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Acceptance and Commitment Therapy as a Novel Treatment for Eating Disorders: An Initial Test of Efficacy and Mediation

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Abstract

Eating disorders are among the most challenging disorders to treat, with even state-of-the-art cognitive-behavioral treatments achieving only modest success. One possible reason for the high rate of treatment failure for eating disorders is that existing treatments do not attend sufficiently to critical aspects of the disorder such as high experiential avoidance, poor experiential awareness, and lack of motivation. These variables are explicit targets of Acceptance and Commitment Therapy (ACT). The current study examined the efficacy of an ACT-based group treatment for eating disorders by examining whether the addition of ACT groups to treatment-as-usual (TAU) at a residential treatment facility for eating disorders would improve treatment outcomes. TAU patients received an intensive residential treatment, while ACT patients received these services but additionally attended, depending on diagnosis, either ACT for anorexia nervosa groups

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or ACT for bulimia nervosa groups. Although individuals in both treatment conditions demonstrated large decreases in eating pathology, there were trends toward larger decreases among those receiving ACT. ACT patients also showed lower rates of rehospitalization during the 6 months after discharge. Overall, results suggest that ACT is a viable treatment option for individuals with eating pathology and further outcome research is warranted.

Keywords
eating disorders, acceptance and commitment therapy, treatment outcome

Eating disorders are exceptionally difficult to treat, particularly among adult patients with a long course of illness. These disorders tend to be ego-syntonic, with many individuals presenting with extreme ambivalence about their need for treatment (Fairburn, 2008). Inpatient or residential treatment is often needed to manage severe adult eating disorders such as anorexia nervosa or treatment refractory bulimia nervosa (Bowers, Andersen, Evans, Osview, & Munich, 2008), and though it can produce short-term improvements, the long-term efficacy is low, and relapse rates are particularly high (Wiseman, Sunday, Klapper, Harris, & Halmi, 2000). Although empirically supported treatments exist for adult patients with bulimia nervosa, those that are considered effective lead to symptom remission for less than 50% of those seeking treatment (G. T. Wilson & Shafran, 2005). For adults with anorexia nervosa, there are currently no treatments that have achieved empirical support (Agras et al., 2004; Kaplan, 2002; G. T. Wilson, Grilo, & Vitousek, 2007).

Cognitive-Behavior Therapy (CBT) for Eating Disorders

Among adult patients with bulimia nervosa, CBT produces large reductions in binge eating, purging, and other compensatory behaviors (e.g., laxative/diuretic use, fasting; Fairburn, 2008; Treasure et al., 1994). Not only does CBT produce rapid changes in the eating patterns of bulimic patients, but these changes also tend to be well maintained over time (Waller et al., 1996). Despite evidence that CBT is an effective treatment for bulimia nervosa, a large subset (30%-50%) of patients remains symptomatic enough to degrade the quality of life (Fairburn, 2008; G. T. Wilson, 2005). In the case of adults

with anorexia nervosa, brief manualized CBT appears to have little efficacy, although more conclusive studies are needed (McIntosh et al., 2005; G. T. Wilson et al., 2007). Thus, although CBT has been shown to result in statistically significant reductions in eating pathology, particularly for those with bulimia nervosa, a sizable number of eating disorder patients do not benefit from current treatments.

Reasons for Limited Effectiveness of Current Treatment

A number of theoretical explanations exist for CBT's limited efficacy with eating disorders. One explanation concerns the lack of motivation for treatment. Because eating disorders are highly ego-syntonic, patients may be reluctant to engage in a treatment with a direct agenda to modify eating disordered thoughts and may be unwilling to make the suggested behavior changes (normalization of eating, reducing dietary restraint, etc.) to the degree needed to see significant improvements (Vanderlinden, 2008). Instead, it may be beneficial for patients to learn how to change their "relationship" to disordered eating thoughts and urges, that is, learning to accept the presence of distressing thoughts and feelings without using these momentary experiences as a guide for behavior.

Acceptance and Commitment Therapy (ACT)

ACT is one of several novel acceptance-based models of CBT that emphasize changing behaviors rather than altering internal experiences (i.e., thoughts, sensations, feelings; Forman & Herbert, 2009; Hayes, Masuda, Bissett, Luoma, & Guerrero, 2004). Experiential avoidance, or efforts to reduce distressing internal experiences even when doing so is ineffective or impairs the ability to engage in desired behaviors, is thought to be at the root of much psychological suffering (Hayes et al., 2004). Ultimately, prioritizing the avoidance of distressing thoughts, feelings, or urges reduces the ability to take behavioral steps that are needed to live a valued life. Therefore, ACT teaches patients to obtain psychological distance (i.e., defuse) from distressing internal experiences; clarify overarching personal values; create goals that can help patients live a more fulfilling, meaningful life; and increase willingness to experience negative internal experiences in the service of valued behavior. Currently, there are more than 50 published treatment studies demonstrating the model's efficacy for a wide range of health concerns (Gifford et al., 2004; Gregg, 2004; McCracken & Eccleston, 2006) and

psychiatric disorders (Bach & Hayes, 2002; Dalrymple & Herbert, 2007; Twohig, Hayes, & Masuda, 2006; Woods, Wetterneck, & Flessner, 2006). Recent meta-analyses have found that ACT is consistently better than control conditions and at least as effective as established treatments such as CBT or BT (Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Powers, Zum Vorde Sive Vording, & Emmelkamp, 2009). However, ACT's effectiveness at treating eating disorders remains understudied.

Acceptance-Based Behavioral Therapies for Eating Disorders: Theoretical and Empirical Evidence

A growing body of research suggests that core constructs targeted by ACT such as experiential avoidance, mindful awareness, and values clarification are central to the development and maintenance of eating disorders. Experiential avoidance has been shown to be particularly high in eating disorder populations (Cockell, Geller, & Linden, 2002; Keyser et al., 2009; Mizes & Arbitell, 1991; Orsillo & Batten, 2002), and it appears that eating disorder symptoms often function as a way to help the patient avoid upsetting internal experiences (Hayes & Pankey, 2002; Keyser et al., 2009; Paxton & Diggens, 1997; Serpell, Treasure, Teasdale, & Sullivan, 1999). Individuals with eating disorders become hyperfocused on their body and food intake as a means of avoiding feelings of rejection, imperfection, failure, vulnerability, and intimacy (Hayes & Pankey, 2002; Keyser et al., 2009; Paxton & Diggens, 1997; Pells, 2006). Patients with eating disorders also tend to be less aware of their emotions than healthy individuals, which may make it more challenging for these patients to defuse from these internal experiences (Merwin et al., 2011; Merwin, Zucker, Lacy, & Elliot, 2010). Previous research has demonstrated that individuals with eating disorders show deficits in emotion recognition and poor interceptive awareness (Harrison, Sullivan, Tchanturia, & Treasure, 2009; Zonnevylle-Bender et al., 2004) and have poor emotional awareness (Gilboa-Schechtman, Avnon, Zubery, & Jeczmien, 2006; Keyser, Pastelak, et al., 2009; Sim & Zeman, 2004). Finally, women with eating disorders, and particularly those with anorexia nervosa, tend to strongly value their disorder and experience it as ego-syntonic (Cockell et al., 2002; Nordbo, Espeset, Gulliksen, Skarderud, & Holte, 2006; Schmidt & Treasure, 2006; Serpell et al., 1999). Because weight, shape, and eating behavior are so highly valued, other areas of life become much lower priorities and engagement in related behaviors decreases. Patients with eating disorders also tend to have poor clarity for values unconnected with food and body image (Fairburn, 2008). Values clarity may be particularly difficult to achieve in such a

