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Psychological Flexibility as Shared Process of Change in Acceptance and Commitment Therapy

and Exposure and Response Prevention for Obsessive-Compulsive Disorder:

A Single Case Design Study

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Abstract

Changes in psychological flexibility were tracked in a combined protocol of exposure and response prevention (ERP) and acceptance and commitment therapy (ACT) for adults with OCD to assess if changes in psychological flexibility processes were unique to ACT intervention (e.g., not impacted by ERP). Using a non-concurrent multiple baseline design, four participants received sessions of ERP and ACT while data was collected on psychological flexibility processes of change and OCD symptom severity. Results indicate treatment response for three of four participants based on OCD scores. Contrary to predictions, data suggest both ERP and ACT have positive effects on psychological flexibility. Implications of these findings are discussed in relation to recent research on ACT and ERP for OCD. This study also illustrates a type of research design that can be accomplished in clinical practice.

Keywords: acceptance and commitment therapy; exposure and response prevention; obsessive-compulsive disorder; single case design; psychological flexibility

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Within the cognitive behavioral therapy (CBT) literature, there has been a shift from its

prior emphasis on discrete protocols targeting specific diagnoses towards understanding broader,

transdiagnostic, evidence-based processes of change (e.g., Hayes & Hoffmann, 2017; Rosen &

Davison, 2003). One proposed transdiagnostic process of change is psychological flexibility.

Psychological flexibility refers to the ability to remain present, even when in contact with

aversive stimuli, in order to engage in deliberate behavior towards meaningful life directions. It

has been conceptualized as the combination of six other psychological flexibility processes,

including *acceptance*, *cognitive defusion*, *present moment awareness*, *self as context*, *values*, and

committed action (Luoma, Hayes, & Walser, 2017). Psychological flexibility is hypothesized to

be the primary process of change behind acceptance and commitment therapy (ACT) but has

been shown to be affected by other treatments as well (e.g., Levin, Hildebrandt, Lillis, & Hayes,

2012), including other forms of CBT (Arch et al., 2012; Twohig et al., 2018).

Exposure and response/or ritual prevention (ERP) is the most established treatment for

OCD (e.g., Cuijpers et al., 2013; Olatunji et al., 2013), but debate is robust as to the processes of

change underlying its effectiveness (e.g., Craske et al., 2014). Of greatest relevance to this study,

the psychological flexibility process of acceptance or willingness has been proposed to be

particularly important in ERP for OCD (e.g., Reid et al., 2017; Twohig et al., 2015).

There is a growing literature that ACT is effective in treating OCD (e.g., Twohig,

Morrison, & Bluett, 2014). Meta-analyses have generally found comparable results for ACT,

with or without exposure exercises, compared to CBT with exposure (Bluett et al., 2014; Landy,

Schneider, & Arch, 2015). While initial studies of ACT for OCD deliberately omitted ERP in order to test whether ACT offered a novel and effective approach for OCD above and beyond ERP (Twohig, Hayes, & Masuda, 2006; Twohig, Hayes, et al., 2010), the use of exposure is compatible with ACT (Twohig et al., 2015). Since this study was initiated, a randomized trial was published that compared 16 individual sessions of traditional ERP for OCD against 16 sessions of ERP integrated within the ACT model (Twohig et al., 2018). Results were strong for both interventions at posttreatment and follow-up, with both treatments resulting in improved OCD symptom severity and increased psychological flexibility, and there were no statistically significant differences in psychological flexibility or obsessional beliefs between conditions, further suggesting that ERP may increase psychological flexibility with or without ACT.

Twohig, Whittal, Cox, & Gunter (2010) found that ACT, ERP, and cognitive therapy (CT) for OCD appear to work through a broader range of processes than predicted by the theorized mechanisms of each individual treatment, with psychological flexibility increasing across most of the participants regardless of treatment. Tolin (2009) argues that the processes of change for ACT and ERP for OCD may be more alike than different. ACT has even been called an exposure-based treatment (Luoma et al., 2017), and it has been theorized that exposure is one method to strengthen any of the six core psychological flexibility processes (Thompson, Luoma, & LeJeune, 2013).

