Research Article

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Lessons Learned from an ACT-Based Physician-Delivered Weight Loss Intervention: A Pilot RCT Demonstrates Limits to Feasibility

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Abstract: Background: Acceptance and Commitment Therapy (ACT) interventions have shown to be effective in facilitating weight loss for emotional eaters, however, the lack of accessibility of these interventions limits their impact. The present study aimed to increase the accessibility of an ACT intervention for emotional eaters through delivery by physicians. Methods: This two-arm pilot randomized controlled trial tested the effectiveness and feasibility of a brief ACT intervention for emotional eaters compared with standard care at a weight loss clinic in Toronto, Canada. Primary outcomes were changes in weight and emotional eating. Treatment satisfaction was also assessed. Results: Participants in neither condition lost weight. Both conditions displayed decreases in emotional eating, but no condition interaction was found. Both patients and physicians reported high treatment satisfaction with the ACT intervention. However, there were high attrition rates and variability in intervention completion times. Conclusion: The ACT intervention led to reductions in emotional eating and was well received by patients and physicians alike. However, the present study identified high attrition as a limitation to the feasibility of this mode of intervention delivery. Future interventions may be more effectively delivered in primary care settings by encouraging further brevity and exploring delivery by other health professionals. Trial registration: ClinicalTrials.gov NCT03611829. Registered 26 July 2018. Retrospectively registered.

Keywords: primary care; obesity; weight loss; weight loss interventions; emotional eating

Introduction

Obesity and Emotional Eating

Overweight and obesity are growing public health problems globally. Having overweight/obesity is associated with health issues such as type II diabetes, hypertension, and heart disease (Grundy, 2004; Haslam & James, 2005). Weight-related health problems contribute significantly to mortality rates and place a large burden on healthcare systems worldwide (Withrow & Alter, 2011). Intensive behavioral weight loss interventions such as the Diabetes Prevention Program (DPP) focus on changing diet and exercise

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habits and have shown to be efficacious in achieving weight loss in those who have overweight and obesity (Knowler et al., 2002). However, such programs have been shown to be less effective for individuals with overweight and obesity who engage in emotional eating (Delahanty et al., 2013; López-Guimerà et al., 2014; Teixeira et al., 2010). Emotional eating is defined as the tendency to overeat in response to emotions such as stress and anxiety (van Strien et al., 2007). A recent review found emotional eating to be linked to weight concerns, both in terms of weight gain over time as well as difficulties with weight loss (Frayn & Knäuper, 2017). Emotional eating may lead to weight gain and deter weight loss through increased consumption of unhealthy foods (Elfhag & Rossner, 2005). Individuals who engage in emotional eating have been shown to be over 13 times more likely to have overweight and obesity than those who do not (Ozier et al., 2008). Between 43% to 60% of those with overweight/obesity are estimated to engage in emotional eating (Ganley, 1989; Jääskeläinen et al., 2014).

Traditional behavioral weight loss interventions use control-based techniques in an attempt to change negative emotions through the manipulation of thoughts and behaviors (Butryn, Webb, & Wadden, 2011). However, control-based techniques used to suppress thoughts and emotions can actually exacerbate the exact thoughts and emotions one is trying to eliminate, in an ironic process known as the “rebound effect” (Wegner, 1994). This is problematic for emotional eaters because by definition, experiencing negative emotions triggers emotional eating. Studies have indeed shown that emotional suppression is associated with increased, rather than decreased emotional eating to cope with negative emotions (Evers, Stok, & de Ridder, 2010; Ferrer, Green, Oh, Hennessy, & Dwyer, 2017). In summary, control-based techniques such as emotion suppression may be detrimental to emotional eaters as they may increase emotions and may subsequently increase emotional eating, which may then hinder weight loss efforts.

Additionally, traditional behavioral weight loss interventions devote little time to specifically targeting emotional eating. For example, in the 22-session DPP, only two sessions address possible causes of overeating that may include emotional eating, (e.g., Knowler et al., 2002). Thus, in such interventions, emotional eaters are not taught the skills necessary to reduce their emotional eating and improve weight loss.

More recently, Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999) has been proposed for weight loss, particularly for emotional eaters (Forman & Butryn, 2014; Lillis & Kendra, 2014). A meta-analysis by A-Tjak et al. (2015) found that ACT-based interventions are effective for treating a variety of mental and physical health problems such as depression and anxiety. Similar interventions applying ACT for weight loss have found it to be especially effective for emotional eaters (Forman et al., 2013; Niemeier et al., 2012). Importantly, ACT focuses on accepting internal thoughts and feelings as a way of promoting healthy behaviors that align with personal values (Forman & Butryn, 2014), unlike control-based techniques used in traditional behavioral weight loss interventions. It teaches emotional eaters skills that they lack including mindfulness, acceptance, and values clarification in order to facilitate weight loss (Forman & Butryn, 2014). Niemeier (2012) conducted a pilot study finding 13.5% weight loss for emotional eaters when ACT was added to a behavioral weight loss intervention. Similarly, Forman et al. (2013) conducted an ACT randomized control trial (RCT) for weight loss and found in post hoc analyses that those in the sample who were emotional eaters and were in the ACT condition lost almost 5% more of their initial body weight than emotional eaters who received a standard behavioral intervention (10.5% vs. 6%, respectively). Lillis et al. (2016) found that ACT interventions may be particularly useful for buffering against weight regain in emotional eaters, with a higher proportion of emotional eaters in their ACT condition achieving 5% weight loss at 24 months compared to those in the control condition. Despite the efficacy of the interventions described, a significant limitation is their time and resource-intensive delivery. Such interventions are usually delivered over the duration of 1 year in the context of RCTs and are thus unavailable to those seeking weight loss in other settings, such as primary care.