risk-averse population because they may fear caring about things that are less tangible or viewed as more difficult to achieve than a specific body shape or weight (Merwin & Wilson, 2009). Helping patients clarify and take committed action toward valued domains outside of their weight and shape may foster motivation to engage in treatment and could encourage patients to reengage with areas of life beyond the drive for thinness.

Few studies have investigated the efficacy of ACT for eating disorders; however, there are suggestions that it may be an effective treatment for this population. Several small pilot studies have demonstrated promise for acceptance-based CBT interventions such as dialectical behavioral therapy (Safer, Telch, & Chen, 2009), mindfulness-based cognitive therapy (Kristeller, Baer, & Quillian-Wolever, 2006), and functional contextual treatment (Anderson & Simmons, 2008) in the treatment of binge eating and bulimia nervosa. Moreover, patients with subthreshold eating pathology who were randomized to ACT showed greater reductions in eating pathology than those randomized to traditional CBT (Juarascio, Forman, & Herbert, 2010). However, despite these positive results, the only data available for ACT as a treatment for eating disorders are case studies (Berman, Boutelle, & Crow, 2009; Heffner, Sperry, Eifert, & Detweiler, 2002) and a modified family-based treatment (Timko, Zucker, & Merwin, 2012).

Current Study

The current study sought to empirically investigate the efficacy of a group-based ACT treatment for a population of adult residential patients with an eating disorder. The study took place at a well-known residential treatment facility for eating disorders in the Mid-Atlantic region of the United States. The treatment package delivered at the residential facility has been shown to produce moderate to large changes in disordered eating at post-treatment (Lowe, Davis, Annunziato, & Lucks, 2003). Although effects are large, most patients are still in the clinical range of symptomatology at discharge, suggesting room for improvement. The primary goal of the study was to assess whether ACT plus treatment-as-usual (TAU) could produce larger reductions in disordered eating than TAU alone. It was hypothesized that individuals receiving the ACT groups would show lower eating pathology (both on self-report measures and in a fear food challenge task) by post-treatment, and would be less likely to require rehospitalization in the months after discharge. It was also hypothesized that number of sessions attended (i.e., dosage of treatment) would be positively associated with symptom improvement. An exploratory hypothesis was that eating-disorder diagnosis (i.e., anorexia

nervosa vs. bulimia nervosa spectrum diagnosis) would moderate the effect of treatment such that ACT may be more effective for a specific diagnostic population. Although ACT appears to be particularly well suited to treat anorexia nervosa (Merwin & Wilson, 2009), bulimia nervosa tends to be more responsive to treatment (Fairburn, 2008); thus, no directional hypotheses were predicted for this series of analyses. Finally, we hypothesized that changes in ACT-related process measures would mediate improvements in eating disorder outcome measures.

Given the pilot nature of this first study and the comparison with a treatment that already produces moderate to large effects, patterns, size of effects, and statistical trends rather than formal statistical significance are emphasized.

Method

Participants

The study took place at a residential treatment facility for eating disorders in the Mid-Atlantic region of the United States (The Renfrew Center). Adolescents were excluded because they had a different treatment schedule in the evenings such that they could not attend ACT groups on a regular basis. All women had a diagnosis of anorexia nervosa, bulimia nervosa, or eating disorder not otherwise specified in the anorexia nervosa or bulimia nervosa spectrum, based on the criteria from the Structured Clinical Interview for *DSM* Disorders (SCID; First, Spitzer, Gibbon, & Williams, 2002). There were no other exclusion criteria, and patients with comorbid disorders were included in the study. Patients were under no pressure or obligation to participate in this study, and were able to attend the ACT groups even if they did not agree to complete study-related measures.

A total of 159 women who met inclusion criteria were admitted to the Renfrew Center during the time period of data collection. Of the 159 who were approached regarding possible participation, 140 consented to take part in the study. The average age of the sample was 26.74 years ($SD = 9.19$), with a range of 18 to 55. The sample was predominantly Caucasian (89.3%, $n = 125$), with small proportions of other racial groups (African American = 3.6%, Asian = 2.1%, Hispanic = 2.9%, Other = 1.4%). The sample had a relatively long eating disorder history ($M = 10.75$ years, $SD = 9.08$) with an average age of onset at 16.43 years ($SD = 5.5$). We grouped individuals into AN (i.e., <85% of their ideal weight; $n = 66$, 47.1%) or BN (i.e., ≥85% of ideal weight and exhibited binge eating and/or compensatory behaviors; $n = 74$, 52.9%) spectrum diagnoses. If patients had recently (i.e., within the preceding

4 weeks) gained enough weight at another treatment facility to place their percentage above 85% and did not engage in significant binge eating and/or compensatory behaviors, they were still considered AN spectrum. These categories have been used in previous studies, and appear to accurately distinguish between pathologies (Fairburn & Walsh, 2002; Walsh & Garner, 1997). The majority of individuals met criteria for at least one other psychiatric diagnosis, most commonly a mood disorder (77.8%), generalized anxiety disorder (43.5%), and substance abuse (17%) or dependence (6.4%) disorders, as assessed by a semistructured clinical interview administered by a master's-level intake coordinator at the residential treatment facility before beginning treatment.