This study aimed to continue the work in clarifying processes of change in OCD treatment via an intensive single case design methodology (e.g., Barlow, Nock, & Hersen, 2009; Kazdin, 2011) that begins with a variable length ERP phase and then proceeds to ACT. Single case design is useful in a practice setting because it requires less infrastructure than group design, is more cost effective, and requires fewer resources to implement (Codd, 2018). Because

individual participants are their own control, participants may receive effective care without waitlists or control conditions.

This study improves upon Twohig, Whittal et al. (2010) by using a measure of the psychological flexibility process *acceptance* that had previously been shown to distinguish between ACT and CT (Forman et al., 2012). We predicted that if psychological flexibility processes were specific to the ACT model, we would not see changes in psychological flexibility during the initial ERP phase and that psychological flexibility would not increase until after the ACT phase began. A secondary aim of this study was to conduct a clinical study within a private practice setting within the restraints of the average therapy client (e.g., 45-minute sessions as compared to the 120-minute sessions used in many randomized trials of ERP for OCD; e.g., Abramowitz, Foa, & Franklin, 2003; Olatuniji et al., 2013; Twohig et al., 2018).

Method

Design

This study used a non-concurrent multiple baseline design across participants, which allows within participant comparison between baseline and intervention phases (Barlow et al., 2009; Kazdin, 2011). Including longer baselines across two or more participants controls for between participant variables such as repeated assessment and therapist contact. The non-concurrent design (vs concurrent) is used when simultaneous observation (e.g., treating all participants at the same time) is not possible and allows for more ethical treatment planning because the researcher can estimate the length of the baselines in advance and plan around participant schedules. By contrast, when all participants are in the same environment (e.g., group home), it is more important to run participants simultaneously (i.e., concurrent multiple baseline design). With high functioning adults living independently, however, we are less concerned

about concurrent study because participants share little in terms of environmental factors that might impact results and threaten internal validity.

After a baseline phase, participants were randomized to either: (a) a shorter initial ERP phase (4 sessions) followed by an ACT phase (4 sessions) and ending with a longer ERP phase (~8 sessions); or (b) a longer initial ERP phase (8 sessions) followed an ACT phase (4 sessions) and ending with a shorter ERP phase (~4 sessions). Total number of ACT sessions were consistent across the two conditions, but the length of the initial ERP phase was varied (i.e., 4 vs. 8 sessions) to control for whether improvements in psychological flexibility observed in the ACT phase were simply due to more treatment (i.e., psychological flexibility would increase after 4 or more sessions regardless of treatment). Assignment of ERP exercises was discontinued during the ACT phase of the treatment and all participants resumed formal ERP following the ACT phase until study completion. Participants were permitted additional sessions of ERP at the end of treatment, if needed, as this was not expected to interfere with the internal validity of the design. All therapy sessions were 45-minutes at a mental health clinic in a northwestern state in the USA following an initial 2-hour consenting and assessment appointment.

Consistent with single case design principles (Barlow et al., 2009; Codd, 2018; Kazdin, 2011), psychological flexibility was assessed repeatedly over time with the aim of evaluating whether psychological flexibility responded more to one intervention over another. Prior to data collection, this study was approved by the Behavioral Health Research Collective Institutional Review Board (IRB). Participants ($N = 4$) were recruited through websites associated with the first author's workplace, professional listservs, word-of-mouth referrals, and through a research posting on the International OCD Foundation website.

Measures

Structured Clinical Interview for DSM-IV-TR - Research version, Module F20-24 only (SCID-R; First, Spitzer, Gibbons, & Williams, 2002). The SCID-R is a structured diagnostic interview that assesses Axis I disorders based on DMS-IV-TR criteria. It is well-validated and widely used to establish diagnostic clarity. For this study, the SCID-R was used to confirm OCD diagnosis at baseline.

The following measures were assessed daily with participants submitting ratings, depending on participant preference, through either a secure voice mail message, email that did not identify the measures, or Google Docs without identifying information.

