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Adding acceptance and commitment therapy to exposure and response prevention for obsessive-compulsive disorder: A randomized controlled trial

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ABSTRACT

The objective of this study was to test whether treatment acceptability, exposure engagement, and completion rates could be increased by integrating acceptance and commitment therapy (ACT) with traditional exposure and response prevention (ERP). 58 adults (68% female) diagnosed with obsessive-compulsive disorder (OCD; *M* age = 27, 80% white) engaged in a multisite randomized controlled trial of 16 individual twice-weekly sessions of either ERP or ACT + ERP. Assessors unaware of treatment condition administered assessments of OCD, depression, psychological flexibility, and obsessional beliefs at pretreatment, posttreatment, and six-month follow-up. Treatment acceptability, credibility/expectancy, and exposure engagement were also assessed. Exposure engagement was high in both conditions and there were no significant differences in exposure engagement, treatment acceptability, or dropout rates between ACT + ERP and ERP. OCD symptoms, depression, psychological inflexibility, and obsessional beliefs decreased significantly at posttreatment and were maintained at follow-up in both conditions. No between-group differences in outcome were observed using intent to treat and predicted data from multilevel modeling. ACT + ERP and ERP were both highly effective treatments for OCD, and no differences were found in outcomes, processes of change, acceptability, or exposure engagement.

Obsessive-compulsive disorder (OCD) affects between 1.5% and 3% of the adult population (Ruscio, Stein, Chiu, & Kessler, 2010). Hallmark symptoms include (a) recurrent intrusive thoughts, ideas, and images (i.e., obsessions) that provoke distress in the form of anxiety and guilt and (b) overt and covert rituals (i.e., compulsions) as well as avoidance behavior performed to reduce or control obsessional distress (American Psychiatric Association, 2013). Obsessions and compulsions exact significant personal distress and interference with work/academic, interpersonal, and leisure functioning. Current evidence-based psychological treatments for OCD emphasize exposure and response prevention (ERP) as the essential ingredients necessary for improvement (e.g., Abramowitz & Jacoby, 2015). Exposure entails systematic confrontation with situational triggers and mental stimuli that are objectively safe but that provoke obsessional anxiety. Response prevention involves refraining from compulsive rituals. Meta-analyses have found large pre- to post-treatment effect sizes with average improvement rates from 50% to 70% across studies of ERP for OCD (Eddy, Dutra, Bradley, & Westen, 2004; Olatunji, Davis, Powers, & Smits, 2013). Moreover, numerous controlled trials indicate that ERP is more effective than credible comparison treatments (e.g., anxiety management training, medication) at posttreatment and at follow-up (Olatunji et al., 2013).

Although ERP is effective, treatment response varies (Loerinc et al., 2015). Moreover, this intervention necessitates the deliberate provocation of anxiety without performing anxiety-reduction behaviors, which may contribute to the fact that between 25% and 30% of otherwise appropriate patients refuse this treatment, drop out prematurely (Ong, Clyde, Bluett, Levin, & Twohig, 2016), or do not adhere to the treatment instructions (Foa et al., 2005). Accordingly, developing ways to increase the acceptability of ERP, patient adherence, and consistency of response is an important objective in OCD treatment research precisely because this intervention can be so effective. Recent studies have addressed whether adding medications (Foa et al., 2005), cognitive therapy (Vogel, Stiles, & Götestam, 2004), or motivational interviewing (Simpson, Zuckoff, et al., 2010) to ERP improves adherence and outcome; yet, to date, no consensus has emerged regarding the degree to which these combination treatments improve ERP

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monotherapy (Tolin, 2009).

In practice, ERP is conducted in the context of a conceptual framework, and there is evidence that the rationale and goals provided for exposure-based therapy (such as ERP) can affect adherence and outcome (Arch, Twohig, Deacon, Landy, & Bluett, 2015). For example, researchers found that individuals with agoraphobia ventured further from their homes during exposure exercises when told that such exercises were part of *treatment* as opposed to merely *assessment* (Southworth & Kirsch, 1988). While there are a handful of conceptualizations of the process of change for ERP, two somewhat distinct theory-driven approaches to framing ERP for OCD currently exist, including (a) traditional cognitive-behavioral approaches that emphasize anxiety reduction and the modification of dysfunctional cognitions (Benito & Walther, 2015; Foa, Huppert, & Cahill, 2006) and (b) acceptance and commitment therapy-based (ACT) approaches that emphasize willingness to experience anxiety, valued living, and cognitive defusion (fostering an "observer perspective" with regard to private experiences; Twohig, 2009; Twohig et al., 2015). These frameworks also incorporate distinct, yet overlapping goals of exposure (anxiety reduction vs. valued living), approaches to targeting the anxiety provoked during exposure exercises (habituation and extinction vs. acceptance), and approaches to addressing fear-based cognitions (testing and modifying vs. defusing from them; Arch et al., 2015). For a number of conceptual and practical reasons, implementing ERP from within an ACT framework provides a promising (but understudied) avenue for improving ERP acceptability, exposure engagement, and completion rates. First, ACT alone holds potential as an effective and tolerable treatment for OCD. In the first controlled study of ACT for OCD, ACT (without explicit ERP) was superior to relaxation control treatment, with response rates in the 55–65% range at posttreatment and 3 month follow-up (Twohig et al., 2010). Moreover, patients found ACT highly acceptable, and the rate of drop-out or refusal was only 12.2%. Second, although procedurally distinct, ACT and ERP are highly compatible. Both are problem-focused, behaviorally based interventions that encourage interaction and engagement with feared stimuli while also discouraging anxiety-reduction strategies. Third, ACT techniques have been shown to increase adherence to difficult activities (Masedo & Rosa Esteve, 2007; Páez-Blarrina et al., 2008), including participating in exposure therapy for anxiety disorders (Levitt, Brown, Orsillo, & Barlow, 2004) and willingness to experience unwanted obsessive thoughts (Marcks & Woods, 2005, 2007). Accordingly, it is conceptually and practically consistent to integrate ACT into ERP (ACT + ERP). Moreover, synergizing these two treatments might improve treatment acceptability, increase engagement in exposures, and reduce drop-out of ERP, while not attenuating (and perhaps even bolstering) outcome.