The Role of Physicians in Implementing Behavioral Weight Loss Interventions

To promote greater accessibility of behavioral weight loss interventions, the Canadian Task Force on Preventive Health Care (Brauer et al., 2015) recommended that behavioral weight loss interventions should be implemented in primary care. It stated that, “Primary care providers have an important role in preventing and managing obesity through services offered to patients” (Brauer et al., 2015, p. 184). The Task Force’s guidelines emphasize the need for primary care settings to offer intensive behavioral weight loss interventions to individuals with overweight/obesity to manage their weight and related health concerns. Intensive behavioral interventions are defined by the Task Force as involving several sessions focused on diet, exercise, and lifestyle change over the course of weeks to months (Brauer et al., 2015). Consistent with Canadian guidelines, the U.S. Preventive Services Task Force submitted a 2011 report supporting the efficacy of behavioral weight loss interventions and recommended their implementation in primary care (LeBlanc et al., 2011).

Physicians are especially well suited to deliver behavioral weight loss interventions for several reasons. First, they are in direct contact with patients with overweight and obesity because of obesity-related comorbidities. Physicians treat a large portion of individuals with obesity because they require continuous medical care for chronic conditions such as high blood pressure, heart disease, and diabetes (Guh et al., 2009; Peirson, Douketis, Ciliska, et al., 2014; Thompson & Wolf, 2001). Second, physicians have great potential to effect weight loss in patients with overweight and obesity beyond that of other health care professionals because they are perceived as experts and viewed as role models (Fraser, Leveritt, & Ball, 2013; Galuska et al., 1999). Patients are likely to follow their physician’s advice even more so than that of other healthcare professionals (Dimmateo, 1994). Rose, Poynter, Anderson, Noar, and Conigliaro (2013) found a positive association between the provision of weight loss advice by physicians and the initiation of weight loss attempts by patients.

A recent review by Tsai, Remmert, Butryn, and Wadden (2018) highlighted physicians’ potential to deliver intensive behavioral weight loss interventions in primary care. They noted empirical evidence that effectiveness of such interventions hinges on physicians’ abilities to engage patients in personalized treatment, provide positive reinforcement, and overall offer supportive, empathetic care. Thus, the personal contact and accountability that physicians provide to patients in conjunction with their ability to provide medically supervised weight loss management may be key to achieving clinically relevant weight loss in this high-risk population.

Current Constraints of Weight Loss Intervention Delivery by Physicians

While the delivery of intensive behavioral weight loss interventions by physicians is a tempting solution to the obesity problem, two challenges prevent physicians from effectively and efficiently delivering them to patients with overweight and obesity: (1) Lack of training and expertise and (2) lack of time.

(1) Lack of Training and Expertise

The primary challenge is that physicians are not formally trained in obesity management (Plourde & Prud’homme, 2012). A systematic review also showed that obesity management and weight loss counselling are not substantial components of medical school curricula (Chisholm et al., 2012). This lack of training indicates that physicians do not gain skills to effectively counsel patients on weight loss and effect behavior change and physicians may feel uncomfortable advising patients on weight loss because of their lack of expertise in this area (Bleich, Bennett, Gudzone, & Cooper, 2012; Jay et al., 2009). This is particularly problematic because patients with overweight or obesity constitute a large portion of physicians’ caseload

and given more training, physicians' contribution to obesity treatment could be substantially enhanced. Results from a recent meta-analysis identified barriers to providing weight management showed that clearer guidelines and specialized training for physicians would help reduce barriers (Dewhurst, Peters, Devereux-Fitzgerald, & Hart, 2017).

(2) Lack of Time

Second, physicians severely lack the time to implement intensive behavioral weight loss interventions (Plourde & Prud'homme, 2012). Existing interventions such as the highly successful NIH-developed National Diabetes Prevention Program (DPP; Knowler et al., 2002) are administered over the course of one year and last up to 22 sessions, each session being one hour long. The Mind Your Health Project (Forman et al., 2013), a weight loss intervention based on ACT, is also one year in duration. Thus, intensive interventions such as these are unrealistic to be administered by physicians in primary care settings.

Brief interventions, however, have shown to be effective in both reducing emotional eating and facilitating weight loss. Focused ACT interventions have shown to be effective when delivered in as little as two to four sessions (Glover et al., 2016; Strosahl, Robinson, & Gustavsson, 2012). Specific to emotional eating, a recent study found that a one-day ACT workshop reduced emotional eating at 2-weeks and 3-months post-intervention (Frayn, Khanyari, & Knäuper, 2019). Further, a brief, intensive version of the DPP for weight loss has been successfully delivered in primary care via 15-minute sessions, leading to 6.1% weight loss at 1 year (Wadden et al., 2019).