Daily Psychological Flexibility Ratings. The Before Session Questionnaire (BSQ; Forman et al., 2012) consists of a variety items intended to assess ACT and CT-related processes and outcomes. In the norming study, the ACT items were positively correlated with established measures of similar constructs. Internal reliability was not calculated because the individual items were not developed to measure separate constructs (Forman et al., 2012). Although originally designed to administered at the beginning of each treatment session to assess the past week, participants provided daily ratings in this study. Four items were intended to assess psychological flexibility as theorized in ACT and are detailed below.

Utilization of acceptance vs changes processes. Two BSQ items were intended to assess theorized mediators of change between ACT and CT. Items reflect use of *change* strategies (e.g., challenging thoughts or feelings) versus *acceptance* strategies (e.g., accepting thoughts and feelings without trying to change them). Items were worded to reduce demand characteristics—that neither end of the scale would appear to be the "right" response (Forman et al., 2012). The first item reflects *cognitive acceptance*. It is worded, "Whenever I had **bothersome thoughts** over the past day, I tended to…" and rated on a Likert-type scale from 1 ("Just notice them

without trying to change them") to 7 ("Try to change them or get rid of them"). The second item

reflects *affective acceptance*. It is worded, "Whenever I had **bothersome feelings** over the past

day, I tended to…," and rated on a Likert-type scale rated from 1 ("Just notice them without

trying to change them") to 7 ("Try to change them or get rid of them"). Forman et al. (2012)

found these two items were able to distinguish between participants receiving ACT therapy and

those receiving CT. For participants in ACT therapy, shifts towards *acceptance* (lower end of

scale or "1") were positively correlated with improvements in symptom intensity and goal

progress, whereas for participants in CT, improvements in symptom intensity and goal progress

were positively correlated with shifts towards *change* (higher end of scale or "7").

    Cognitive defusion and committed action. The other two BSQ items used in his study

reflect ACT-related processes that did not differentiate between ACT and CT in the prior study;

that is, improvements on these items did not significantly differ between participants receiving

ACT and participants receiving CT (Forman et al., 2012). One item reflects the psychological

flexibility process *cognitive defusion*. It is worded, "When I have thoughts that I 'know' are

unrealistically negative…" and rated on a Likert-type scale from 1 ("I'm able to see them as just

thoughts and not as the truth") to 7 ("I can't help but take them as the truth"). Lower scores

reflect greater defusion from thoughts (e.g., noticing thoughts without accepting them as literal

reality). The other item reflects *committed action*. It is worded, "In terms of the effect of my

emotions on my behavior, my distress…" on a Likert-type scale from 1 ("Does <u>not</u> prevent me

from doing anything of importance") to 7 ("Prevents me from doing many important things").

Lower scores reflect greater psychological flexibility.

    Daily Time Spent on Rituals. Along with BSQ ratings, participants submitted daily

scores tracking time engaged in rituals (i.e., "Number of minutes spent on rituals"), consistent

with the self-monitoring form used in the ERP treatment protocol (Foa, Yadin, Lichner, 2012;

Yadin, Foa, & Lichner, 2012) adapted for this study.

The following measures were administered at baseline, mid-treatment (i.e., session 9) and

at post-treatment.

Yale-Brown Obsessive Compulsive Scale (Y-BOCS; Goodman et al., 1989). The Y-

BOCS is a semi-structured interview assessing OCD symptom severity and is the best validated

and most widely used measure for assessing OCD symptom severity. The 10-item severity scale

(5 items measure obsessions; 5 items measure compulsions) is rated on a scale of 0 ("none") to 4

("extreme"), yielding a total score between 0 and 40. A reduction of $\geq$35% on the Y-BOCS is

considered to indicate *treatment response* and a score of $\leq$ 14 reflects *symptom remission* (Farris,

McLean, Van Meter, Simpson, & Foa, 2013).

Obsessive-Compulsive Inventory-Revised (OCI-R; Foa et al., 2002). The OCI-R is an

18-item self-report measure of OCD symptom severity. Items are rated on a Likert scale of 0

("Not at all") to 4 ("Extremely"), with higher scores reflecting greater symptom severity. A cut-

off score of $\geq$21 is recommended to screen for people with or without OCD. Although subscales

can be calculated, only the total score was calculated for this study. For the total score in a

sample of people with OCD, internal consistency was .81, and test-retest reliability was .82, and

it has been shown to discriminate between individuals with and without OCD with a sensitivity

of 99.5% (Foa et al., 2002).

Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011). The AAQ-II is a

7-item self-report measure of psychological flexibility on a scale of 1 ("never true") to 7

("always true") with lower scores reflecting greater psychological flexibility. Internal

consistency ranges from .78-.88, and it has acceptable test-retest reliability (3 months = .81; 12

months = .79; Bond et al., 2011). It is a widely used measure in ACT research; however, researchers have more recently questioned the discriminative validity of the AAQ-II (Ong, Lee, Levin, & Twohig, 2019).

Cognitive Fusion Questionnaire–7 (CFQ; Gillanders, et al., 2014). The CFQ is a 7-item measure of the psychological flexibility process cognitive fusion: the degree to which people believe in the content of their thinking vs. having some degree of distance or objectivity from thoughts. Items are rated on a Likert scale of 1 ("never true") to 7 ("always true) and are summed. Lower scores reflect greater defusion (e.g., greater psychological flexibility). Gillanders et al. (2014) found it has acceptable internal consistency (.88) and test-retest reliability (.80), although the authors acknowledge one weakness in that the CFQ has a strong correlation with the AAQ-II (.72-.87).

The Philadelphia Mindfulness Scale (PHLMS; Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008). The PHLMS is 20-item self-report measure of mindfulness with 2 subscales: acceptance and awareness. Items are rated on a Likert scale of 1 ("Never") to 5 ("Very Often"). Higher scores on each subscale reflect greater awareness and acceptance. Internal consistency for the awareness subscale is .81, and .85 for the acceptance subscale, and the subscales are orthogonal, suggesting they measure separate constructs (Cardaciotto et al. 2008).

Procedure

Participants completed a phone screening prior to scheduling an assessment. Phone screening eligibility included: (a) 18 years or older; (b) can read and speak in English; (c) no disabilities that would preclude ability to participate in the study (e.g., autism spectrum) or thought disorders; (d) no previous treatment experience with ERP or ACT; (e) if prescribed benzodiazepines, participants agreed to not take them during the study. If a potential participant

passed the phone screen and remained interested in the study, a 2-hour assessment was scheduled.

At the in-person assessment, participants were provided a description of the study and completed a study-specific consent form. Participants were told they would be receiving two evidence-based treatments for OCD to assess the impact of each. OCD diagnosis was confirmed using the OCD subscale from the SCID-R (First et al., 2002). Information about obsessions, compulsions, and avoidance was collected. The Y-BOCS was administered by the experimenter, and participants completed the remaining self-report measures (i.e., OCI-R, AAQ-II, CFQ, PHLMS). At completion of the assessment, participants were asked to begin daily self-monitoring (e.g., 4 BSQ psychological flexibility items; daily minutes spent ritualizing).

The Baseline phase began after the 2-hour initial assessment and lasted between two to three subsequent sessions. These sessions involved the completion of the weekly self-monitoring form, psychoeducation, detailed assessment of obsession content and compulsions, creating a detailed list of potential ERP exercises, and development of an exposure hierarchy.

The initial ERP phase began after completion of exposure hierarchy. ERP was adapted from a widely used and well-researched treatment protocol (Foa et al., 2012; Yadin, et al., 2012). Sessions were shortened from 90-120 minutes in the manual to 45-minutes for the study, as is more appropriate for standard clinical practice settings in which insurance reimbursement is sought. In-session exposures were conducted within what time the 45-minute sessions permitted, and participants were asked to practice daily ERP exercises for 45-minutes and track SUDS (Subjective Units of Discomfort Scale) scores.