Measures

Disordered eating was measured via self-report, a food challenge task, and clinical interview. The *Eating Disorder Examination Questionnaire* (EDE-Q; Fairburn & Beglin, 1994) is a self-report version of the EDE interview. It covers a 4-week time period, and it assesses the core features of eating disorders. Four subscales may be derived from the instrument, together with a global score: Restraint, Weight Concern, Shape Concern, and Eating Concern. Internal consistency and test–retest reliability are both excellent (Luce & Crowther, 1999). Cronbach's alphas for the current study were as follows: Global = .91, Restraint = .82, Eating Concern = .70, Shape Concern = .90, and Weight Concern = .86. The SCID (First et al., 2002) is a diagnostic exam used to determine *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., *DSM-IV*; American Psychiatric Association, 1994) Axis I disorders. For this study, only the eating disorders section of the SCID was used to assess initial diagnostic status. Reliability for the eating disorder section of the SCID has shown acceptable interrater and test–retest reliability (Zanarini et al., 2000). *Willingness to consume a forbidden food* was measured using a food challenge. The food challenge presented participants with 60 g of a forbidden food (chosen from rice cakes, animal crackers, wheat thins, chocolate chip cookies, and potato chips). The food item presented to each participant was based on the participant's self-reported willingness to try the challenge food; patients were presented with the item they reported being willing to try but that they ranked as the most challenging to consume. The food item participants selected at baseline was the same food item presented for the food challenge at post-treatment to allow for ease in comparison between the 2 time points. Patients were asked to "eat as much of it as you can"[1] and were given 10 min to consume the challenge snack. The food was weighed before

and after consumption, and grams, calories, and percentage of food consumed were recorded. Percentage of food consumed was used as the primary outcome measure to standardize across test foods; however, the pattern of results was similar using other measures. Test foods were selected with equivalent frequency, $\chi^2(4) = 2.12$, $p = .71$, and percentage of food consumed at baseline was small ($M = 13.0$, $SD = 22.0$) and did not differ significantly between most of the test foods,[2] indicating that the procedure resulted in a distribution of foods such that most participants found it difficult to complete the food challenge. Preliminary data for the food challenge task indicate acceptable reliability and validity (Shaw et al., 2013). However, analyses of food challenge data revealed unexpectedly high consumption levels at baseline for a subset of participants, thereby creating a ceiling effect for this subgroup (i.e., the measure did not allow significant room for improvement). As a result, food challenge analyses only included participants ($n = 69$) whose baseline consumption was less than 21.35% (which was the mean consumption at post-treatment).[3]

Defusion was measured via the *Drexel Defusion Scale* (DDS; Forman, Herbert, et al., 2012), a self-report questionnaire assessing the extent to which a person is able to distance himself or herself from negative thoughts, feelings, and physiological reactions. The measure begins with a 3-paragraph definition of defusion, and is followed by 10 items presenting common scenarios that elicit negative internal experiences. The participant is asked to respond how well they are able to defuse from the negative internal experiences on a Likert-type scale from 0 (*not at all*) to 5 (*very much*). Higher scores on this measure reflect a greater ability to defuse from negative internal experiences. It has been demonstrated to have acceptable reliability. Cronbach's alpha for the current study was .83.

Psychological Acceptance was measured with the *Acceptance and Action Questionnaire–II* (AAQ-II; Bond et al., 2011), seven-item version, which assesses experiential avoidance, or the tendency to avoid unwanted internal experiences and willingness to engage in behaviors despite unpleasant internal experiences. It has demonstrated adequate reliability and validity (Bond et al., 2011). Cronbach's alpha for the current study was .92.

Emotion Regulation was measured with the *Difficulties in Emotion Regulation* (DERS; Gratz & Roemer, 2004), a 36-item multidimensional self-report measure assessing individuals' characteristic patterns of emotion regulation. It contains six subscales: Nonacceptance of Emotional Responses, Difficulties Engaging in Goal-Directed Behavior, Impulse Control Difficulties, Lack of Emotional Awareness, Limited Access to Emotion Regulation Strategies, and Lack of Emotional Clarity. Preliminary empirical

studies have demonstrated good overall internal consistency and adequate subscale reliability with Cronbach's alpha >.80 for each subscale (Gratz & Roemer, 2004). Cronbach's alpha for the current study ranged from .91 to .95 for the subscales.

General Symptoms were evaluated weekly using the *Brief Symptom Questionnaire* (BSQ), a seven-item self-report measure with ratings provided on a 7-point Likert-type scale (Forman, Chapman, et al., 2012). Items measure outcome (symptom intensity, progress toward goals) and theorized mechanisms of change (e.g., cognitive acceptance vs. change, affective acceptance vs. change, dysfunctional thinking, cognitive defusion, and willingness) thought to occur in both ACT and more conventional types of CBT. A number of other items were added to this measure to assess weekly changes in eating disordered behavior, but for the purpose of the present study, only the five mediator-based items were utilized. These questions assessed changes in experiential acceptance (both cognitive and emotional), dysfunctional thinking, willingness, and defusion, using a single item and the text for the items can be found in the manuscript of Forman, Chapman, and colleagues (2012). Prior research has demonstrated that the individual items on the BSQ were correlated with the closest-corresponding established measure, suggesting that these items were generally representative of the constructs they were designed to measure (Forman, Chapman, et al., 2012). As each item on the measure is not necessarily related to other items, no Cronbach's alpha was calculated.

Rehospitalization was gathered both directly from Renfrew treatment records and from data provided by participants to Renfrew in response to an email sent directly from the treatment center at 6 months following discharge.[4]

Weight and Height were assessed using a medical grade scale and a stadiometer. Assessment was completed by nursing staff at the residential treatment facility.

Treatment Acceptability was assessed using the Treatment Acceptability Questionnaire (TAQ, unpublished). The TAQ was created for the current study to assess treatment acceptability in both the TAU and TAU + ACT conditions. Participants were instructed to answer in response to the entire treatment package they received while at Renfrew. The measure contained 6 items rated on a Likert-type scale from 1 to 7, with 7 being the highest level of treatment acceptability. Domains included acceptability (Question 1), morality (Question 2), effectiveness (Question 3), negative side effects (Question 4), knowledge of staff (Question 5), and trustworthiness (Question 6). Total scores on the treatment acceptability measure higher than a mean of 30 indicate high levels of treatment acceptability.

Procedure

The study was approved by the Institutional Review Board at Drexel University and by the Core Research Committee at The Renfrew Center. Due to use of a preexisting residential treatment as a comparison condition, pure random assignment was not feasible. We therefore used a nonequivalent groups design where half of the participants received standard TAU and half received TAU + biweekly ACT groups. Given the threats to internal validity observed in nonequivalent group designs, a switching replication design was utilized to as best as possible to ensure that observed differences in groups were due to the interventions (Cook & Campbell, 1979; Reichardt, 2005). Groups were run in three sequential phases and all participants entering the treatment center during a given phase were assigned to the same condition. The order of the sequence, that is, TAU, ACT, TAU, was chosen through random assignment. Each treatment phase was followed by a 3-week wash-out period, which resulted in no patient being in the treatment facility during two different waves.

Assessments. Main assessments occurred at pre- and post-treatment. Patients who were above the age of 18 and admitted to the treatment facility were approached within 3 days of their admission date by a member of the research team to determine whether they would be interested in participating in the study, and if so, to review the consent form. If a patient consented to being part of the treatment study, she underwent a 1-hr pretreatment assessment that included a brief structured interview, food challenge, and a questionnaire packet including all ACT process variables. Additional eating disorder specific measures (including the main outcome measure for the study, the EDE-Q) were administered during a subsequent assessment that is part of the standard Renfrew intake and discharge procedure. Both assessments were repeated between 5 and 0 days before discharge. The BSQ was administered weekly.