With this in mind, the aim of the present study was to evaluate whether ACT + ERP for OCD increases treatment acceptability and engagement in exposures, and reduces drop-out, relative to ERP conducted from within the traditional habituation of anxiety framework. Specifically, we compared the efficacy of these two approaches in a randomized controlled trial with adults diagnosed with OCD. We hypothesized that, whereas both ERP approaches would lead to substantial improvements in OCD symptoms, clients receiving ACT + ERP would find the intervention more acceptable, tolerable, and show better adherence than would those receiving standard ERP. Secondary aims of this study were to examine possible outcome differences between the two conditions and the effects of the two treatment approaches on proposed processes of change. Specifically, we predicted that ACT + ERP would be associated with greater change on measures of acceptance and cognitive defusion, and traditional ERP would be associated with greater change in obsessional beliefs (e.g., overestimates of threat and responsibility). Findings from this study could support a larger study powered to examine outcome differences.

Table 1
Demographic characteristics of the study groups.

	Treatment condition		Test of the difference
	ERP	ACT + ERP	
Variable	Mean or frequency (%)	Mean or frequency (%)	(t or χ^2)
Age	27.29 (6.93)	27.21 (9.62)	t (1) = 0.03, $p > .05$
Sex			χ^2 (1) = 0.00, $p > .05$
Male	9 (32)	9 (32)	
Female	19 (68)	19 (68)	
Race			χ^2 (1) = 3.36, $p > .05$
African American	2 (7.1)	1 (3.6)	
Asian American	1 (3.6)	1 (3.6)	
White	22 (78.6)	23 (82.1)	
Hispanic	1 (3.6)	3 (10.7)	
Native American	1 (3.6)	0	
Other	1 (3.6)	0	
Employment status			χ^2 (1) = 0.36, $p > .05$
Unemployed	3 (11.1)	3 (11.1)	
Part-time	5 (18.5)	7 (25)	
Full-time	11 (40.7)	10 (38.2)	
Disability			
Student	8 (29.6)	8 (29.6)	
Retired			
Highest education level			χ^2 (1) = 3.69, $p > .05$
Doctorate	1 (3.6)		
Master's degree	1 (3.6)	2 (7.1)	
Some graduate school	5 (17.9)	5 (17.9)	
Bachelor's degree	8 (28.6)	9 (32.1)	
Associate's degree	2 (7.1)		
Some college	9 (32.1)	9 (32.1)	
High school diploma	2 (7.1)	3 (10.7)	
Some high school			
Religion			χ^2 (1) = 6.98, $p > .05$
Catholic	1 (3.8)	7 (25.9)	
Latter-Day Saint	11 (42.3)	8 (29.6)	
Protestant	6 (23.1)	3 (11.1)	
Jewish	1 (3.8)	1 (3.7)	
Islamic		1 (3.7)	
Other	1 (3.8)	1 (3.7)	
None	6 (23.1)	6 (22.2)	
Income			χ^2 (1) = 7.6, $p > .05$
$30,000 and greater	16 (57.2)	15 (57.7)	
$0–30,000	12 (42.8)	11 (42.3)	
Concurrent psychotropic medication	15 (55.6)	15 (57.7)	X^2 = 0.03, $p > .05$
Comorbidity			
Anxiety disorder	5 (19.2)	9 (32.1)	X^2 = 1.17, $p > .05$
Depressive disorder	6 (24)	11 (39.3)	X^2 = 1.42, $p > .05$
Mood disorder	7 (28)	13 (46.4)	X^2 = 1.91, $p > .05$
Substance use disorder	0	1 (3.7)	X^2 = 1.02, $p > .05$
Eating disorder	1 (3.6)	0	X^2 = 1.09, $p > .05$

1. Method

1.1. Participants

Fifty-eight adults who met DSM-IV criteria for a principal or co-principal diagnosis of OCD were randomized to either standard ERP (n = 28) or ACT + ERP (n = 30). An additional 16 participants were

ACT AND ERP FOR OCD

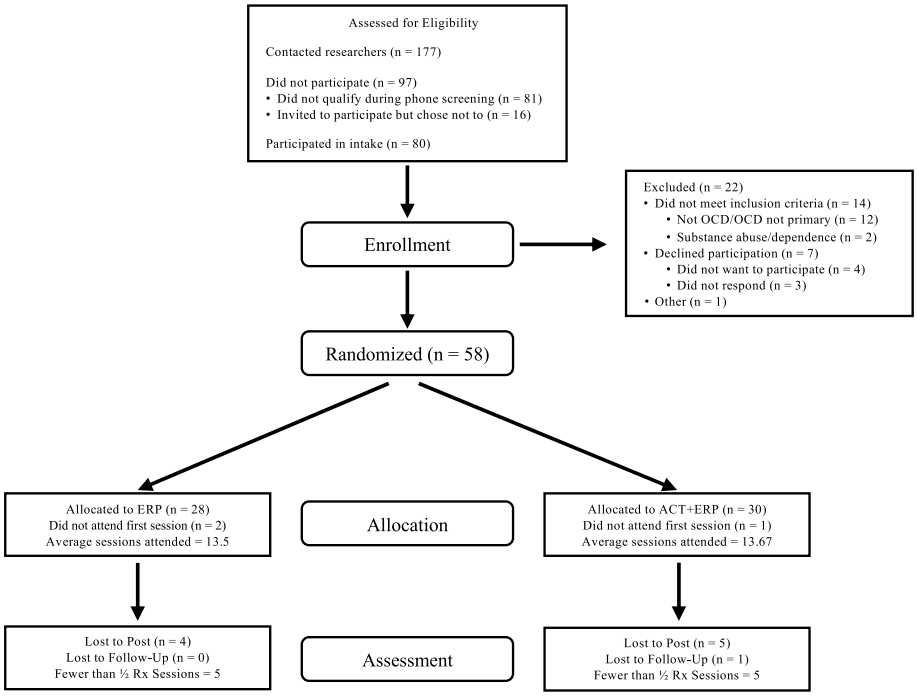

Fig. 1. Participant flow and attrition.