The Present Study

As described, previous studies have found ACT-based weight loss interventions to be effective for emotional eaters (Forman et al., 2013; Forman & Butryn, 2014; Hill et al., 2015; Lillis et al., 2016; Niemeier, 2012). However, such interventions are not yet widely available to the large numbers of people who struggle with emotional eating. Physicians are in a unique position to increase the accessibility of weight loss interventions by delivering them in primary care settings. Frequent patient contact and the influence physicians have on individuals with overweight and obesity makes them prime candidates to deliver weight loss interventions, but they currently lack the training and time to do so.

The purpose of the present study was to conduct a pilot RCT to test the feasibility of a physician-delivered ACT-based intervention for emotional eaters with overweight/obesity against standard care at a network of weight loss clinics. Clinical psychology doctoral students trained physicians in the delivery of the brief manualized intervention and were available for regular consults to address the aforementioned barrier of lack of training. To address lack of time, the intervention consisted of eight, 5-10 minute sessions that could be easily incorporated into the physician's current practice. Over the duration of the ACT intervention, physicians met individually with patients to teach them various techniques to address and improve mindfulness, acceptance, and values clarification and commitment, all of which emotional eaters have been found to struggle with (Forman & Butryn, 2014). The proven habit formation technique of if-then planning (Gollwitzer, 1993) was used throughout these sessions in order to train emotional eaters to habitually use ACT techniques and to change the maladaptive habit of eating in response to negative emotions.

It was hypothesized that emotional eaters in the ACT intervention would achieve greater weight loss and greater decreases in emotional eating post-intervention than emotional eaters who received standard care (primary outcome). Hypotheses for secondary outcomes were that emotional eaters in the intervention would display decreased body fat percentage, decreased external eating, increased restrained eating, increased distress tolerance, increased mindfulness, and increased clarification of values as a result of the ACT skills taught over the course of the intervention. Patient and physician treatment satisfaction, recruitment rates, attrition rates, questionnaire completion, and intervention completion time were also assessed to evaluate the feasibility of the 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 NCT03611829, and the trial protocol can be accessed there.

Trial Design

The present study was a two-arm pilot randomized controlled trial conducted from May 7, 2016 to March 7, 2018. Participants were randomized to eight sessions of either an ACT-based intervention aimed at reducing emotional eating or standard care, which involved diet and exercise counselling. All outcomes were assessed at baseline and post-intervention. The present study aimed to recruit 128 participants (64 per condition), similar to the trial protocol outlined by Knäuper *et al.* (2014).

Participants

Participants were adults over the age of 18 with overweight or obesity who were seeking treatment for weight loss at a clinic in Toronto, Ontario. Only participants considered to be emotional eaters, as assessed by a score of 3.25 or higher on the Dutch Eating Behavior Questionnaire (DEBQ), were included in the study (van Strien, Herman, Anschutz, Engels, & de Weerth, 2012). In addition, participants who did not speak, write, and read in English fluently were excluded from the study, as well as those who were pregnant.

Study Procedures

Participants were recruited upon initial registration at the weight loss clinic. Those who expressed interest to participate were assigned a participant ID number and asked to complete a brief prescreen questionnaire to determine their eligibility based on the criteria described above. Eligible participants were randomly assigned to either the ACT intervention or control condition based on the ID number they had initially received. Participants completed a battery of questionnaires both baseline and Session 8. Weight was measured every session.

Randomization and Blinding

Participants were randomized in 1:1 sequence using a random number generator (randomizer.org). Two hundred participant ID numbers (1-200) were randomized prior to study commencement and assigned to patients who were prescreened. Due to a high number of ineligible participants, an additional 100 ID numbers (201-300) were randomized during the recruitment process. Participants retained the same ID number throughout, regardless of their eligibility, to simplify the process for administrative staff at the clinics. Participants were blind to their condition, but physicians and administrative staff were not blind to participant condition. Physicians were not blind to participant condition because they were responsible for delivering the ACT intervention or standard care. They were thus required to know the participant's condition in order to deliver the adequate treatment. Administrative staff was responsible for providing physicians with this information and organizing study paperwork and thus needed to be aware of participant condition as well.

Physician Training

Physicians were trained in the delivery of the weight loss interventions in a 1-hour Skype training session delivered by a clinical psychology doctoral student. During this training session, each physician was taught how to administer the manualized ACT intervention and provided the opportunity to ask questions pertaining to the various skills that they would be required to teach their patients. Copies of the manual

were provided to physicians to follow during sessions. Follow-up training sessions were conducted as necessary to ensure treatment fidelity and clarify questions that arose as physicians began delivering the interventions.

Intervention

Participants in the standard care condition were provided with diet and exercise counselling and psychoeducation from their physicians over the course of 8 sessions, as was routinely done at the clinic. Standard care did not involve any targeted intervention to reduce emotional eating. Thus, in addition to standard care, participants in the ACT condition were taught techniques to reduce their emotional eating. All sessions were approximately 5-10 minutes in length and weight was assessed at each visit. Three overarching skills were taught over the course of the ACT intervention: (1) values clarification and commitment, (2) metacognitive awareness, and (3) distress tolerance (Forman & Butryn, 2014). ACT participants were first taught values clarification and commitment techniques, where they reflected on their reasons for losing weight and how this would improve their quality of life. Participants were taught the BOLD technique (Breathe, Observe sensations, Listen to values, Decide on actions that are in line with values) to use their values to make discussions pertaining to avoiding emotional eating (Ciarrochi, Bailey, & Harris, 2013). Next, participants were introduced to the concept of metacognitive awareness, or recognizing and identifying one's thoughts, feelings, and emotions. Specifically, participants were trained in mindful eating, in order to increase awareness of hunger and satiety cues and avoid eating when not physically hungry (Kristeller & Wolever, 2011). Lastly, participants were taught to increase distress tolerance in the face of negative emotions that typically led to emotional overeating. Participants were taught acceptance techniques (dropping the rope, urge surfing) to use when experiencing triggering emotions or cravings (Bowen & Marlatt, 2009). An intervention summary can be found in Table 1 and the intervention manual (Frayn & Knäuper, 2016) is available from the authors upon request.