TAU. Treatment at the residential facility is based on a comprehensive system designed to normalize eating patterns, stabilize or increase weight, and eliminate compensatory behaviors. The theoretical orientation of the program is eclectic and includes psychodynamic, feminist, interpersonal, and cognitive-behavioral components. Although most of the group and individual treatments are eclectic, many of the more behavioral interventions inherent in the residential treatment program (i.e., regular weighing, normalization of eating, fear food exposures) are components of CBT for bulimia nervosa

(Fairburn, 2008). Patients are assigned to a treatment team consisting of a clinical psychologist, a psychiatrist, a master's-level primary therapist, a registered nurse, a dietician, a family therapist, and art and movement therapists. During the day, patients attend structured meals, individual meetings with members of their treatment team, and therapist-run group sessions addressing diverse topics. Patients also attended evening staff-run groups that addressed topics such as leisure planning, coping skills, and female bonding. These groups were 60 to 75 min in duration and occurred 7 times per week.

TAU + ACT. Participants in the TAU + ACT (subsequently referred to as ACT) condition received all TAU elements described above and also received twice-weekly ACT group treatment in lieu of the regularly programmed staff-run leisure groups described above. The manualized group treatment was heavily based on exercises and discussions in existing ACT books, including *Get Out of Your Mind and Into Your Life* (Hayes & Smith, 2005) and *Acceptance and Commitment Therapy* (Hayes, Strosahl, & Wilson, 1999). Some activities were modified to focus on eating-disorder-specific experiences and others were left to focus on more general distress such as depression and anxiety. Eight unique groups were offered to ensure that patients with a longer-than-average length of stay would not have repetitive groups. Although eight groups were offered, the average patient was unable to attend all groups due to the typical length of stay and competing demands of her schedule. A small number ($n = 6$) attended the same group more than one time. Due to the nature of the treatment facility, all participants who wanted to attend the group were given permission to do so, even if they had already attended the same group before. Each group covered a variety of core ACT processes such as acceptance, willingness, defusion, mindfulness, values clarification, committed action, and perspective taking. In addition to these skills, a principal focus of the groups was identifying, practicing, and achieving behavioral goals. Many of these were drawn from the behavioral suggestions recommended by conventional CBT for eating disorders such as normalization of eating, reducing dietary restraint, and eliminating compensatory behaviors. Patients were instructed to utilize ACT strategies while attempting behavioral change. In addition, each group contained at least one exposure activity, which was either body/eating focused or interpersonally focused.

Group attendance was determined by diagnostic status, with AN patients attending one group and BN patients attending the other group. The manual was designed to target mechanisms hypothesized to underlie both AN and BN as recent research has suggested a transdiagnostic model of eating pathology (Wade, Bergin, Martin, Gillespie, & Fairburn, 2006). Although the content of

the groups was parallel, this allowed group therapists to use examples and exercises that were more specific to those experienced by the majority of participants within each group. The groups utilized an open format to account for the presence of new admissions and discharges. Groups were structured as stand-alone ACT interventions to ensure that patients who could only attend a small number of groups would receive the full treatment. Patients missed groups for a variety of reasons including attendance at other therapeutic groups, passes off campus, visiting hours, or discharge from the facility before having the opportunity to attend all groups. However, because all groups covered several core ACT processes, attendance at three groups (or roughly one group a week for the average length of stay for patients with bulimia nervosa) was considered a sufficient dosage of treatment to be considered a treatment completer. ACT groups were conducted by master's-level therapists with prior experience in treatment for eating disorders and ACT. All primary therapists had received at least 3 years of training and supervision in ACT and had served as study therapists on previous ACT treatment outcome studies. Primary therapists had also worked at the Renfrew Center as group therapists for at least 1 year prior to leading the ACT groups. The primary therapists were also the creators of the manualized treatment groups and followed checklists during each group to ensure adherence. Adherence was further maintained through weekly team supervision meetings.

Results

Participant Enrollment

As previously stated, a total of 140 participants consented to take part in the study (TAUa = 20, ACT = 66, TAUb = 54). Twenty women did not return pretreatment questionnaires (TAUa = 3, ACT = 5, TAUb = 12) because they were no longer interested in participating ($n = 18$) or because they left the unit due to limited insurance coverage ($n = 2$). Four additional participants could not participate in the food challenge due to dietary restrictions. Retention was high throughout the initial phase of the study, with 111 (92.5%) completing the main Renfrew posttreatment questionnaire packets for eating disorder outcome variables (ACT = 58, TAU = 53), 90 (75%) completing the additional ACT process measures questionnaire packet (ACT = 45, TAU = 45), and 98 (84.5%) participating in the food challenge (ACT = 50, TAU = 48). Sixty-five women responded to the emailed assessment at 6-month follow-up (32 ACT and 33 TAU). There were no significant differences in response rates across condition. See Figure 1 for a complete Consolidated Standards of Reporting Trials (CONSORT) flow sheet.