Table 2
Means (standard deviations) on symptom and process measures at pretreatment, posttreatment, and follow-up.

	Treatment condition					
	ERP			ACT + ERP		
	Pretreatment n = 28	Posttreatment n = 24	Follow-up n = 23	Pretreatment n = 30	Posttreatment n = 25	Follow-up n = 24
			Symptom Measures			
Y-BOCS	25.29 (4.1)	11.38 (5.5)	10.91 (6.8)	24.57 (4.45)	11.20 (4.3)	11.83 (6.9)
DOCS	34.14 (14.7)	18.46 (9.5)	15.86 (11.7)	29.93 (11.8)	16.36 (11.7)	15.28 (13.1)
BDI-II	15.32 (10.5)	8.71 (6.4)	8.91 (6.5)	16.66 (10.6)	7.16 (5.8)	7.19 (8.3)
			Process Measures			
AAQ-II	28.11 (8.54)	23.33 (8.28)	23.14 (8.55)	31.03 (8.05)	24.96 (8.82)	21.24 (8.39)
OBQ	195.81 (45.64)	146.37 (48.94)	130.00 (57.84)	195.63 (48.93)	138.76 (51.00)	124.39 (46.46)

Note. ERP = Exposure and Response Prevention, ACT = Acceptance and Commitment Therapy, Y-BOCS = Yale-Brown Obsessive-Compulsive Scale, DOCS = Dimensional Obsessive-Compulsive Scale, BDI-II = Beck Depression Inventory II, AAQ-II = Acceptance and Action Questionnaire II, OBQ = Obsessive Beliefs Questionnaire 44.

identified as ineligible at intake and excluded from the study. We used a modified intent-to-treat (ITT) approach that included all participants who began treatment and did not include six who dropped out of the study prior to treatment initiation (before being informed of their randomly assigned treatment condition). These attriters did not differ from non-attriters on sociodemographic variables (*ps* > .12), clinical severity ratings (p = .85), or assignment to treatment condition (p = .48). We chose this modified approach because pretreatment attrition gave us no information about treatment acceptability or response. See Table 1 for ITT sample characteristics and Fig. 1 for patient flow. Scores on all measures appear in Table 2.

Participants were recruited using flyers, internet and local newspaper advertisements, and clinic referrals. Twenty-eight participants were treated at the Anxiety and Stress Disorders Clinic at the University of North Carolina at Chapel Hill (13 in the ERP group and 15 in the ACT + ERP group), and 30 were treated at the ACT Research Laboratory at Utah State University (15 in the ERP group and 15 in the ACT + ERP group). Participants were either psychotropic medication-free or stabilized for at least one month and willing to remain at a fixed dose while participating in the study. Participants were also not receiving other psychotherapy (or stabilized if receiving non-psychotherapy (e.g., college mindfulness classes) and did not endorse a previous trial of formal ERP or ACT for OCD. Additional exclusion criteria were: active suicidal ideation; severe depression; current mania, psychosis, or borderline or schizotypal personality disorder.

1.2. Procedure and design

The current randomized controlled trial followed a two-armed parallel design. The Institutional Review Board at each university approved all study procedures; participants and participant data were treated in accord with the American Psychological Association Ethics

Code. Participants who appeared eligible following an initial phone screen were invited to a study interview. During the interview, informed consent was received, the Mini International Neuropsychiatric Interview 5.0 (MINI 5.0) was administered by a trained assessor who was unaware of treatment condition (by not seeing the randomization chart prior to assessments) to establish a diagnosis of OCD (and determine the presence of any other psychiatric disorders), and other study measures (described in the Measures section) were completed. Additional measures were administered, and they will be reported in future publications. Based on information collected by the assessor, study supervisors determined if the participant met eligibility criteria. If so, condition was randomly determined, and the case was assigned to a therapist. Assessments occurred prior to the first treatment session (pretreatment), one week after the final session (posttreatment), and 6 months after posttreatment (follow-up).

1.3. Treatments

Participants in both treatment groups received 16 twice-weekly, 120-min individual therapy sessions based on standardized treatment manuals. Whereas the ERP and ACT + ERP conditions were matched on the number of sessions devoted to exposure therapy, they differed in how exposure was framed and implemented, as described in the following section.

ERP. ERP was delivered in accordance with established exposure-based treatment for OCD (Foa & Kozak, 2004). Sessions 1 and 2 included information-gathering, psychoeducation about the cognitive-behavioral model of OCD and rationale for ERP, and introduction to self-monitoring of rituals. The treatment rationale emphasized that (a) exposure weakens the connection between obsessional cues and anxiety (via habituation) and response prevention weakens the connection between rituals and anxiety reduction, and (b) ERP corrects obsessional beliefs pertaining to overestimates of the dangerousness of obsessional stimuli. Session 3 was dedicated to developing the exposure hierarchy and response prevention plan. Sessions 4–16 included in-session graduated exposure therapy (*in vivo* and imaginal as needed), the assignment of daily between-session exposure practices, and instructions to refrain from rituals during and between sessions. Participants were taught to monitor their subjective anxiety during exposure trials and observe habituation of anxiety within and between trials. Session 16 addressed discontinuation and relapse prevention.