Throughout the sessions, physicians formed if-then plans with the patients to specify how to habitually use the ACT techniques to reduce emotional eating in their everyday lives. At the end of each session, participants were given a one-page homework sheet that asked them to monitor their behavior and their use of the ACT techniques during the week. Participants were instructed to bring the homework back with them for the next session so that it could be reviewed with their physician.

Measures

Demographics. At baseline, participants reported basic demographic information including gender, age, English fluency, ethnicity, marital status, educational attainment, employment status, household income, and whether or not they smoked.

Anthropomorphic measures. Weight was measured at each of the eight sessions (primary outcome). Participant body fat percentage was assessed and recorded by their physician at baseline and at completion of the eight sessions (secondary outcome).

Emotional, restrained, and external eating. Participants were pre-screened for emotional eating using the Dutch Eating Behavior Questionnaire (DEBQ; van Strien et al., 1986). The DEBQ is a 33-item questionnaire that assesses three dimensions of eating behaviors: emotional eating (primary outcome), restrained eating (secondary outcome), and external eating (secondary outcome). The emotional eating subscale assesses the reported desire to eat under specific negative emotional conditions such as stress, anxiety, and depression. The DEBQ has high internal consistency and factorial validity (van Strien et al., 1986). The DEBQ was administered again post-intervention.

Distress tolerance. The Distress Tolerance Scale (DTS; Simons & Gaher, 2005), a brief self-report questionnaire that assesses one's ability to tolerate distressing emotions, was completed at baseline and post-intervention (secondary outcome). The scale is made up of items that assess the dimensions of distress tolerance, absorption, appraisal, and regulation. The DTS has high reliability and high discriminant, convergent, and criterion validity (Leyro, Bernstein, Vujanovic, McLeish, & Zvolensky, 2011; Simons & Gaher, 2005).

Table 1. Intervention summary

Session	Session Content	Homework
1 – Emotional eating	The patient and physician discussed emotional eating and what emotions lead to the patient overeating, and what situations in the patient's life lead to these emotions. They went over the patient's DEBQ results to determine what emotions they scored the highest on.	The patient kept an emotional eating diary for 1 week, where each time the patient overate they wrote down the emotions they felt before and after overeating, as well as whether or not they were truly hungry.
2 – Values	The patient and physician discussed what core values are. They discussed why the patient wanted to lose weight and why weight loss is important to them, as well as how their values are related to emotional eating and how emotional eating may hinder their weight loss progress.	The patient wrote down their reasons for wanting to lose weight and how these reasons are related to emotional eating.
3 – Using values to make decisions	The patient and physician briefly reviewed the patient's values related to losing weight. The physician taught the patient the BOLD technique and how to use it to reduce emotional eating, as well as introduced if-then plans and how they can be used to reduce emotional eating.	The patient practiced following if-then plans (IF I want to eat when I experience _____ emotion, THEN I will use the BOLD technique). They journaled their observations from a time when the BOLD technique was used to reduce emotional eating.
4 – Acceptance	The patient and physician discussed the concept of accepting and tolerating negative emotions. The tug-of-war metaphor and the concept of dropping the rope in the face of negative emotions was introduced. They brainstormed alternative ways to respond to negative emotions (instead of eating).	The patient practiced dropping the rope and finding alternatives to eating in response to negative emotions. The patient used the if-then plan "IF I feel _____ emotion, then I will practice dropping the rope and do (alternate behaviour) instead of eating". They journaled a time when this occurred during the week and what the experience was like.
5 – Urge surfing	The patient and physician discussed the concept of urge surfing and how it can be used when experiencing emotions or cravings to prevent overeating.	The patient practiced urge surfing using the if-then plan "IF I feel _____ emotion, THEN I will practice urge surfing". They journaled a time during the week when urge surfing was used and what the experience was like.
6 – Mindful eating	The physician explained the concept of mindful eating and how to do it. They completed a mindful eating exercise to train the patient in how to prevent mindless eating.	The patient practiced mindful eating at home. They used the if-then plan "IF I want to eat my favourite treat, THEN I will practice eating it mindfully". They journaled a time during the week when mindful eating was used and what the experience was like.
7 – Establishing habits	The physician reviewed the skills taught in the first six sessions to help reduce emotional eating and promote long-term weight loss. They discussed the techniques that the patient found most useful and emphasized the importance of practicing these skills routinely to establish a habit.	The patient chose the if-then plans that worked best for reducing their own emotional eating and wrote them down. They tailored them to the emotions the patient finds most triggering.
8 – Commitment to values	The patient and physician discussed setbacks, loss of motivation, and how they are a normal and inevitable part of the weight loss journey. They discussed ways to stay committed to values and goals despite setbacks. The if-then plans the patient had chosen as the most effective were reviewed. The patient wrote those plans on a summary card.	The patient was encouraged to keep the summary card of if-then plans somewhere accessible to act as a constant reminder of values when feeling a lack of motivation.

