participants who expressed interest in the workshop over this time period; the time period required to recruit the 30 required participants), (2) eligibility rates (i.e., of those who expressed interest, the percentage that met the DEBQ-EE 3.25 cutoff and were thus eligible to attend), (3) attendance rates (i.e., of those who signed up, the percentage that attended the workshop), and (4) attrition at 2 weeks and 3 months follow-up (i.e., of those who attended the workshop, the percentage that completed the subsequent follow-up questionnaires).

Qualitative feasibility and acceptability data

At the conclusion of each workshop, participants consented to participate in a brief group discussion to provide their feedback. They were asked a series of questions assessing their expectations for the workshop, to what extent these expectations were met, and whether or not they would recommend the workshop to others struggling with emotional eating. Participants were also asked to describe which of the three workshop skills (values clarification, acceptance/distress tolerance, mindfulness) they thought would be most and least useful in addressing their emotional eating. Finally, they were asked to provide their feedback on the dose of the workshop (i.e., 1 day) and any thoughts they had pertaining to convenience and accessibility.

Results

Data analysis

All analyses were conducted in SPSS version 24. A one-way, repeated measures MANOVA was used to compare changes between baseline, 2 weeks, and 3 months on emotional eating and related ACT processes, with follow-up t tests conducted as necessary, using Bonferroni to correct for multiple comparisons.

Demographic information for the sample is available in Table 2. The mean age of the sample was 46.71 (SD = 13.43) and the mean BMI was 33.13 (SD = 5.40, min = 24.03, max = 47.34). Based on BMI, 3 participants fell into the "normal weight" range (9.38%), 8 were within the "overweight" range (25.00%), and 21 were in the "obese" range (65.63%). Qualitative feasibility data were analyzed using the procedure described by Braun and Clarke [62]. Feedback provided immediately after each of the three workshop sessions was recorded and transcribed, prior to being coded and thematically analyzed to identify common themes across participants. Twenty-seven out of 28 participants consented to participate in the qualitative portion of the study.

Quantitative feasibility data

During the recruitment period, 59 people expressed interest in the study and were emailed the pre-screen questionnaire to determine their eligibility. Of these, 48 people completed the pre-screen questionnaire and 44 (91.67%) were eligible to participate based on the DEBQ-EE cutoff of 3.25. Thirty-nine people then signed up to attend the workshops. Furthermore, the workshops had an attendance rate of 82.05%; of the 39 people who signed up, 32 were in attendance. Seven participants canceled last minute due to illness or scheduling changes. Finally, all 32 participants in attendance completed both the baseline and 2-week questionnaires. Thirty of these participants completed the 3-month questionnaires (93.75% response rate). Further, two questionnaires could not be included in the analyses due to incomplete data, bringing the sample size for the quantitative analyses to 28 participants.

Quantitative results

The MANOVA revealed a significant main effect of time, $F(14, 96) = 4.98$, $p < 0.001$, partial $\eta^2 = 0.421$, with follow-up ANOVAs indicating that this effect held for all

Table 2 Demographics

Category	Response	Intervention	
		N	% of total (32)
Gender	Male	4	12.5
	Female	28	87.5
Ethnic group	Caucasian	25	78.13
	Middle Eastern	1	3.13
	Black	1	3.13
	Hispanic	1	3.13
	Other	4	12.5
	Prefer not to answer	0	0
Marital status	Married	13	40.63
	Widowed	2	6.25
	Divorced	4	12.5
	Never married	12	37.5
	Prefer not to answer	1	3.13
Educational attainment	High school diploma or equivalent	1	3.13
	CEGEP (Quebec only)	1	3.13
	Some college/university	3	9.38
	Bachelor's degree	13	40.63
	Graduate degree	14	43.75
Employment status	Employed	28	87.5
	A student	3	9.38
	Retired	1	3.13
Household income 2018	$20,000 or less	2	6.25
	$20,001–$40,000	3	9.38
	$40,001–$60,000	4	12.5
	$60,001–$80,000	3	9.38
	$80,001–$100,000	5	15.63
	$100,001–$120,000	2	6.25
	More than $120,000	5	15.63
	Prefer not to answer	8	25
Category	**Response**	**Mean**	**SD**
Age	Male	43.75	11.93
	Female	47.15	13.79
BMI	Male	35.17	8.35
	Female	32.84	5.01