ACT + ERP. This treatment, developed for the present study and described in detail in Twohig et al. (2015), was a modification of the manual used in the ERP condition. As an overview, sessions 1–3 cast exposures as ways to practice psychological flexibility; sessions 4–15 involved in-session exposures cast as opportunities to practice psychological flexibility; and session 16 focused on values and maintenance of gains. ACT + ERP was matched to ERP in terms of the number and duration of exposure sessions. Sessions 1 and 2 involved information gathering, collaborative discussion of the ACT model of OCD and ERP (aimed to promote psychological flexibility), and introduction to self-monitoring of obsessions and rituals. Session 3 involved the development of an exposure hierarchy and response prevention plan and further explanation ACT + ERP, which focused on learning flexible responding in the presence of obsessions, anxiety, and urges to ritualize. Exposure practices (sessions 4–16) were similar to the ERP condition but were framed as an opportunity to practice and foster psychological flexibility (i.e., acceptance of obsessions and anxiety when they occur) rather than habituation/elimination of fear. For example, clients in the ACT + ERP condition practiced noticing their obsessions as if they were leaves floating by on a stream during exposure. Instead of monitoring anxiety during an exposure exercise, participants tracked their *willingness* to experience anxiety. Homework exposure practice was linked to the participant's goals for values-based living. Session 16 included an ACT model of relapse prevention focusing on following one's values in the presence of obsessive thoughts and compulsive urges.

1.4. Therapists and treatment fidelity

Study therapists at both sites were master's-level clinical psychology doctoral students who had at least two years of clinical experience and received supervised training in delivering ACT and ERP for OCD. All therapists (n = 10) treated at least one participant in each condition. All ERP cases (at both sites) were supervised by JSA and all ACT + ERP cases (at both sites) were supervised by MPT; both are doctoral-level clinical psychologists with extensive experience in the treatment of OCD. All sessions were videotaped, and individual supervision occurred after each treatment session either in person or via video conferencing software. Each supervisor also treated one client in each condition early in the study.

To examine whether the two treatment conditions could be reliably differentiated, 20% of the tapes of session 8 (an exposure therapy session in both conditions) were randomly chosen and viewed by raters familiar with the treatment manual, but unaware of treatment condition. These raters were 100% accurate in determining whether the session they watched was drawn from the ERP or ACT + ERP condition, suggesting reliable differentiation between treatment protocols.

1.5. Primary outcome measures

Yale-Brown Obsessive Compulsive Scale (Y-BOCS; Goodman, Price, Rasmussen, Mazure, Delgado, et al., 1989a; Goodman, Price, Rasmussen, Mazure, Fleischmann, et al., 1989b). Global OCD severity was measured using the Y-BOCS, a semi-structured interview that includes a symptom checklist and 10-item severity scale. The checklist is first used to identify the participant's particular obsessions and compulsions. The severity scale then assesses the main obsessions (items 1–5) and compulsions (items 6–10) on the following five parameters: (a) time, (b) interference, (c) distress, (d) resistance, and (e) degree of control. The clinician rates each item from 0 (*no symptoms*) to 4 (*extreme*) based on the past week. The 10 items are summed to produce a total severity score that ranges from 0 to 40. The Y-BOCS is the most widely used measure of OCD severity and has satisfactory psychometric properties (Goodman et al., 1989b; Storch et al., 2005). The internal consistency (Cronbach's alpha) of the pretreatment Y-BOCS in the present sample was .74.

Dimensional Obsessive-Compulsive Scale (DOCS; Abramowitz et al., 2010**).** The DOCS is a 20-item self-report measure that assesses the severity of the four most consistently replicated OCD symptom dimensions: (a) contamination, (b) responsibility for harm and mistakes, (c) symmetry/ordering, and (d) unacceptable thoughts. Five items (rated 0 to 4) assess the following parameters of severity of each symptom dimension: (a) time occupied by obsessions and rituals, (b) avoidance, (c) distress, (d) functional interference, and (e) difficulty disregarding the obsessions and refraining from rituals. Scores on the DOCS converge well with other measures of OCD symptoms (Abramowitz et al., 2010). The internal consistency (Chronbach's alpha) of the pretreatment DOCS in the present sample was .84.

Beck Depression Inventory (BDI-II: Beck, Steer, & Brown, 1996). The BDI-II is a 21-item self-report scale that assesses the severity of affective, cognitive, motivational, vegetative, and psychomotor components of depression. Scores of 10 or less are considered normal; scores of 20 or greater suggest the presence of clinical depression. The BDI-II has excellent reliability and validity and is widely used in clinical research (Beck et al., 1996). In the present sample, the pretreatment BDI-II had a Cronbach's alpha of .93.

1.6. Measures of treatment credibility and engagement

Treatment Credibility and Expectancy Questionnaire (TCEQ; Devilly & Borkovec, 2000**).** The TCEQ is a 6-item self-report scale assessing the patient's perception of a treatment's believability and its perceived probability of resulting in improvement. Items are rated from

1 to 10, and total scores range from 6 to 60. Patients completed this measure at the beginning of session 4 (i.e., following the treatment rationale and before the first exposure session began).

Patient ERP Adherence Scale (PEAS; Simpson, Maher, et al., 2010). The PEAS is a 3-item clinician-rated measure of adherence to prescribed ERP exercises that was administered at sessions 5–16. The clinician asks the participant about homework completion since the previous visit and rates the participant's adherence on: (a) the estimated proportion of exposures attempted out of those assigned, (b) the estimated quality of the attempted exposures, and (c) the estimated proportion of urges to ritualize that the participant successfully resisted. Each item is rated on a scale from 1 (*none/poor*) to 7 (*all/excellent*). The PEAS is a valid assessment of ERP adherence and has excellent inter-rater reliability (ICCs ≥ .97) for all three items (Simpson, Maher, et al., 2010).

Treatment Evaluation Inventory - Short Form (TEI-SF; Kelley, Heffer, Gresham, & Elliott, 1989). The TEI-SF is a widely used measure of a patient's opinion of a treatment. A modified version, which contains seven items, was used in the present study (the deleted questions concern developmental disabilities and were not appropriate for our sample) and administered at posttreatment only. Each question is rated on a 5-point scale, with higher numbers reflecting greater acceptability. Total scores range from 7 to 35.