Mindfulness. At both time points (i.e. baseline, post-intervention) participants completed the Philadelphia Mindfulness Scale (PHLMS; Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008), a 20-item self-report questionnaire that assesses two components of mindfulness: present-moment awareness and acceptance (secondary outcome). The scale has been shown to have good internal consistency and construct validity (Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008).

ACT application. At baseline and post-intervention participants filled out a self-report questionnaire designed to assess the extent of the participant's use of ACT strategies to reduce emotional eating (secondary outcome). This questionnaire was developed for the present study to evaluate participants' real-world application of the intervention. Participants were asked to indicate their level of agreement on a 5-point scale (1 = strongly agree and 5 = strongly disagree) to prompts such as "My values motivate me to lose weight" and "I am able to accept negative emotions and don't have to eat when I'm feeling bad".

Treatment satisfaction. After the eighth session, participants completed a brief, self-developed questionnaire to assess their overall satisfaction with the intervention. Participants were asked to indicate their level of agreement on a 5-point scale (1 = strongly agree and 5 = strongly disagree). Physicians were also asked to complete a similar questionnaire at various points throughout the intervention to obtain their input on its feasibility and effectiveness of the intervention. Open-ended feedback was also collected from physicians, asking for their suggestions on ways to improve the intervention, and to provide insight on patient dropout/non-responsiveness.

Results

Data Analysis

All analyses were conducted in SPSS version 24. Two separate 2 (Condition: Standard Care, ACT Intervention) x 2 (Time: Baseline, Session 8) repeated measures MANOVAs were conducted for the anthropomorphic and questionnaire data outlined above, respectively, with follow-up *t*-tests conducted as necessary. Two separate MANOVAs were conducted to not lose data from incomplete cases (i.e., participants who had completed anthropomorphic but not questionnaire data). Independent samples *t*-tests were conducted for treatment satisfaction data collected at Session 8, whereas chi-square tests were conducted to compare recruitment rates, attrition rates, questionnaire completion, and intervention completion time between conditions. Missing data were not imputed because of the large drop out rates: Imputation with small sample sizes and high rates of missingness has been shown to be highly prone to Type I error (McNeish, 2016).

Sample

Recruitment was conducted from May 7, 2016 to March 7, 2018. The trial was ended prematurely due to low enrolment and mutual decision between participating collaborators to cease recruitment. No important harms or unintended effects occurred.

A total of 87 participants enrolled in the study. Forty-four received the ACT intervention and 43 received standard care. The majority of the sample was female (92.4%) and Caucasian (59.1%). Detailed demographic information and baseline characteristics for those who participated can be found in Table 2.

Figure 1 presents a flow chart outlining recruitment, randomization, and completion rates. As can be seen in the figure, only 46.0% of participants who enrolled completed all eight sessions and even fewer completed the requisite questionnaires. Figure 2 presents a bar graph with the number of participants who completed each of the eight sessions, showing that the majority of the dropouts occurred before Session 4, with 43.7% of participants completing four sessions or less. Figure 3 presents a scatterplot of completion times (with each marker representing one participant) for those who finished Session 8, ranging from 7 weeks to over 50 weeks. The average time to complete all eight sessions was 16.3 weeks (i.e., approximately bi-weekly sessions). No differences between conditions were found on any of these variables.

Figure 1. CONSORT flow chart

Figure 2. Cumulative session completion by condition.

Table 2. Baseline characteristics

	Standard Care	ACT Intervention
Demographics		
Age, mean (<i>SD</i>) (years)	46.87 (15.18)	46.94 (14.21)
Gender, <i>n</i> (%) female	30 (96.77)	31 (88.57)
Caucasian, <i>n</i> (%)	15 (48.39)	24 (68.57)
Married, <i>n</i> (%)	17 (53.13)	19 (54.29)
Education, <i>n</i> (%) some college/university	15 (48.39)	11 (31.43)
Employed, <i>n</i> (%)	19 (61.29)	20 (57.14)
Household Income, > \$40,001, <i>n</i> (%)	11 (35.48)	17 (48.57)
Smoker, <i>n</i> (%)	2 (0.06)	3 (0.09)
Anthropomorphic Measures		
Weight, mean (<i>SD</i>) (kg)	96.01 (25.66)	96.93 (25.85)
Body fat percent, mean, (<i>SD</i>)	43.53 (7.70)	43.19 (7.77)
Self-Report Measures		
DEBQ emotional eating, mean (<i>SD</i>)	4.09 (0.53)	3.96 (0.49)
DEBQ external eating, mean (<i>SD</i>)	3.57 (0.65)	3.56 (0.56)
DEBQ restrained eating, mean (<i>SD</i>)	3.18 (0.64)	3.17 (0.69)
DTS total score, mean (<i>SD</i>)	2.48 (0.94)	2.69 (0.84)
PHLMS awareness, mean (<i>SD</i>)	36.03 (6.01)	36.06 (6.78)
PHLMS acceptance, mean (<i>SD</i>)	24.94 (7.79)	26.00 (7.00)
ACT assessment, mean (<i>SD</i>)	2.92 (0.73)	2.90 (0.70)

Notes. $n = 43$ and $n = 44$ for the standard care and ACT intervention conditions for anthropomorphic and DEBQ data. $n = 31$ and $n = 35$ for the standard care and ACT intervention conditions for the remaining questionnaire data. No significant differences were observed between conditions on anthropomorphic or questionnaire measures at baseline using independent samples *t*-tests ($p < .05$)

Figure 3. Intervention completion time in weeks. Notes. $N = 40$ Each marker presents one participant.