After a pre-determined number of ERP sessions—either 4 or 8—participants began the ACT phase. ACT was adapted from Eifert and Forsyth's (2005) *ACT for Anxiety Disorders*

treatment manual. During the ACT phase, participants were asked to suspend engagement in formal ERP exercises and focus instead on learning and practicing ACT exercises. The first ACT session introduced a guided mindfulness exercise, The Acceptance of Thoughts and Feelings exercise, and a recording was provided for daily home practice. *Creative Hopelessness*—the notion that attempts at avoiding or struggling with uncomfortable thoughts, feelings, and interoceptive sensations are generally unsuccessful—was introduced through two experiential exercises (i.e., Tug-of-War with a Monster; Finger Traps). In the second ACT session, obsessive thoughts were identified and written on note cards, which were used in defusion exercises such as the Passengers on the Bus. Participants were then given the cards to take home and asked to look at them 1-2 times daily. The third ACT session introduced a second mindfulness exercise, The Acceptance of Anxiety exercise, that involved participants deliberately evoking and practicing acceptance of OCD-related thoughts and feelings, with a recording provided for daily home practice. In addition, the Bull's Eye assessment was used for values clarification (Lundgren, Luoma, Dahl, Strosahl, & Melin, 2012). The fourth session introduced the concept of self as context via the Chessboard Metaphor and allowed time to return to any material not covered in the prior sessions (e.g., finishing values clarification).

We provide more detail about homework to allow readers to better assess the level of overlap between ACT exercises and the more traditional exposure approaches used in ERP. During the ACT phase, the primary homework was listening to a 15-minute acceptance recording each day. The Acceptance of Thoughts and Feelings exercise was practiced across two sessions and consisted of the participant mindfully noticing any experiences that arose without trying to control them. The Acceptance of Anxiety exercise asked the participant to spend part of the time thinking about something uncomfortable, but participants were free to choose the

stimuli focused on during each practice, which might be different across practices. In this exercise, because the stimuli were not selected ahead of time or necessarily related to obsessions, any exposure that occurs is less consistent and briefer than exposure conducted as part of ERP. In contrast, in ERP the individual typically confronted the same stimuli during repeated practices of 45 minutes each. Another ACT homework, looking at thoughts on note cards (e.g., "I'm a pedophile") may be considered a "mini-exposure" but remains much less intensive than what occurred in ERP. While the ACT approach certainly includes some exposure-like elements, we believe this is substantially different from formal ERP exercises that involve using a hierarchy, tracking SUDS, and repeating this systematically.

Results

Participant Background and Summary of Treatment

Participant 1 (P1) was a White female in her early 30's with primary obsessions related to harm (e.g., may be a pedophile; cause others to become sick; inadvertently writing something offensive in email). Compulsions included excessive handwashing, checking locks, and repeatedly proofreading emails and writing assignments to check that she did not include something offensive. Aside from OCD, she had no other known comorbid psychiatric diagnoses. She began the ACT phase after a 4-session ERP phase, and she completed the study in 17 sessions as she could not identify additional exposure targets and felt she had met her treatment goals. She was not taking any psychiatric medications. At study completion, when asked for feedback, P1 commented she found the ERP work extremely important but felt she "would have progressed faster" if she had engaged in more ACT work.

Participant 2 (P2) was a White female in her late 30's. Obsessions included fear of becoming a hoarder, fear of having brain damage, and fear of harm (e.g., molesting children;

hitting pedestrians when driving). Compulsions included frequently changing her clothing and re-arranging her furniture (e.g., home; office), repeating her library card number to herself to reassure herself she did not have brain damage, and compulsively giving away possessions that she often wished she had kept because she feared she might be a hoarder. In addition to OCD, she had a diagnosis of ADHD. She began the ACT phase after an 8-session ERP phase, and she completed the study in 19 sessions. P2 was taking Cymbalta and Adderall during the study. Unfortunately, she was noncompliant with the study requirement to maintain her medication dosage at a stable level throughout the study. She reported she decreased her dosage of Cymbalta before session 2 without consulting her prescriber, as she feared the medication was causing "brain damage." She reported she reduced her Cymbalta to a lower daily dose again around session 16. Between sessions 8 and 9, P2 stopped submitting daily process ratings for 1 week and did not respond to email reminders. At completion, P2 noted some improvement in rituals but stated "exposure doesn't work for me." She stated she thought the ACT phase was "short" and that it provided a useful reminder that she could "let my thoughts pass."