1.7. Theoretical change process measures

Acceptance and Action Questionnaire - II (AAQ-II; Bond et al., 2011). The AAQ-II is a 7-item, 7-point Likert-type self-report measure of experiential avoidance/psychological inflexibility. The items reflect: (a) unwillingness to experience unwanted emotions and thoughts and (b) the inability to be in the present moment and behave according to value-directed actions when experiencing unwanted psychological events. The AAQ-II shows good psychometric properties (mean alpha of .88). In the present sample, the pretreatment AAQ-II had a Cronbach's alpha of .87.

Obsessive Beliefs Questionnaire (OBQ; Obsessive Compulsive Cognitions Working Group, 2003; 2005). The OBQ is a 44-item self-report questionnaire developed to assess three domains of dysfunctional beliefs thought to underlie OCD symptoms: overestimates of threat and responsibility for harm, importance and control of intrusive thoughts, and perfectionism and the need for certainty. Participants rate their agreement with each of 44 statements from 1 (*disagree very much*) to 7 (*agree very much*). The instrument possesses good validity and internal consistency. Cronbach's alpha for the present sample was .90.

1.8. Statistical analyses

Data were analyzed with multilevel modeling (MLM) using the packages nlme (Pinheiro et al., 2017) and reghelper (Hughes, 2017) in R (R Core Team, 2017) in an intent-to-treat sample containing all randomized participants (Hedeker & Gibbons, 2006). Measurement occasion was used as a temporal variable. In the three-wave data, pretreatment was set to 0, posttreatment to 1, and follow-up to 2. In the multiple session data, the first occasion was set to 0. Condition and site were used as binary group variables, with ERP set to 0 and ACT + ERP set to 1 and UNC set to 0 and USU set to 1. For the treatment outcomes, a series of models were estimated in four steps (Bliese & Ployhart, 2002) using Restricted Maximum Likelihood (REML) estimation. In the first step, a random intercept model was fitted to estimate the intraclass correlation coefficient (ICC). In the second step, a fixed effect for time was added. In the third step, we added a random effect for time and tested whether this model was significantly better than the simpler model of step 2 using the chi-square difference test. In the fourth step, we assessed the error structure of the model. First, we fitted a model with a general correlation structure (i.e., a separate covariance for each distinct pair of time points) and then tested whether this model was better than the model of step three. We then allowed for a separate residual variance for each time point in the model with a general correlation structure and compared these two models, again using the chi-square difference test. The most parsimonious model was selected provided there was no significant difference in fit compared with the more complex model. Finally, we added condition and site as moderators to the equation using the model selected. For the model in which adherence to ERP served as an outcome, we estimated the same series of models with the exception of the step testing whether there was a fixed effect for time. This step was skipped because we did not expect a time effect for adherence to ERP. While not reported, analyses showed the same pattern of results using repeated measures ANOVAs with completer data.

2. Results

2.1. Preliminary analyses

Table 1 shows the sociodemographic characteristics of the two groups. A series of *t*-tests and chi-square tests (also presented in Table 1) failed to detect any significant group differences, suggesting successful randomization. There were no between-group differences in co-occurring clinical diagnoses or in the proportion of participants using psychotropic medication.

Table 2 displays the means and standard deviations on all clinical variables for both groups at pretreatment, posttreatment, and 6-month follow-up. As can be seen, both groups evinced moderate to severe levels of OCD symptoms and moderate depressive symptoms at pretreatment. Pretreatment scores on the AAQ-II and OBQ were similar to those observed in other OCD patient samples. A series of *t*-tests revealed no significant differences between groups on any of the clinical variables at pretreatment.

2.2. Treatment attrition

Approximately 83% (n = 48) of the sample completed all 16 treatment sessions. Attrition rates (ERP = 17.9%, ACT + ERP = 17.0%) did not differ between conditions, χ^2 (1) = 0.01, p = .90.

2.3. Treatment outcomes

OCD symptoms. The model with no random effect for time, a separate residual variance for each time point (heteroscedasticity), and a separate correlation for each pair of time points was most appropriate for analysis of Y-BOCS scores. In this model, the overall effect of time (estimate = −7.699, SE = 0.625) was significant, t (94) = 12.327, p < .001. There was no significant effect of condition (estimate = −0.829, SE = 1.016), t (56) = 0.816, p = .418, or the time × condition interaction (estimate = 0.948, SE = 0.874), t (94) = 1.085, p = .281. Simple slopes were significant: ERP (estimate = −7.699, SE = 0.625), t (94) = 12.327, p < .001; ACT + ERP (estimate = −6.751, SE = 0.611), t (94) = 11.043, p < .001. As Table 2 shows, the pre-to post-treatment decrease in Y-BOCS scores in the ERP condition was large (55.0% reduction) and statistically significant, t (94) = 7.740, p < .001, Cohen's d = 2.498. There was virtually no change in Y-BOCS scores between posttreatment and follow-up, t (94) = 0.245, p = .807, Cohen's d = 0.099. Similarly, the pre-to post-treatment decrease in Y-BOCS scores in the ACT + ERP condition was large (54.3% reduction) and statistically significant, t (94) = 7.640, p < .001, Cohen's d = 2.667, with virtually no change between posttreatment and follow-up, t (94) = 0.343, p = .732, Cohen's d = 0.113.