Table 3 Follow-up F test statistics

Measure	Mean (SD) baseline	Mean (SD) 2 weeks	Mean (SD) 3 months	*F*	*df*	*p*	η_p^2
DEBQ-EE	3.91 (0.46)	3.27 (0.58)	3.10 (0.55)	28.97	2, 54	< 0.001	0.518
DTS	3.32 (0.92)	3.17 (0.79)	2.87 (0.86)	5.99	2, 54	0.004	0.182
FAAQ	28.18 (6.24)	32.71 (4.29)	32.68 (4.76)	11.06	2, 54	< 0.001	0.291
MEQ	2.35 (0.35)	2.51 (0.35)	2.65 (0.41)	13.09	2, 54	< 0.001	0.326
Values	3.24 (0.66)	3.79 (0.63)	3.63 (0.66)	8.98	2, 54	< 0.001	0.250
EE frequency	4.64 (1.66)	3.00 (1.49)	3.43 (1.67)	9.41	2, 54	< 0.001	0.258
EE ability to stop	1.96 (0.88)	2.68 (1.12)	2.71 (1.01)	6.77	2, 54	0.002	0.200

variables (see Table 3 for F-test statistics). Follow-up t tests revealed that there were significant improvements from baseline to 2 weeks ($t(31) = 5.80$, $p < 0.001$) and baseline to 3 months for DEBQ-EE ($t(29) = 6.96$, $p < 0.001$), but no change from 2 weeks to 3 months ($t(29) = 1.44$, $p = 0.160$). FAAQ ($t(31) = -4.81$, $p < 0.001$), values ($t(31) = -3.89$, $p = 0.001$), emotional eating frequency ($t(31) = 3.78$, $p = 0.001$), and ability to stop emotional eating ($t(31) = -3.47$, $p = 0.002$) improved from baseline to 2 weeks, but not baseline to 3 months or 2 weeks to 3 months. There were no significant changes in DTS at either time point. Finally, there were significant improvements in MEQ from baseline to 3 months ($t(29) = -4.43$, $p < 0.001$), and 2 weeks to 3 months ($t(29) = -3.78$, $p = 0.001$), but not baseline to 2 weeks ($t(31) = -3.23$, $p = 0.003$). The t test statistics can be found in Table 4.

Table 4 Follow-up t test statistics

Measure	t	df	p
DEBQ-EE			
Change from baseline to 2 weeks	5.80	31	< 0.001*
Change from baseline to 3 months	6.96	29	< 0.001*
Change from 2 weeks to 3 months	1.44	29	0.160
DTS			
Change from baseline to 2 weeks	0.67	31	0.506
Change from baseline to 3 months	2.89	28	0.007
Change from 2 weeks to 3 months	2.56	28	0.016
FAAQ			
Change from baseline to 2 weeks	− 4.81	31	< 0.001*
Change from baseline to 3 months	− 3.09	28	0.004
Change from 2 weeks to 3 months	0.00	28	1.000
MEQ			
Change from baseline to 2 weeks	− 3.23	31	0.003
Change from baseline to 3 months	− 4.43	29	< 0.001*
Change from 2 weeks to 3 months	− 3.78	29	0.001*
Values			
Change from baseline to 2 weeks	− 3.89	31	0.001*
Change from baseline to 3 months	− 2.73	29	0.011
Change from 2 weeks to 3 months	1.35	29	0.188
EE frequency			
Change from baseline to 2 weeks	3.78	31	0.001*
Change from baseline to 3 months	3.30	28	0.003
Change from 2 weeks to 3 months	− 1.07	28	0.293
EE Ability to stop			
Change from baseline to 2 weeks	− 3.47	31	0.002*
Change from baseline to 3 months	− 3.19	28	0.003
Change from 2 weeks to 3 months	− 0.15	28	0.882