Anthropomorphic Measures

Anthropomorphic data was available and analyzed from 40 participants at Sessions 1 and 8. The MANOVA conducted for weight and body fat percentage yielded no significant multivariate main effect of time or interaction between time and condition, and no univariate main effects or interactions. That is, individuals in neither condition lost significant amounts of weight or body fat.

Self-Report Measures

Self-report data was available and analyzed from 26 participants at Sessions 1 and 8. The MANOVA conducted for the DEBQ subscales, DTS, PHLMS subscales, and ACT assessment yielded a significant multivariate main effect of time, $F(7, 18) = 4.57$, $p = .004$, partial $\eta^2 = .64$, but no time by condition interaction. Participants in both conditions improved on all of the measures described above. Univariate results for each of the measures are described below. Main effects of time were found for all DEBQ subscales, distress tolerance, and the ACT assessment. Mean changes in all outcomes from baseline to Session 8 pooled across conditions and separately by condition can be found in Table 3.

Emotional, restrained, and external eating. Across conditions, there was a significant main effect of time on emotional eating showing a reduction of emotional eating from baseline to Session 8. There was no significant interaction between time and condition. Similar results were found for external eating, which decreased from baseline to Session 8 for both conditions. There was no significant interaction by condition. A main effect but no interaction was also found for restrained eating, which increased from baseline to Session 8.

Table 3. Mean changes with confidence intervals in all outcomes from baseline to Session 8 separately by condition and pooled across conditions

	Standard Care	ACT intervention	<i>t</i>	<i>df</i>	<i>p</i>	Cohen's <i>d</i>	Pooled	<i>F</i>	<i>df</i>	<i>p</i>	partial η^2
Anthropomorphic Measures											
Weight, kg	1.56 [-7.49, 10.62]	0.71 [-2.32, 3.76]	0.18	38	.861	0.06	1.16 [-3.60, 5.92]	0.23	1, 38	.636	.01
Body fat %	-0.72 [-1.53, 0.09]	0.16 [-0.92, 1.23]	-1.38	38	.175	-0.45	-0.30 [-0.95, 0.35]	0.78	1, 38	.382	.02
Self-Report Measures											
Emotional eating	-0.92 [-1.35, -0.49]	-0.91 [-1.47, -0.35]	-0.04	24	.968	-0.02	-0.92 [-1.23, -0.60]	33.05	1, 24	< .001	.58
External eating	-0.52 [-0.98, -0.06]	-0.31 [-0.78, 0.16]	-0.70	24	.489	-0.29	-0.42 [-0.73, -0.12]	7.50	1, 24	.011	.24
Restrained eating	0.27 [-0.01, 0.55]	0.26 [-0.16, 0.68]	0.06	24	.954	0.02	0.27 [0.04, 0.49]	5.47	1, 24	.028	.19
Distress tolerance	0.52 [0.18, 0.86]	0.04 [-0.31, 0.39]	2.14	24	.043	0.87	0.30 [0.05, 0.54]	6.16	1, 24	.020	.20
Mindfulness											
Awareness	-1.50 [-4.51, 1.51]	1.67 [-1.76, 5.10]	-1.52	24	.142	-0.62	-0.04 [-2.23, 2.16]	0.01	1, 24	.937	.00
Acceptance	1.64 [-2.16, 5.45]	-1.83 [-3.82, 0.15]	1.76	24	.095	0.72	0.04 [-2.18, 2.25]	0.01	1, 24	.928	.00
ACT application	-0.60 [-1.15, -0.04]	-0.43 [-1.06, 0.20]	-0.43	24	.673	-0.17	-0.52 [-0.91, -0.13]	7.09	1, 24	.014	.23

Notes. 40 participants were included in the analyses for anthropomorphic measures and 26 participants were used in the analyses for self-report measures.

Distress tolerance. A significant interaction between time and condition was found for distress tolerance, $F(1, 24) = 6.16$, $p = .020$, partial $\eta^2 = .20$. Follow-up *t*-tests revealed that, unexpectedly, distress tolerance increased

in the control condition from baseline to Session 8 ($M = 2.35$ and $M = 2.87$, respectively), $t(13) = -3.30$, $p = .006$, while it remained the same in the intervention condition ($M = 2.71$ and $M = 2.75$, respectively), $t(11) = -0.24$, $p = .813$.

Mindfulness. There were no significant main effects or interactions for the PHLMS Awareness or Acceptance subscale scores.

ACT application. There was a significant main effect of time on participants' ACT assessment scores from baseline to Session 8, such that scores improved over time. Participants in both conditions endorsed being better able to cope with negative emotions without eating and that their values motivated them to lose weight.