For DOCS scores, the model with no random effect for time, the residual variances constrained to be equal across time point (homoscedasticity), and no correlation between the time points was most

appropriate. In this model, the overall effect of time was significant (estimate = 9.676, *SE* = 1.272), *t* (89) = 7.605, *p* < .001. There was no significant effect of condition (estimate = −4.250, *SE* = 3.049), *t* (56) = 1.394, *p* = .169, or the time × condition interaction (estimate = 2.724, *SE* = 1.816), *t* (89) = 1.500, *p* = .137. Simple slopes were significant: ERP (estimate = −9.676, *SE* = 1.272), *t* (89) = 7.605, *p* < .001; ACT + ERP (estimate = −6.952, *SE* = 1.296), *t* (89) = 5.367, *p* < .001. As shown in Table 2, the pre-to post-treatment decrease in DOCS scores in the ERP condition was large (47.5% reduction) and statistically significant, *t* (89) = 5.883, *p* < .001, Cohen's *d* = 1.043, although the decrease between post-treatment and follow-up was small (15.0%) and not significant, *t* (89) = 0.917, *p* = .361, Cohen's *d* = 0.399. Similarly, although the pre-to post-treatment change in DOCS scores for the ACT + ERP group was large (54.32%) and statistically significant, *t* (89) = 5.189, *p* < .001, Cohen's *d* = 1.970, there was virtually no change on this measure from posttreatment to follow-up, *t* (89) = 0.379, *p* = .706, Cohen's *d* = 0.076.

Depressive symptoms. The model with no random effect for time, a separate residual variance for each time point (heteroscedasticity), and no correlation between the time points emerged as the most appropriate for analysis of BDI-II scores. In this model, the effect of time was significant (estimate = −2.704, *SE* = 0.958), *t* (89) = 2.824, *p* = .006. There was, however, no significant effect of condition (estimate = 0.659, *SE* = 2.34), *t* (56) = 0.282, *p* = .779, or time × condition interaction (estimate = −1.350, *SE* = 1.363), *t* (89) = 0.990, *p* = .325. Simple slopes were significant for both conditions: ERP (estimate = −2.704, *SE* = 0.958), *t* (89) = 2.824, *p* = .006; ACT + ERP (estimate = −4.054, *SE* = 0.971), *t* (89) = 4.177, *p* < .001. The pre-to post-treatment decrease in BDI-II scores for the ERP group was 44.1%, which was statistically significant, *t* (89) = 3.084, *p* = .003, Cohen's *d* = 0.993, yet there was virtually no change in BDI-II scores from posttreatment to follow-up, *t* (89) = 0.088, *p* = .930, Cohen's *d* = 0.059. Similarly, in the ACT + ERP condition, there was a large pre-to post-treatment improvement in BDI-II scores (67.2%), which was statistically significant, *t* (89) = 4.514, *p* < .001, Cohen's *d* = 0.911, yet no significant change was found between posttreatment and follow-up, *t* (89) = 0.013, *p* = .989, Cohen's *d* = 0.161.

Psychological inflexibility. The model with no random effect for time, the residual variances constrained to be equal across time point (homoscedasticity), and no correlation between the time points was the most appropriate for analysis of AAQ-II scores. In this model, there was a statistically significant effect of time (estimate = −2.722, *SE* = 0.923), *t* (89) = 2.949, *p* = .004, but not condition (estimate = 3.243 *SE* = 2.135), *t* (56) = 1.519, *p* = .134, or time × condition interaction (estimate = −1.953, *SE* = 1.317), *t* (89) = 1.483, *p* = .142. Simple slopes were significant for both conditions: ERP (estimate = −2.722, *SE* = 0.923), *t* (89) = 2.949, *p* = .004; ACT + ERP (estimate = −4.675, *SE* = 0.939), *t* (89) = 4.979, *p* < .001. The pre-to post-treatment decrease in AAQ-II scores for the ERP condition (17%) was statistically significant, *t* (89) = 2.443, *p* = .017, Cohen's *d* = 0.616, yet there was virtually no change on this measure from posttreatment to follow-up, *t* (89) = 0.095, *p* = .925, Cohen's *d* = 0.077. Within the ACT + ERP condition, the pre-to post-treatment change on the AAQ-II (27%) was also statistically significant, *t* (89) = 3.169, *p* = .002, Cohen's *d* = 0.658, yet there was no significant change from posttreatment to follow-up, *t* (89) = 1.790, *p* = .077, Cohen's *d* = 0.196.

Obsessive beliefs. The model with no random effect for time, the residual variances constrained to be equal across time point (homoscedasticity), and no correlation between the time points was the most appropriate for analysis of OBQ scores. In this model, the effect of time was significant (estimate = −35.590, *SE* = 6.122), *t* (81) = 5.813, *p* < .001, yet there was no significant effect of condition (estimate = −3.627 *SE* = 12.912), *t* (56) = 0.281, *p* = .780, or time × condition interaction (estimate = 1.497, *SE* = 8.849), *t* (81) = 0.169, *p* = .866. Simple slopes were significant: ERP (estimate = −35.591, *SE* = 6.122), *t* (81) = 5.813, *p* < .001; ACT + ERP (estimate = −34.093, *SE* = 6.390), *t* (81) = 5.336, *p* < .001. Within the ERP condition, the reduction in OBQ scores from pre-to post-treatment (24.4%) was significant, *t* (81) = 3.791, *p* < .001, Cohen's *d* = 1.094, yet there was no significant change from posttreatment to follow-up (10.1%), *t* (81) = 1.163, *p* = .248, Cohen's *d* = 0.389. Within the ACT + ERP condition, the reduction in OBQ scores (23.8%) was also significant, *t* (81) = 4.408, *p* < .001, Cohen's *d* = 0.727, yet there was no significant change from posttreatment and follow-up (10.0%), *t* (81) = 1.000, *p* = .320, Cohen's *d* = 0.213.

2.4. Treatment Credibility and engagement

Treatment credibility and expectation. Mean scores on the TCEQ at session 4 for the ERP and ACT + ERP groups were 49.67 (*SD* = 8.30) and 50.44 (*SD* = 6.41), respectively, and not significantly different from one another, *t* (47) = 0.37, *p* = .716. Thus, patients in both groups found their respective intervention highly credible and had high expectations of improvement once they had received a rationale and description of the therapeutic procedures.