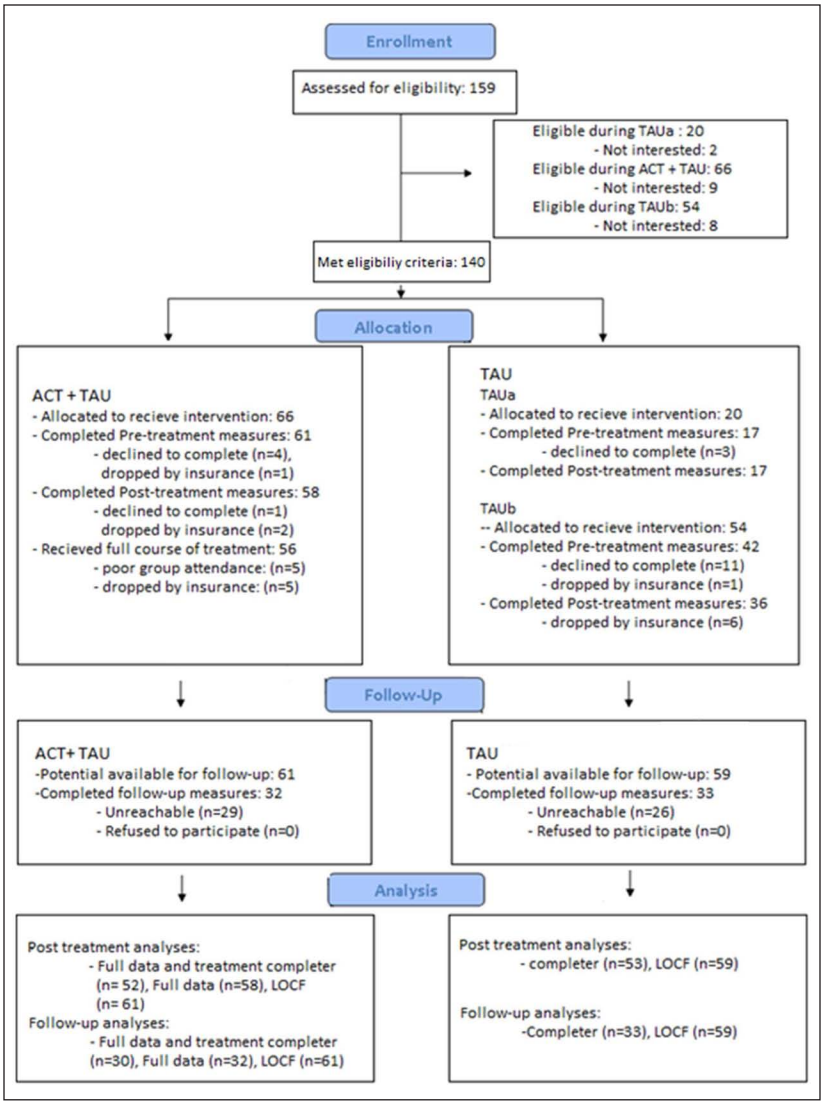

Figure 1. CONSORT flowchart.
Note: CONSORT = Consolidated Standards of Reporting Trials; TAU = treatment-as-usual; ACT = acceptance and commitment therapy; LOCF = last observation carried forward.

Baseline Characteristics and Equivalence of Groups

To ensure that the two TAU waves were equivalent and could be combined for the purposes of analysis, a series of one-way ANCOVAs were conducted comparing the groups on all posttreatment outcome measures when controlling for baseline scores on the measure. Only small and statistically nonsignificant differences were found on any of the measures, suggesting the groups showed relatively equal improvements during treatment. Thus, these samples were combined into one group (henceforth referred to as TAU).

ACT participants attended 4.75 (SD = 2.51, range = 0-11) group sessions on average. ACT group completers (defined as attending 3 or more groups; n = 56 of whom 52 completed posttreatment measures; 93%) were equivalent to ACT nongroup completers (n = 10) on demographic and baseline variables, with only length of stay differing between the two groups, Group completers: 28.83 days, SD = 10.24; Nongroup completers: 19.00, SD = 8.36, $t(64) = 2.86$, $p < .01$. The results described below used the full completer samples (ACT: 52 patients who completed at least three groups and main outcome posttreatment measures, TAU: all 53 patients who completed main outcome posttreatment measures); all analyses were repeated both with noncompleters and using intent-to-treat analyses with last observation carried forward, and results were equivalent.

TAU and ACT completers were generally equivalent on demographic characteristics and baseline symptoms, as well as process and well-being variables (see Table 1). The one exception was that in the ACT group, DERS impulsivity was higher. Analyses were performed both with and without these variables as covariates; because results were virtually identical, only the latter analyses are reported. A similar percentage of AN and BN spectrum patients were in both treatments conditions (ACT: 25 AN patients and 27 BN patients; TAU: 29 AN patients and 24 BN patients; $\chi^2 = 0.46$, $p = .56$). The average length of stay for completers was 29.09 days (SD = 14.12, range = 10-90) in the TAU group and 29.10 days (SD = 10.40, range = 12-62) in the ACT group; $t(103) = -.001$; $p = .99$.

Treatment Acceptability

Acceptability of TAU and TAU + ACT was compared by using an independent-measures t test to examine mean differences in acceptability. Across groups, the scores for overall treatment acceptability were high, with all individual items averaging over 5 (out of 7) and the total (35.90, SD = 4.93) well over the preestablished cutoff (30) for an acceptable treatment. Individual and

Table 1. Baseline and Posttreatment Characteristics of Sample and Results of Mixed-Model ANOVAs Across Treatment Completers.

	Pre-TAU		Pre-ACT		Group differences		Post-TAU		Post-ACT		Interaction effect			
Variable	*M*	*SD*	*M*	*SD*	*t*	*p*	*M*	*SD*	*M*	*SD*	*F*	*df*	*p*	η_p^2
Outcome measures														
EDE-Q Restraint	3.93	1.62	4.14	1.89	−0.59	.55	1.51	1.40	1.21	1.02	1.68	103	.19	.02
EDE-Q Eating Concerns	3.93	1.29	3.83	1.38	0.38	.70	2.20	1.24	1.78	1.21	1.35	103	.25	.01
EDE-Q Shape Concerns	4.94	1.31	4.88	1.30	0.25	.83	3.96	1.49	3.48	1.85	2.36	103	.09	.03
EDE-Q Weight Concerns	4.59	1.49	4.51	1.56	0.28	.77	3.65	1.67	3.10	1.76	2.68	103	.07	.03
EDE-Q global scores	4.40	1.20	4.34	1.28	0.25	.79	2.85	1.32	2.39	1.32	2.72	103	.07	.03
Percentage of challenge food consumed	1.99	4.39	4.57	6.82	−1.92	.06	11.90	16.82	24.88	28.90	2.89	42	.09	.06
Baseline characteristics														
BMI AN	17.38	1.93	17.00	1.97	0.72	.47	18.97	2.45	18.36	1.51	0.34	52	.56	< .01
BMI BN	23.17	5.09	27.27	10.01	−1.80	.08	23.34	4.57	27.33	9.43	0.23	49	.63	< .01
Age	25.94	8.25	27.32	10.01	−0.73	.46								
Age of onset	15.78	4.79	16.95	5.94	−1.37	.29								
Previous hospitalizations	0.92	2.07	1.53	2.43	−0.67	.17								

(continued)

Table 1. (continued)

Variable	Pre-TAU		Pre-ACT		Group differences		Post-TAU		Post-ACT		Interaction effect			η_p^2
	M	*SD*	*M*	*SD*	*t*	*p*	*M*	*SD*	*M*	*SD*	*F*	*df*	*p*	
Process variables														
DERS acceptance	18.97	6.72	19.90	6.66	−0.67	.51	15.69	6.62	16.48	6.47	0.68	69	.41	.01
DERS goals	17.39	3.63	18.29	3.47	−1.22	.22	15.86	3.77	15.94	4.64	0.19	69	.65	< .01
DERS impulsivity	17.05	4.43	19.01	5.14	−1.97	.05*	13.92	4.86	15.66	5.21	0.41	69	.52	< .01
DERS awareness	16.65	5.36	16.72	5.25	−0.06	.94	20.08	5.39	19.22	6.52	1.18	69	.28	.02
DERS strategy	25.65	6.70	27.63	6.76	−1.42	.16	22.77	7.29	22.58	7.89	0.26	68	.61	< .01
DERS clarity	14.48	2.69	14.48	3.11	−0.01	.99	14.01	2.69	13.47	3.06	0.70	69	.79	< .01
DDS total	23.90	9.08	22.08	9.91	0.91	.37	27.13	12.09	27.64	9.24	0.43	69	.51	< .01
AAQ-II	32.98	8.76	34.74	9.05	−0.96	.34	28.72	11.06	20.79	7.93	3.15	68	.08	.04

Note: TAU = treatment-as-usual; ACT = acceptance and commitment therapy; EDE-Q = Eating Disorder Examination Questionnaire; BMI AN = body mass index, anorexia nervosa; BMI BN = body mass index, bulimia nervosa; DERS = Difficulties in Emotion Regulation Scale; DDS = Drexel Defusion Scale; AAQ-II = Acceptance and Action Questionnaire–II.