*Statistical significance at $p \leq 0.002$ after applying Bonferroni correction

Qualitative results

Expectations of workshop

Overall, participants reported that their expectations for the workshop were to gain skills to cope with their emotional eating. Some described having participated in past programs to change their eating behaviors and were subsequently looking for a refresher. Overarchingly, participants endorsed that their initial expectations were met following the workshop and that they did walk away with skills to help them reduce their emotional eating.

> I think the expectations were met. I wanted to have some additional tools in order to analyze my approach to emotional eating. You know insanity is doing the same thing all the time and expecting a different result, so I needed some different way of looking at it or different ideas that I could put together. So, from that point of view it has been useful.

They also appreciated that a variety of strategies were taught so they could have options to use what they found most useful. For some, the framework within which the workshop was taught (i.e., ACT) was unexpected, rather, they cited anticipating a "stricter" approach ultimately aimed at demonizing and eliminating emotional eating. Despite this discrepancy in expectation, these participants reported appreciating the acceptance and non-judgment embodied during the workshop.

> It wasn't what I expected in a way because I thought it would be more like, 'ok we're going to stop emotional eating,' but the whole acceptance part really threw me for a loop because that's not what I was expecting. {A stricter approach} would have been a more familiar, but probably not the best for me, so I think this took me a while to fully accept but I think it'll help.

Most useful aspects of the workshop

Participants endorsed appreciating the discussion and social support provided during the workshop and felt like a safe environment was created to allow them to open up about their concerns. Values clarification and commitment were cited as the element of the workshop that resonated most with participants. This was endorsed as a different way of looking at emotional eating and most admitted that they had never considered their values in relation to emotional eating before.

> I like the values one because I never really framed it that way of, 'you say you want to be these things, yet you're not doing anything to achieve them,' so I

> think if I could hold onto those values in my head, they might be what I need to execute on the other tactics.

Mindful eating was also a popular aspect of the workshop, namely for the experiential component that accompanied it (i.e., mindful chocolate tasting exercise). Acceptance was described as the most polarizing element of the workshop; although it resonated with many participants, others found it more difficult to comprehend. Also, participants reported appreciating that all of the workshop elements complemented each other and that they could use them in tandem to be most successful in addressing their emotional eating. Finally, many participants endorsed valuing that the workshop was not focused on weight and weight loss, but rather overall health and well-being.

> I liked that the focus is not on weight; it's more about how to make life better, not just about looking better or meet someone else's standards.

Least useful aspects of workshop

As mentioned, some participants cited that acceptance was more difficult to comprehend, specifically the tug-of-war metaphor. Also, a select number of participants wished for the provision of more concrete nutritional information.

Feedback on workshop dose

In terms of the workshop dose (i.e., 1 day), many participants appreciated the brevity and felt like they walked away with useful strategies in a condensed time frame, rather than having to participate in multiple sessions. Participants described other benefits of the single day delivery, including this helping to prevent forgetting the material, as well as the group cohesion created from spending several hours together.

> I think having it all in one day, instead of two 1-h sessions or three 2-h sessions, makes it more interesting because you don't have time to forget about what you saw the first time around. We can put things in context more easily together because we see it all in 1 day.

Many participants stated that they would prefer having "booster" or follow-up sessions, if only for the social support that these would provide. The preferred frequency of follow-up varied from monthly, to once every 3 or 4 months. In fact, one of the groups exchanged contact information to organize meeting up on their own to help support each other.

Recommending workshop to others

Everyone who attended the workshops endorsed that they would recommend it to others struggling with emotional eating. Many participants cited feeling like the program should be broadly applied to all staff at the university, and/or be offered to individuals at a younger age to facilitate earlier exposure to the concepts taught.