Adherence to ERP. Mean scores on each of the three PEAS items were computed for each patient from across the 13 administrations of this instrument during treatment. Mean scores for the PEAS exposures attempted item were 5.73 (*SD* = 1.58) for ERP and 5.96 (*SD* = 1.45) for ACT + ERP. A score of 5 on the PEAS corresponds to attempting "about 75%" of assigned exposures and a score of 6 corresponds to an attempt rate of "about 90%." Thus, patients in both groups attempted the majority of assigned exposure tasks. The model with a separate residual variance for each time point and a separate correlation for each pair of time points was most appropriate for analysis of these data. This model revealed no significant effect of condition (estimate = 0.238, *SE* = 0.207), *t* (48) = 1.149, *p* = .256, Cohen's *d* = 0.150.

Mean scores for the PEAS exposure quality item were 5.41 (*SD* = 1.36) for ERP and 5.44 (*SD* = 1.20) for ACT + ERP, indicating that participants, "completed the exposures as assigned by the therapist with minimal compulsions or safety aids." The model with a separate residual variance for each time point and condition and a separate correlation for each pair of time points was the most appropriate for analyses of these data. This model revealed no significant effect of condition (estimate = 0.014, *SE* = 0.199), *t* (46) = 0.068, *p* = .956, Cohen's *d* = 0.025.

Mean scores for the PEAS response prevention item were 5.24 (*SD* = 1.33) for ERP and 5.36 (*SD* = 1.27) for ACT + ERP, which correspond to resisting "about 75%" of urges to ritualize. The model with a separate residual variance for each time point and condition, and a separate correlation for each pair of time points, emerged as the most appropriate model for analysis of these data. This model also revealed no significant effect of condition (estimate = 0.266, *SE* = 0.207), *t* (47) = 1.284, *p* = .206, Cohen's *d* = 0.097.

Patient evaluation of treatment. Mean scores on the TEI at post-treatment for the ERP and ACT + ERP groups were 30.61 (*SD* = 2.54) and 30.00 (*SD* = 3.03), respectively, and not significantly different from one another, *t* (46) = 0.76, *p* = .456. These ratings indicate that following their full course of treatment, participants in both groups rated their respective interventions to be highly acceptable.

2.5. Effects of study site

To examine whether outcomes on each of the main symptom and change process variables varied by study site, we re-computed each of the models reported previously adding site as a moderating variable. No significant effect of site was detected in any model (all *ps* > .05).

2.6. Clinically significant change

We used the Jacobson methodology (Jacobson & Truax, 1991) to determine the number of patients in each group that achieved (a) end-state functioning within the nonpatient distribution of Y-BOCS scores and (b) reliable change. Method *c* (Jacobson & Truax, 1991, p. 13) for determining the cutoff score for clinically significant change yielded a Y-BOCS cutoff score of 16. Incidentally, this cutoff score also equates to the widely used cutoff score for moderate (≥16) OCD symptoms (Goodman, Price, Rasmussen, Mazure, Delgado, et al., 1989). Reliable change (p. 14) was calculated to be 6.39 points on the Y-BOCS. All dropouts were scored as unimproved and included in the denominator, providing a full intent-to-treat analysis. At posttreatment, 19 (68%) patients in the ERP condition and 21 (70%) in the ACT + ERP condition attained both clinically significant and reliable change; these proportions were not significantly different, χ^2 (1) = 0.03, p = .860. At follow-up, this status was attained by 18 (64%) patients in the ERP condition and 18 (60%) in the ACT + ERP condition; the proportions again were not significantly different, χ^2 (1) = 0.11, p = .737. To deal with missing data, researchers frequently report these figures using the last value carried forward or including only completers instead of assuming that all missing data are negative. A more sophisticated approach to missing data is to use imputed values from the person-specific growth curves from the MLM analysis. With these values, no between-groups differences were detected at posttreatment (ERP: 21 [75%]; ACT + ERP: 23 [77%]), χ^2 (1) = 0.22, p = .882, or at follow-up (ERP: 22 [79%]; ACT + ERP: 23 [77%]), χ^2 (1) = 0.03, p = .862.

3. Discussion

Although ERP is an effective treatment for OCD, it is important to identify methods to improve patient adherence, completion, and outcome. For a number of conceptual and practical reasons (as articulated previously), integrating ACT and ERP provides a promising avenue for addressing these aims. Accordingly, this investigation tested the differential efficacy of traditional ERP versus ACT + ERP. As predicted, participants in both conditions showed substantial pre-to post-treatment decreases in clinician-rated and self-reported OCD symptoms as well as in depressive symptoms, with these improvements being maintained at follow-up. The rates of symptom reduction, effect sizes, and clinically significant/reliable change attained in this study were consistent with those reported in previous investigations of ERP for OCD (e.g., Olatunji et al., 2013). Thus, the present study adds to the vast literature supporting the efficacy of ERP.

Contrary to our prediction, however, we found no between-group differences on any indices of symptom outcome. Thus, explicitly targeting psychological flexibility, acceptance of obsessional thoughts, willingness to experience anxiety, and valued living did not enhance ERP over the more traditional approach focusing on habituation of anxiety and changes in dysfunctional beliefs about threat, responsibility, perfectionism, and the importance of thoughts. One explanation for this finding is that ERP has an efficacy ceiling—at least in studies that include large samples of adults with heterogeneous presentations of OCD—that can be reached by the traditional approach to implementing this intervention, which limits the detection of differential outcomes. Indeed, systematic confrontation with feared stimuli is therapeutically potent, and there is little evidence that adding other active interventions (e.g., medication, cognitive therapy, motivational interviewing) to ERP improves its efficacy in large controlled studies (Tolin, 2009). Thus, it might be that an idiosyncratic (i.e., patient-specific) microanalytic approach is required to identify patient factors related to sub-optimal response so that ways to improve response to ERP can be developed and studied using more homogeneous groups of individuals with OCD, such as those with a specific obsessional theme, greater intolerance of anxiety, or particular sociocultural background.