*$p = .05$.

total acceptability items were equivalent between TAU and TAU + ACT Groups.

Main Outcome Analyses

Overall changes during treatment across groups were assessed using mixed-model ANOVAs. As can be seen in Table 2, large improvements were observed in nearly all outcome and process variables over the course of treatment. No significant differences were observed in the amount of change seen in process variables between conditions, although patients in the ACT condition trended toward greater improvements in AAQ-II scores (Table 1). Another series of mixed-model ANOVAs were used to compare outcome variables between groups. Several trends were observed for EDE-Q scores at post-treatment, with those in the ACT condition showing larger decreases in weight concern ($p = .07$), shape concern ($p = .09$), and global eating pathology ($p = .07$; Figure 2) at post-treatment (Table 1). Effect sizes for these analyses ranged from small to moderate. The ACT group also increased their consumption in the food challenge by nearly twice as much (posttreatment consumption: 24.88%) as TAU (posttreatment consumption: 11.90%, $p = .09$; Figure 3). Other EDE-Q variables followed a similar pattern, but did not reach the trend level.

Clinical Significance

Clinical significance was assessed by examining the rates of EDE-Q global score within 1 standard deviation of the community mean (EDE-Q global below 1.74; Murphy, Straebler, Cooper, & Fairburn, 2010). Normative comparisons of this type are widely used to identify clinically significant change (Kazdin, 2003; Ogles, Lunnen, Bonesteel, 2001). Twenty of 52 (38%) ACT patients who were in the clinical range at pre-treatment had fallen to the normative range by post-treatment, whereas only 9 of 53 (17%) of TAU patients similarly improved ($\chi^2 = 5.56$, $p = .02$). Additional treatment between discharge and 6 months post-treatment was assessed by dichotomizing into those who did or did not return to inpatient care. Those in the TAU group were more likely to be rehospitalized (18%) compared with the ACT group (3.5%; $\chi^2 = 3.19$, $p = .07$), suggesting poorer maintenance of treatment gains in the TAU group.

Eating Disorder Diagnostic Status

A series of repeated-measures ANOVAs were conducted to examine the interaction between treatment, time, and eating disorder diagnosis in

Table 2. Overall Changes During Treatment Among Treatment Completers.

Variable	Pre-treatment		Post-treatment					
	M	*SD*	*M*	*SD*	*F*	*df*	*p*	η_p^2
Outcome measures								
EDE-Q Restraint	4.03	1.76	1.36	1.23	182.47	103	<.01	.64
EDE-Q Eating Concerns	3.88	1.33	1.99	1.24	178.76	103	<.01	.63
EDE-Q Shape Concerns	4.91	1.30	3.72	1.34	64.62	103	<.01	.39
EDE-Q Weight Concerns	4.55	1.52	3.38	1.73	59.94	103	<.01	.37
EDE-Q global scores	4.37	1.24	2.62	1.33	187.54	103	<.01	.65
Percentage of challenge food consumed	3.25	5.80	18.26	24.18	28.95	42	<.01	.30
BMI BN	25.34	7.74	25.45	8.26	0.78	50	.38	.02
BMI AN	17.20	1.94	18.68	2.07	61.61	53	<.01	.54
Process variables								
DERS acceptance	19.11	6.42	15.89	6.34	16.10	69	<.01	.19
DERS goals	17.78	3.64	15.84	6.35	13.20	69	<.01	.16
DERS impulsivity	17.50	4.84	14.72	5.02	19.83	69	<.01	.23
DERS awareness	16.39	4.90	1.66	5.92	14.66	69	<.01	.17
DERS strategy	26.56	6.84	22.54	7.51	22.26	68	<.01	.24
DERS clarity	14.68	2.87	13.74	2.88	4.13	69	.02	.05
DDS total	22.50	8.86	27.34	10.75	22.55	69	<.01	.25
AAQ-II	33.84	8.76	29.77	9.59	18.96	68	<.01	.21

Note: EDE-Q = Eating Disorder Examination Questionnaire; BMI BN = body mass index, anorexia nervosa; BMI AN = body mass index, bulimia nervosa; DERS = Difficulties in Emotion Regulation Scale; DDS = Drexel Defusion Scale; AAQ-II = Acceptance and Action Questionnaire–II.

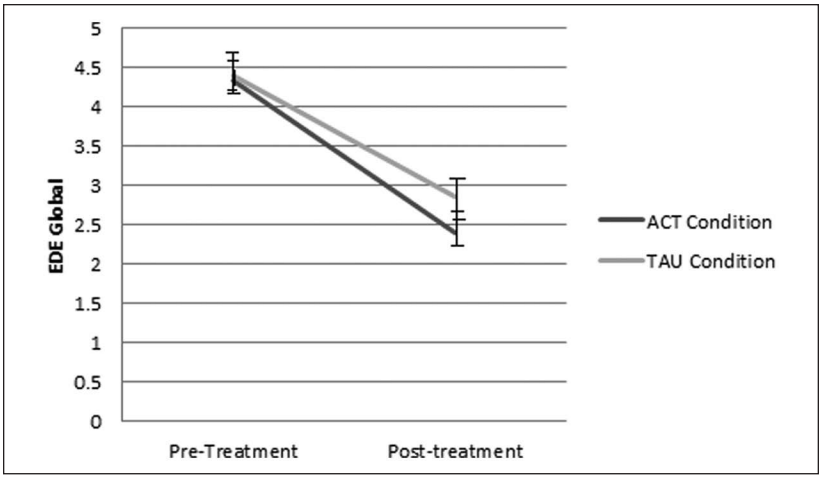

Figure 2. Graph of EDE-Q global scores across treatment conditions.
Note: EDE-Q = Eating Disorder Examination Questionnaire; ACT = acceptance and commitment therapy; TAU = treatment-as-usual.

predicting key outcomes. To reduce the number of analyses, we only utilized EDE-Q global scores and food challenge scores. There was a general pattern for a stronger advantage of ACT for AN when compared with BN when examining graphical representations of the data, but overall effects were small and insignificant, EDE-Q global $F(108) = 2.01$, $p = .15$, $\eta_p^2 = .02$). An advantage of ACT on challenge food consumption was evident for AN participants, time × condition, $F(1, 23) = 4.32$, $p = .05$, $\eta^2 = .16$, but not BN participants, time × condition, $F(1, 17) = 0.76$, $p = .40$, $\eta^2 = .04$. However, because no significant differences were observed statistically on the more validated measures of eating pathology, it is important to note this pattern must be interpreted cautiously.