Participant 3 (P3) was a White female in her late 20's who struggled with relationship obsessions (e.g., "right relationship"), fears of being poisoned by "non-natural" household cleaners (e.g., Comet), and endorsed some scrupulosity obsessions. Compulsions included obsessively reading articles on relationships, excessive cleaning (e.g., silverware; handwashing; brushing teeth), and avoiding certain cleaning agents. Aside from OCD, she had no other known comorbid psychiatric diagnoses. She began the ACT phase after a 4-session ERP phase, and she completed the study in 19 sessions. The final 2 sessions occurred after a monthlong break during which she was married. She was not taking any psychiatric medications. At the end of treatment,

she described ACT as a "more focused form of mindfulness" and "extremely helpful," especially in "learning not to 'engage' my thoughts."

Participant 4 (P4) was a Latina female in her early 30's whose primary obsessions concerned accidentally harming someone—especially when driving. Her most time-consuming compulsion involved spending hours after work and/or the next morning before work repeatedly reviewing her prior drive to work to ensure she had not harmed anyone. Aside from OCD, she had no other known comorbid psychiatric diagnoses. She began the ACT phase after an 8-session ERP phase, and she completed the study in 20 sessions as she struggled to implement a final ERP exercise aimed at disrupting morning rituals of trying to remember all the events of the past day (i.e., reassure herself she had not accidentally harmed anyone). She was not taking any psychiatric medications. At completion, P4 endorsed a preference for ERP over ACT. She stated the ACT phase helped her learn to "accept my thoughts" but would have preferred 2 rather than 4 ACT sessions in order to focus more on ERP.

Primary outcomes

  Daily psychological flexibility ratings. The standard method for evaluating single case design data is visual inspection (e.g., Barlow et al., 2009; Kazdin, 2011). Continuous assessment data is graphed and carefully inspected for shifts between phases. Means for daily assessments are calculated in Table 1.

  Utilization of acceptance vs change processes. As ratings of *acceptance vs change processes* (i.e., BSQ cognitive acceptance, affective acceptance) clustered closely together across all 4 participants (see Table 1), these two items were averaged together. Graphs of daily ratings of these items are provided in Figure 1. Lower scores across all psychological flexibility items

reflect increases in ACT-consistent processes (i.e., high psychological flexibility) whereas higher

scores reflect a focus on change (i.e., low psychological flexibility).

Baselines for P1, P3, and P4 appear stable, but the baseline for P2 is problematic. Initially

P2's baseline appears stable across 2 weeks until the week before beginning the ERP phase,

when there is an unexpected increase in psychological flexibility (i.e., decelerating slope). This

change occurred during the time the P2 decreased her medication because she feared it was

causing brain damage. For these reasons, it is difficult to interpret P2's change from baseline to

ERP phases, but the decrease from ERP to ACT phases is interpretable due to the stability seen

during ERP.

Graphs for all participants indicate increases in psychological flexibility between baseline

and final ERP phase (i.e., study completion). The graph for P1 who had a shorter initial ERP

phase (4 sessions), indicates little change in psychological flexibility until the ACT phase, when

there is an increase in psychological flexibility. The graph for P3 suggests a slight increase in

psychological flexibility during the second half of the 4-session ERP phase just prior to the ACT

phase. Graphs for P1 and P3 indicate increases in psychological flexibility during the ACT phase

with additional increases in the final ERP phase. The graph for P4, who had a longer initial ERP

phase (8 sessions), indicates greater increases in psychological flexibility during the initial ERP

phase well before the ACT phase, with minimal additional change in psychological flexibility

between the ACT and final ERP phases. The graph for P2 who, with P4, had a longer initial ERP

phase (8 sessions) indicates an increase in psychological flexibility just prior to the first ERP

phase with a small additional increase during the ACT phase. However, because of P2's unstable

baseline, it is possible that P2's increase in psychological flexibility is unrelated intervention. In

sum, graphs in Figure 1 indicate that both ACT and ERP appear to increase psychological

flexibility. In addition, the graphs suggest that at least 2 out of 4 participants (P3, P4) increased

in psychological flexibility during the ERP phase before the ACT phase, suggesting that

psychological flexibility changes are not unique to ACT. The only participant who clearly did

not improve in psychological flexibility prior to the ACT phase was P1, who had a shorter initial

ERP phase.