Treatment Satisfaction

Treatment satisfaction did not significantly differ between conditions. All participants endorsed that the intervention helped to reduce their emotional eating, was easy to follow, and was applicable to their everyday life. Physicians also endorsed that the ACT intervention was easy to deliver, required minimal preparation time, and perceived it to be effective with their patients. Results for specific treatment satisfaction survey items from patients and physicians can be found in Tables 4 and 5, respectively.

Open-ended feedback from physicians revealed limited suggestions on ways to improve the intervention. The only feedback provided was to shorten the self-report questionnaire component of the study to facilitate ease of delivery at the clinics (i.e., some physicians reported that the questionnaires took too long for patients to complete). Reasons provided for patient dropout and non-responsiveness included: lack of motivation, not completing the homework and not practicing the skills taught, and difficulty attending regular appointments.

Table 4. Patient treatment satisfaction

	Standard Care	ACT Intervention	t	df	p	Cohen's d
	Mean (SD)	Mean (SD)				
1. The program reduced my emotional eating.	2.33 (0.72)	2.00 (0.58)	1.33	26	.194	0.52
2. The program was easy to follow.	2.13 (0.83)	2.15 (0.55)	-0.75	26	.941	-0.29
3. I applied what I learned in this program to my everyday life.	1.87 (0.74)	2.08 (0.49)	-0.87	26	.394	-0.34
4. I can see myself using what I learned in the program in the long term.	1.67 (0.82)	1.85 (0.90)	-0.55	26	.585	-0.22
5. I consistently completed the homework assignments between sessions.	-	2.31 (0.85)	-	-	-	-
6. The homework wasn't too difficult for me to complete.	-	2.15 (1.07)	-	-	-	-
7. It would be easier if the homework was completed online vs. on paper.	-	2.69 (1.18)	-	-	-	-
8. My physician delivered the program effectively and was supportive of helping me to achieve my weight loss goals.	1.73 (0.88)	1.46 (0.52)	1.01	26	.324	0.40

Notes. Scores represent mean ratings on a 5-point Likert-type rating scale from 1 = strongly agree to 5 = strongly disagree.

Table 5. Physician feedback

	Physician Rating
	Mean (SD)
1. Ease of delivery (1 = very difficult, 5 = very easy).	4.29 (0.76)
2. Required preparation time (1 = very little, 5 = too much).	2.71 (0.76)
3. Adherence to the manual (1 = did not adhere, 5 = adhered closely).	4.29 (0.76)
4. Patient comprehension difficulty (1 = no difficulty, 5 = a lot of difficulty).	1.71 (0.76)
5. Perceived patient resistance (1 = very resistant, 5 = very embracing/engaged).	4.00 (0.82)
6. Perceived effectiveness compared to usual treatment (1 = less effective, 5 = more effective).	3.86 (0.69)
7. Screening effectiveness (1 = patients were not emotional eaters/program did not apply, 5 = patients were emotional eaters/program was well-suited to their needs).	3.71 (0.95)

Notes. $N = 7$.

Discussion

Despite the potential for physicians to deliver weight loss interventions in primary care, the present study found limitations with the feasibility of this mode of intervention delivery. Attrition was 54.0%, with only 40 of the 87 individuals who initiated the intervention completing all eight sessions. Of the 47 participants who dropped out, 31 (66.0%) did so by Session 4 (i.e., halfway through the intervention). Participants in neither condition lost weight nor decreased in body fat percentage. However, individuals in both conditions displayed decreases in emotional eating and external eating as well as increases in restraint eating, distress tolerance, and a clarification of values. In addition, both physicians and patients reported high treatment satisfaction. Physicians endorsed that the intervention was easy to deliver and well received by their patients and patients endorsed that the intervention helped to reduce their emotional eating and was applicable to their everyday lives. It should be noted that treatment satisfaction was assessed by non-validated questionnaires and that high treatment satisfaction for participants may have been influenced by high attrition.

Lack of weight loss or decreased body fat percentage in either group may be explained by several factors. First, variability in intervention completion time likely contributed to the absence of weight loss. Average intervention completion time for all eight sessions was 16 weeks (i.e., bi-weekly sessions), ranging from 8 to 50 weeks across participants. For those who took longer to complete the intervention, the lack of regular attendance and thus lower intensity likely prevented consistent behavior change that is needed to facilitate weight loss. Attrition in the present study was also high and so results for both weight loss and other outcome variables should be interpreted with caution. Second, the lack of weight loss suggests that participants were not consistently altering their diet and exercise habits. Given that the ACT intervention specifically targeted instances of emotional eating and not other eating occasions, it may be that patient's overall dietary habits did not change substantially enough to facilitate weight loss.

The lack of group differences in significant improved outcomes (i.e., emotional eating, external eating, distress tolerance, values clarification) suggests there may have been contamination such that the control group also received strategies by the physicians to reduce their emotional eating. Given that physicians reported finding the ACT intervention to be useful, it may be that they applied some variation of these strategies to patients in the control group who brought up concerns with emotional eating, in order to facilitate the most effective care. Although this may not be desirable from a research standpoint, given that the present study was conducted in a real-world setting, it is understandable that physicians may have been motivated to use the training they received to most effectively help their patients. Future research could explore such limitations of conducting research in less controlled environments (i.e., real world settings) such as primary care.