> Something like this should be offered at a younger age so we don't live our lives being shamed for certain habits. It would help to have better coping mechanisms throughout our lives and not only the solution of, 'oh go to a dietician', 'you're not eating well', or 'you're too fat'. There's a lot of emotional behaviors that take place before emotional eating and so if we can break that earlier on and have this amazing knowledge before, I think we can make a world of difference for a lot of people out there.

Convenience and accessibility of workshop

Finally, with regard to convenience and accessibility, participants found the location to be convenient and easily accessible by transit. They reported that the group size (i.e., 9–12 people) was good for facilitating discussion and allowing everyone to be heard. Also, participants appreciated that the workshop was held on a weekend, so they could dedicate the "mental energy" to participating, rather than having to do it after a long day at work. Logistical concerns did arise for some participants, for example obtaining childcare for the day; however, these were ultimately not a barrier to participation.

Discussion

The aim of the study was to test the feasibility, acceptability, and efficacy of a 1-day ACT workshop to reduce emotional eating without promoting weight loss. Reductions in emotional eating were found at 2 weeks post-intervention, and these improvements held at 3-month follow-up. There were also significant improvements in acceptance, mindfulness, and values clarification and commitment at 2 weeks post-intervention, with improvements in mindfulness holding at 3 months as well.

Quantitative feasibility data showed high rates of attendance (82.7%) and responses to follow-up questionnaires that assessed emotional eating and related ACT skills taught in the workshop (93.75%). Through qualitative methods, participants reported that their expectations for the workshop were to gain skills to cope with their emotional eating and they felt these expectations were adequately met. While values clarification and commitment were seen as the most useful aspect of the workshop, acceptance/distress tolerance was identified as being harder to comprehend for most participants. Participants also reported appreciating the brevity,

convenience, and accessibility of the workshop, and reported that they would recommend it to others struggling with emotional eating.

The results demonstrate that a 1-day ACT workshop can be efficacious in reducing emotional eating behavior for adults. While positive changes were observed in the specific ACT skills taught at 2 weeks post-intervention, mindfulness was the only process that showed improvements at 3 months post-intervention. Mindfulness may be useful in reducing emotional eating as it focuses on increasing the individual's sensitivity to their hunger and satiety cues [2]. Inability to respond to or be aware of internal cues of hunger and satiety has been found to be associated with increased emotional eating behavior [63]. Thus, mindfulness training to increase awareness of these cues may in turn have contributed to reductions in emotional eating in the present study.

Also, emotional eating is thought to be indicative of emotion dysregulation, as proposed by the affect regulation model [1]. Mindfulness training has been shown to help regulate emotions, which may be another factor that accounted for the observed reductions in emotional eating [64]. It is also possible that simply by attending a workshop aimed at emotional eating, participants were more aware of, and sensitive to, their eating behavior, thus promoting mindfulness. Moreover, many participants reported appreciating the experiential nature of the mindful chocolate tasting exercise that was included in the workshop. Therefore, this practical experience of mindful eating may have helped with the increased integration of this particular skill into their daily lives.

These findings may suggest that future brief interventions for emotional eating may be even more efficiently delivered by focusing exclusively on mindfulness and mindful eating. Acceptance and values clarification skills may require more time to internalize and be better targeted in a longer-term intervention or further emphasized through booster sessions, which some participants expressed interest in through the qualitative feedback. Future research is needed to better understand the mechanisms behind changes in eating behaviors in such interventions, to identify and target the relevant processes and understand the intensity with which they need to be addressed in interventions.

Contrary to our hypotheses, participants did not show decreases in distress tolerance at either the 2-week or 3-month time points. Reasons for this may be twofold. First, these findings are consistent with qualitative data showing that participants found acceptance/distress tolerance to be a more difficult component of the workshop to comprehend. Thus, lack of understanding of these principles may have prevented participants from effectively applying them in their everyday lives. Second, distress tolerance was assessed by the Distress Tolerance Scale [58], which is a general measure of distress tolerance. It may be that the questionnaire's lack of specificity toward food and eating contributed to the lack of change on this variable. In other words, because the questionnaire assessed distress tolerance generally, it may be that changes relevant to food and eating did not generalize to other areas of life and thus could not be identified by the questionnaire. It is important to continue to target distress tolerance in future interventions because of its role as a component of psychological inflexibility, which is associated with eating behaviors such as binge eating, as well as mental health symptoms such as depression and anxiety [23].