Session Attendance

To test the hypothesis that greater session attendance in the ACT condition would predict greater improvement in eating behaviors, a linear regression with EDE-Q global as the outcome variable was assessed. Session attendance in the ACT condition (which was strongly associated with length of stay, $r = .64$, $p < .01$) was positively associated with improvements in EDE-Q Global ($r = .28$, $B = -.19$, $t = -2.09$, $p = .04$) subscale scores from pre- to post-treatment.

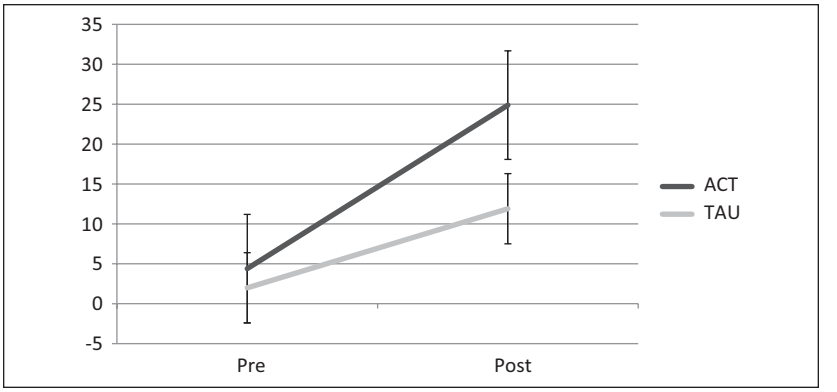

Figure 3. Graph of challenge food consumption across treatment conditions.
Note: ACT = acceptance and commitment therapy; TAU = treatment-as-usual. Participants consuming <21.34 at baseline.

Mediation Analyses

To test the hypothesis that changes in ACT-related process variables would mediate change in outcome variables, a series of mediation analyses were conducted. Mediation analyses were conducted using two types of measures: the standard process measures and the Brief Symptom Measure (BSQ) given 1 time each week. To reduce the number of analyses, only EDE-Q global subscale scores were used as an outcome measure. The bootstrapping method described by Preacher and Hayes (2008) was used as an initial test of mediation, with change from pre- to midtreatment (for BSQ data) or post-treatment (for other process measures) on the mediator variables predicting changes from pre- to post-treatment on the outcome variables. The bootstrapping method produces confidence intervals (CIs) to test for significance, with values not crossing zero corresponding to significance at the $p < .05$ level. Most tests, specifically all analyses using change in process measures (DERS, AAQ-II, and DDS) from pre- to post-treatment, did not support mediation hypotheses. However, BSQ-General Willingness significantly mediated the effects of treatment condition on EDE-Q global (CI = [−.4623, −.0046], $p <$ .05).This question asked participants to rate on a scale of 1 (*does not prevent me from doing anything important*) to 7 (*keeps me from doing many important things*), "In terms of the effect of my emotions on my behavior, my anxiety, depression and other distress, . . . " with lower scores indicating greater willingness to experience distressing thoughts and feelings while engaging in valued behaviors.

Discussion

Prior research has indicated that even state-of-the-art treatment by highly trained therapists leaves a large portion of patients with bulimia nervosa either partially or fully symptomatic (G. T. Wilson, 2005), and the outcomes for anorexia nervosa are decidedly worse (G. T. Wilson et al., 2007). It has been theorized that the lack of efficacy of predominant treatment models stems from their failure to focus on important maintenance factors such as experiential avoidance and distress intolerance. So-called "third generation" CBT treatments such as ACT specifically target these potential maintenance factors (Hayes et al., 2004), but only limited research has been conducted to date on ACT as a potential treatment for eating disorders. The current study sought to examine the incremental efficacy of an ACT treatment group when added to a preexisting comprehensive intervention program at a residential treatment facility.

Main Outcomes

The main hypotheses for the current study were partially supported. Overall, the data showed a consistent pattern wherein participants in the ACT condition experienced slightly greater improvements in eating pathology when compared with participants in the TAU condition, although the results were typically only significant at the trend level. Individuals in the ACT condition trended toward lower global eating pathology, shape concerns, and weight concerns by post-treatment, as well as greater willingness to consume a distressing food. Patients in this condition also trended toward greater increases in psychological flexibility as measured by the AAQ-II. Although relatively small effects, it is notable that the addition of a small number of ACT group sessions showed a consistent pattern of reduced eating pathology by post-treatment over and above the effect of a much broader and more comprehensive treatment program (i.e., TAU). These patterns are especially noteworthy considering that the TAU treatment resulted in considerable improvement on its own. Of note, the ACT condition also trended toward lower rates of rehospitalization among those who responded to the 6-month follow-up. The fact that a relatively low dosage of ACT can create small but consistent improvements in eating pathology above and beyond the effects of a full residential treatment program raises the possibility that a full ACT-based treatment program would be especially efficacious and should be a target of future evaluation. Although the trend-level results observed in this pilot study limit the ability to make conclusions about the efficacy of the ACT groups, the

consistency in pattern suggests future study in ACT as a treatment for eating pathology is warranted.

In addition, although the primary test of eating disorder diagnostic status as a moderator did not indicate a statistically significant relationship, for challenge food consumption, a weak pattern suggesting a possible three-way interaction trend was observed, suggesting that AN patients in particular benefited from ACT. These results may be due to ACT's focus on treating experiential avoidance and values clarity, which tend to be more pervasive among individuals with anorexia nervosa (Hayes & Pankey, 2002; Merwin & Wilson, 2009; Schmidt & Treasure, 2006). If replicated, this would be a noteworthy finding as AN spectrum patients are typically more challenging to treat and have a worse prognosis. However, it is possible that length of stay, which was longer in AN patients, confounds these findings, and additional research where length of stay is less variable would lead to greater confidence in interpretation. The modest effect sizes and the lack of statistical significance for main outcome variables constrain the interpretability of these findings that await future replication. At this point, any suggestions that ACT might be particularly useful for AN patients is unreliable and additional research in a well-powered sample is sorely needed.