Addressing Lack of Training in the Present Study

The present study aimed to address physicians' lack of training in behavior change (Plourde & Prud'homme, 2012) in a concise manner by having clinical psychology doctoral students deliver virtual training and provide ongoing support. Past research has suggested that physicians are open to receiving training in this area (Dewhurst, Peters, Devereux-Fitzgerald, & Hart, 2017) and the present study generally supported this. Many of the physicians, particularly those who were younger, were receptive to the training and delivery of the ACT intervention to their patients. Although some physicians initially reported skepticism towards the intervention, quantitative feedback collected throughout the intervention suggests that physicians overall had positive views of the intervention with regards to its perceived efficacy and ease of delivery. Thus, their opinions may have changed as they delivered the intervention and saw that it was positively received by patients.

More research is needed to better identify factors that contribute to physician's willingness and openness to facilitate behavioral interventions. It may be that as behavior change is gradually incorporated into medical school curricula (Hauer, Carney, Chang, & Satterfield, 2012; Hivert et al., 2016), the newer generation of physicians acknowledges the need for effective behavioral weight loss interventions and may be more open to participating in continuing education to learn how to deliver such interventions. This emphasizes the need for the continued addition of weight management and behavior change training to medical school curricula and increasing the availability of continuing education programs in this area.

Our lack of significant changes in outcomes may have been influenced by the brevity of the training that physicians received. Although training was tailored to physicians' schedules to be as brief as possible (i.e., 1 hour), with follow-up sessions conducted as needed, this dose may still have been too small. Other brief interventions have provided physicians with 4-6 hours of training for a 21-session intervention (Wadden et al., 2019). Thus, closer to 2 hours of training may be more effective for a comparably brief 8-session intervention.

Addressing Lack of Time in the Present Study

The present study also aimed to address physicians' lack of time to deliver behavioral weight loss interventions by providing them with a brief, manualized, 8-session intervention to deliver to their patients. Our attrition rates suggest that even condensing elements from existing interventions (e.g., Forman et al., 2013) down to as few as eight sessions is unfeasible for delivery in a primary care setting. This may be addressed in future interventions by further condensing interventions into their most active ingredients to deliver over fewer sessions. Past research has found that behavioral interventions, including emotional eating and weight-related interventions, can be effectively delivered in as little as one day (Dindo et al., 2017; Frayn, Khanyari, & Knäuper, 2019; Lillis, Hayes, Bunting, & Masuda, 2009). Future research is needed to test if this would be effective for weight loss interventions in primary care.

In addition to further condensing future interventions, it may be useful to examine and address barriers to treatment retention. In the present study, patients who completed the intervention endorsed high treatment satisfaction. However, it is not known what motivated other patients to drop out of the study. Treatment retention may be augmented by the use of Therapeutic Assessment, an approach that has been found to increase the effectiveness of short, manualized treatments (Kraupl-Taylor, Ng, & Low, 2008; Morey, Lowmaster, & Hopwood, 2010). Additionally, interventions with high retention have been found to address knowledge, attitudes, and barriers to treatment (Greene, Bina, & Gum, 2016). Qualitatively assessing these elements could inform ways to improve retention in future interventions.

Alternatively, delivery by other health care professionals such as nurses, physician's assistants, and dietitians, in conjunction with physicians, may allow for more time to be allocated to effectively delivering such interventions to patients. Past studies have found that delivery of behavioral weight loss interventions by trained non-specialists in primary care can lead to clinically significant weight losses of 5-10% (Nanchahal et al., 2012; Wadden et al., 2011). However, these interventions were not brief; they were delivered over 1 to 2 years, rendering them costly.

Conclusion

Overall, the present study found positive effects of both interventions on emotional eating and related outcomes such as distress tolerance and values clarification. The ACT intervention was also positively received by physicians and patients alike, all of which reported high treatment satisfaction. Despite these positive findings, our study also identified limitations with delivering an 8-session intervention in a real-world setting. Namely, participants struggled to complete all eight sessions, likely rendering the intervention less effective than its potential. The lessons learned from the present study, including increasing intervention brevity and testing delivery by other health care professionals, may be useful in increasing the effectiveness and feasibility of future interventions in primary care settings.

Recommendations for Future Interventions

Interventions may be more effectively delivered by other health care professionals (physician assistants, nurses, dietitians, etc.) who have more time and more training in behavior change. This could be done in collaboration with physicians and psychologists to offer patients access to a multi-disciplinary team to address their weight and health concerns.

If physicians deliver such programs, it is important to ensure motivation and training. Physicians' openness and confidence in delivering behavioral weight loss programs hinges on receiving sufficient training in this field, ideally beginning in medical school and in subsequent continuing education.

Further condensing and testing existing, effective weight loss interventions may be useful to determine the minimum effective dose. This may better facilitate the delivery of such interventions in primary care settings where time and resources are often limited.

Conducting focus groups or needs assessments with physicians, other health care professionals, and patients would be useful to gain their insight into how best to develop such interventions to be as efficient and effective as possible for all stakeholders. This feedback could be used to guide development of such interventions, tailoring them to the target population and setting. This may help to increase the integration of behavioral interventions into primary care, thus broadening their dissemination to individuals seeking help with changing health-related behaviors.

Ethical Statement: 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 NCT03611829, and the trial protocol can be accessed there.

Conflict of Interest: The authors have no conflict of interest with respect to this publication.

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