Despite decreases in emotional eating at both follow-up time points as assessed by the DEBQ [57], decreases in emotional eating frequency (i.e., the self-reported number of times in the past week participants engaged in emotional eating) were only found at 2 weeks post-intervention. It is suspected that the discrepancy in these findings are likely attributable to a lack of statistical power due to the small sample size. The means for this variable did improve at both time points but the improvements were not statistically significant at 3 months post-intervention. The aim of the present study was to test feasibility and efficacy; thus the interpretation of our efficacy results points more to initial trends that need to be replicated with larger samples in future research.

Strengths and limitations

A notable strength of the intervention was that many participants appreciated its lack of focus on weight and treatment of emotional eating as a behavior to target in and of itself. Qualitative feedback collected at the end of the workshops reflected these views, with several participants appreciating the emphasis on overall health and well-being, rather than on weight reduction. Participants highlighted that removing the focus off of weight subsequently helped to reduce their experience of weight bias and stigma that may have previously prevented them from engaging in behavior change. This supports the need for HAES® interventions that target emotional eating and other behaviors from a weight-neutral perspective, rather than focusing on weight loss as the targeted outcome [46]. Instead of focusing solely on weight outcomes, adopting a weight-neutral approach could increase the inclusivity of future interventions to target unhealthy eating behaviors that predispose individuals to a variety of physical and mental health concerns, as seen with emotional eating.

The limitations of this study are that it was a small, uncontrolled intervention. The efficacy of the intervention needs to be investigated in a larger randomized controlled trial. Further, the follow-up duration was limited to 3 months, therefore more research is needed to determine whether the reductions in emotional eating and improvements in mindfulness are maintained over a longer time

period. Another limitation with the present sample was the lack of diversity; this sample consisted of primarily female, white, highly educated, and middle-aged participants. Future research could recruit more varied samples with different socioeconomic statuses, ethnicities, ages, and genders to inform on the generalizability of such interventions. Finally, it is not known what proportion of participants was motivated to attend the workshop due to an underlying desire to lose weight. Although the majority of participants were very receptive to the intervention's lack of emphasis on weight, it should be acknowledged that weight loss is still a societally promoted ideal that may interfere in the administration of HAES®-based interventions.

Future research directions

Given that this feasibility study has demonstrated the efficacy of addressing emotional eating in a time efficient and accessible manner, future research could test the intervention in the context of a larger randomised controlled trial. The intervention could also be compared against other behavioral interventions such as cognitive behavioral therapy [65] or dialectical behavior therapy [66] to determine whether or not different therapeutic modalities are more effective for emotional eating in a 1-day format. It may also be informative to test an ACT intervention for emotional eating against a pure mindfulness intervention for emotional eating to determine whether or not there are differential outcomes. Such an intervention could also be modified to address the emotional eating challenges faced by individuals struggling with eating disorders such as binge eating disorder or bulimia nervosa [18, 19, 67]. Therefore, testing this design with various samples would be an important part of future research in this area. Further, testing workshop delivery in other community settings is a potential direction for future research. As a 1-day workshop, the intervention requires minimal resources and could be delivered in other accessible settings such as community centers, schools, or even workplaces.

Conclusions

Overall, the results of the present study suggest that it is feasible, acceptable, and efficacious to implement a brief, 1-day emotional eating intervention that focuses not on weight loss, but reducing this eating behavior in and of itself. Therefore, to assist a wider population in improving their eating behavior and subsequently their health, future interventions could benefit from removing their focus on weight and instead target emotional eating itself, independent of the number on the scale.

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

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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