As was expected, greater session attendance was found to enhance the impact of the ACT condition. However, interpreting this result is complicated by the fact that attendance is confounded with length of stay (and thus with severity and treatment response). A test of a model controlling for length of stay was conducted, but the results were inconclusive because of low power. Additional research both with larger samples and among patient populations where length of stay will not be a confounding variable (i.e., in a trial where everyone receives the same number of ACT sessions) can better clarify the influence of receiving more or less ACT treatment.

Mediation

Tests of statistical mediation suggested that willingness to experience negative thoughts or emotions while still engaging in valued behaviors was a significant mediator of global Eating Pathology, Eating Concern, Weight Concern, and Body Image Dissatisfaction. Willingness, as opposed to other ACT-related variables such as acceptance, mindfulness, values clarity, and defusion, appears to be most strongly associated with the improvements seen in the ACT condition. The fact that process variables improved equally across conditions was not predicted but may reflect that the behavioral interventions inherent in TAU resulted in patients developing better experiential acceptance

and a better ability to step back from thoughts and feelings. However, the core skill of engaging in values-consistent behavior when experiencing distressing internal experiences trended toward greater improvements for those who received ACT, and appears to be an important driver of outcome. Despite the promising findings, it is important to interpret these results with caution as the single-item measures of willingness are less well validated than standard measures and the more conventional ACT measures did not show a similar pattern of responding. Additional mediation research is needed with samples powered for this type of analysis.

Limitations

Despite the positive findings, a number of limitations should be noted. Several methodological limitations were evident in the current study, which suggest that any interpretation and extensions of the current results must be done in a cautious manner. First, the study was designed as a pilot study, and the use of a residential treatment program as a comparison group (where it was only possible to add in a small number of ACT groups) was in many ways not an ideal control group, but was chosen because it allowed researchers to target a suitable number of patients. A more stringent efficacy design using true randomization is essential for determining whether ACT is a viable treatment option for this population. This study only serves as an initial step in suggesting that future research in ACT for eating disorders is warranted. Although effort was made to ensure that the ACT and TAU patients received the same amount of treatment, it is possible that observed effects were due to greater contact in the ACT condition with therapists as those in the TAU group participated in staff-run leisure groups during this time. Ideally, ACT should be tested as a stand-alone treatment in a variety of settings and against more stringent control conditions (such as empirically supported treatments like standard CBT for eating disorders). In addition, given the large changes observed during the course of TAU, there may have been little room for incremental effects of the ACT program. This fact, combined with the relatively low dose of ACT treatment, may have underestimated the effects of ACT as a potential treatment. Other limitations include the limited prior research involvement at the residential facility. The setting is almost entirely clinically focused, and limited research support was available. For example, patients were often denied insurance coverage prematurely and discharged before members of the research team were available to complete a posttreatment assessment. To obtain the highest rate of data compliance possible, the posttreatment assessment window was left relatively large (5 days), which

meant some patients were assessed closer to their discharge than others. The limited research support also led to a lower response rate on rehospitalization data at 6 month follow-up, which reduces confidence in these findings. Although the study attempted to mitigate these limitations by checking for equivalency between completers and dropouts and the use of intention-to-treat analyses, additional research in a more well-controlled setting with higher research support would allow for greater confidence in these results. The study did not utilize formal measures of adherence and fidelity, which future research should use to assess the degree to which the ACT condition was applied competently in the manner suggested in the treatment manuals. Several measures that were utilized to assess ACT process variables are novel measures for which validity and reliability data are currently in progress. Although initial efforts suggest that these measures are valid, additional research is needed. The large number of analyses conducted without corrections for Type 1 error, although consistent with a pilot study analytic approach, raises concerns about potential false positives. Finally, whereas the study was sufficiently powered for the main outcome analyses, moderation and mediation analyses were underpowered. Future research using larger samples could allow for more accurate tests of potential mediating and moderating variables.

The limitations described above are balanced by a number of strengths. First, this study reflects one of the only tests of the efficacy of an ACT-based intervention for an eating disorder population. The use of a residential setting for treatment reflects a novel population, and few existing eating disorder treatment outcome studies utilize experimental designs to assess treatment at higher levels of care. The use of a full clinical sample, with severe eating pathology as indicated by length of illness and prior hospitalizations, as opposed to subthreshold eating pathology or a college undergraduate population, is also a strength and suggests that ACT may be effective with patients with severe symptomatology. Although underpowered for several analyses, the study reflects a relatively large sample size for eating disorder research. In addition, the use of both self-report and behavioral measures and consistency of those outcomes allows greater confidence in the validity of the obtained results. Finally, the use of a control group represents an important strength.

Conclusions and Future Research

The current study is one of the first empirical tests of an ACT-based treatment for eating disorders. Results of this pilot study suggest that ACT may be a

useful treatment for eating disorders among women; however, care must be taken in interpreting the trend-level results. Ideally, additional research would not only replicate, but extend, the current findings by examining other potential uses of ACT-based skills, techniques, and treatment programs for eating disorder populations. Future studies could examine ACT as a stand-alone individual treatment, as an adjunctive group treatment, or as a more comprehensive and extensive program in various higher levels of care. Although the study begins to hint at the mechanisms of actions for an ACT-based treatment, larger studies with more assessment periods might provide stronger and more valid tests of mediation, which could enhance knowledge about which maintenance factors most need to be altered to ensure treatment success.

Overall, this study suggests that ACT may have promise as a treatment for eating disorders. As many theorists and researchers have noted, ACT appears to be a good conceptual fit for the treatment of both bulimia nervosa and anorexia nervosa, but the lack of systematic research has limited its use. The benefits of an ACT-based treatment observed in this study will hopefully spur additional research in this area.

Declaration of Conflicting Interests

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Notes

1. A full description of the food challenge procedure is beyond the scope of this manuscript and is available from the authors on request.
2. Individuals who were given chocolate chip cookies consumed significantly more than those who were given rice cakes ($p = .01$) or animal crackers ($p = .04$). When individuals who consumed above 21.34% at baseline are removed, the difference between those consuming chocolate chip cookies and animal crackers is no longer statistically significant ($p = .31$). No other test foods differed on amount consumed."
3. Analyses using a 2 × 2 mixed-model ANOVA showed that participants above this cutoff at baseline did not experience significant change across time,

$F(1, 20) = .01$, $p = .92$, nor were there any significant group by time interactions, $F(1, 20) = 1.36$, $p = .26$. Part of the limitation in change in these patients is likely related to the increase in calories consumed from required meals and snacks from 1,800 per day (for all patients) to an average of 2,384 calories per day ($SD = 711.7$).

4. The email sent at 6-month follow-up from the Renfrew Center did not assess other outcome or process measures. A separate study-specific email was sent to participants, but response rate was poor and produced data that were unusable for follow-up analyses.

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