Another potential explanation for the lack of between-group differences lies in our finding that both approaches to conducting ERP were associated with comparable changes in both psychological flexibility and in dysfunctional ("obsessive") beliefs. Although increasing willingness to experience obsessions and anxiety and pursuing valued living are not explicit aims in traditional ERP, it is perhaps not surprising that repeatedly confronting one's fears and resisting rituals would also set the stage for increased willingness to experience obsessional thoughts and anxiety, as well as the ability to behave according to one's values even while having these experiences. Similarly, although ACT + ERP does not explicitly emphasize modifying dysfunctional beliefs, changes in cognitions about threat, responsibility, uncertainty, and the importance of thoughts are implied within such a framework. Consistent with previous research, it is indeed difficult to imagine someone increasing their willingness to experience an obsessional thought without also eventually changing their beliefs about the need to control such a thought (Manos et al., 2010). Thus, whereas the ACT framework expands our understanding of (and how we communicate about) OCD and its treatment, our data do not suggest that this approach is a replacement for existing cognitive (misinterpretations/belief change) and behavioral (negative reinforcement/habituation/extinction) frameworks (Abramowitz & Jacoby, 2015).

Also in contrast to our predictions, ACT + ERP neither reduced attrition nor improved acceptability or exposure engagement. Both conditions were associated with high expectations for improvement immediately before beginning exposures and were perceived as highly acceptable at posttreatment. These findings are in line with previous studies that suggest that as long as an empirical rationale is provided, the framework utilized does not differentially impact credibility and expectancy ratings of exposure (Arch et al., 2015; England et al., 2012). Dropout rates for both conditions were comparable and similar to those reported in previous trials of ERP for OCD. Moreover, our observed dropout rate was in line with those reported in studies of non-exposure-based therapy (Ong et al., 2016), which runs counter to the assertion, held by some, that the anxiety associated with exposure therapy results in especially high dropout rates from this intervention (Rachman, Radomsky, & Shafran, 2008). We further found no differences on any index of treatment engagement, with both groups completing a high percentage of high quality ERP exercises as rated by their clinicians. Paired with our results in support of ERP's efficacy, our findings stand in juxtaposition to the widespread beliefs that exposure therapy increases patient symptoms, decompensation, or dropout (Cook, Schnurr, & Foa, 2004; Deacon, Lickel, Farrell, Kemp, & Hipol, 2013) and consequent underutilization of exposure-based therapies (Hipol & Deacon, 2013). An important caveat, however, is that our patients volunteered to participate in a treatment study and were selected on the basis of meeting particular inclusion/exclusion criteria. Thus, they might not be representative of treatment-seeking patients with OCD at large. Therapists in our study were also highly trained and closely supervised by experts, which is not typical of how ERP is delivered in most clinical settings.

The present findings have clinical implications. Most importantly, therapists have options when choosing a framework from which to implement ERP for OCD. In contrast to the traditional approach (e.g., Foa & Kozak, 2004), which emphasizes the habituation of anxiety during exposure, the ACT framework casts ERP as a process by which one learns and practices willingness to experience obsessions and anxiety in order to move toward what one values in life despite their presence (i.e., psychological flexibility). In addition, as opposed to the didactic and Socratic styles used to communicate the rationale for ERP in the traditional approach, the ACT framework uses various metaphors and experiential exercises to convey its rationale (e.g., Twohig et al., 2015). It is also noteworthy that the ACT framework bears resemblance to approaches that optimize inhibitory learning during exposure in that both models aim to foster fear tolerance and do not rely on the habituation of anxiety as indicators of learning (Craske et al., 2008; Jacoby & Abramowitz, 2016). Precisely because there are different empirically

supported frameworks from which to implement ERP, an important challenge for future research is to identify the optimal match between framework and patient characteristics.

A number of limitations of the present study should be considered. First, the therapists in the present study were primarily graduate students, and results may differ in the hands of more experienced treatment providers. At the same time, study therapists received close supervision and a high degree of oversight that is not typical (or feasible) in most clinic settings. Supervisors functioned as case managers and trainers, working to maintain therapist adherence to treatment protocols. Second, patient adherence ratings were provided by the treating clinicians and may have been affected by the perceptions of the patients' progress or reflective of patient-therapist alliance. Although we attempted to reduce this bias by having therapists base compliance ratings on data collected during session and by manualizing how the adherence ratings were to be coded, more reliable methodology for assessing adherence in ERP is needed. For example, compliance could be rated by independent observers watching session videotapes. Third, study participants were overwhelmingly white, young, and had at least some college education, which are unfortunately overrepresented groups in psychotherapy research. Future studies testing both treatments with a more diverse sample is needed, as is the use of culturally adapted treatments. Finally, there are concerns with the process of change measures used in this study. Though the OBQ and AAQ-II are the two most representative measures for each purported process of change, the OBQ measures beliefs that are more or less specific to OCD, whereas the AAQ-II is a more general measure of psychological inflexibility and might not have been as sensitive to changes during treatment, or it measures broader constructs (Wolgast, 2014).

4. Summary and conclusion

This study represents the first randomized controlled trial comparing traditional ERP to ACT + ERP. Despite differences in the rationale and implementation of ERP, the overall findings are characterized by similarities in the immediate and long-term outcomes, acceptability and engagement, and theoretical processes of change in both approaches. In concert with previous work (Arch et al., 2012; Fabricant, Abramowitz, Dehlin, & Twohig, 2013; Wolitzky-Taylor, Arch, Rosenfield, & Craske, 2012), this study suggests that there are overlapping and shared processes of change in traditional ERP and ACT. Additional research is needed to explicate these relationships and their differential effectiveness depending on client characteristics. Overall, our findings suggest that the beneficial effects of ERP, the gold standard psychological treatment for OCD, may be obtained by using either a habituation or an ACT approach without sacrificing acceptability or tolerability. Further, our study points to promising directions for future research on the (a) shared versus unique mechanisms of therapeutic change and (b) patient-specific characteristics that indicate one approach to ERP delivery over the other.

Author note

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Conflict of interests

We have no conflict of interests to report.

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