Cognitive defusion and committed action items. Compared to the acceptance vs change

items, increases in BSQ cognitive defusion and committed action were more modest (See Means

in Table 1). We graphed the data but opted not include the eight graphs in this manuscript in the

interest of space, because compared to the acceptance vs change items, the graphs for the

cognitive defusion and committed action items had: (a) unstable baselines (i.e., decelerating

slopes) for P2 and P4; (b) ratings that somewhat mirrored acceptance vs change item ratings for

P2 and P3; and (c) changes that did not clearly differentiate between phases for P1, P2 and P4.

Overall changes in OCD symptoms

Daily change in rituals. Mean changes in minutes spent engaged in daily rituals per phase

per participant are reported in Table 1. All participants reported decreases in daily rituals

between baseline and treatment completion.

Y-BOCS. Three of the four participants exhibited $\geq$35% reductions on the Y-BOCS,

reflective of *treatment response* (Farris et al., 2013). Post-treatment Y-BOCS scores for P1 and

P3 reached *symptom remission*, defined as having mild to subclinical or no symptoms ($\leq$14)

(Farris et al., 2013), with P4 being one point short of symptom remission (See Table 2).

OCI-R. Based on the OCI-R, 3 of 4 participants were below the recommended cut-off

($\leq$21) for clinically significant OCD symptoms at post-treatment. (See Table 2.)

For P1, P3 and P4, improvements on the Y-BOCS and OCI-R were reflected in gradual decreases in daily rituals. P2's Y-BOCS scores would not classify her as a treatment responder, and decreases in daily rituals appeared to occur immediately after baseline, as there are no further decreases in rituals between the first and second ERP phases as there are with P1, P3, and P3 (See Means in Table 1). These factors suggest that changes in P2 may be due more to outside factors such as medication changes than to active treatment. Interestingly, P4, whose improvements on the Y-BOCS met criteria for *treatment response,* exhibited less pronounced reductions in daily rituals (from $M = 170.67$ minutes at baseline to $M = 159.18$ at the second ERP phase) compared to the other participants who responded to treatment, P1 and P3. When asked about her daily ratings compared to her changes in Y-BOCS scores, P4 stated that her rituals, which were mainly mental at completion, remained time-consuming but were less intense and easier to ignore by treatment completion. Rather than spending up to 2 hours in bed each morning repeatedly reviewing the events of the past day (i.e., that everyone she encountered was unharmed) until she "felt right," P4 reported she could leave her bed and engage in her morning routine while reviewing the past day. This is consistent with the psychological flexibility model in which the emphasis is on changing the function of internal stimuli rather than the form or frequency (e.g., Eifert & Forsyth, 2005; Twohig et al., 2015).

Changes on Other Measures of Psychological Flexibility

See Table 2 for pre- mid- and post-treatment scores on self-report measures of psychological flexibility. Note that *decreases* in scores on the AAQ-II and CFQ reflect *increases* in psychological flexibility processes (e.g., increased psychological flexibility on the AAQ-II; increased cognitive defusion on the CFQ). Among the three psychological flexibility measures, the PHLMS acceptance scale indicated the strongest increases in psychological flexibility.

Changes in scores on the CFQ were consistent with changes in the BSQ cognitive defusion items, in that participants who exhibited greater relative improvements on one exhibited greater relative improvement on the other (See Tables 1 and 2). Increases in psychological flexibility as measured by the AAQ-II did not appear to correspond directly with improvement on Y-BOCS, which suggests psychological flexibility was not directly related to improvements in OCD symptom severity.

Discussion

This study used a controlled single case design methodology to examine changes in psychological flexibility during a combined ERP and ACT treatment for OCD. Between baseline and treatment completion, all participants exhibited increases in psychological flexibility. As measured by daily BSQ *utilization of acceptance vs change* items, participants reported shifts from emphases on trying to change unwanted thoughts and feelings towards greater acceptance of unwanted thoughts and feelings without trying to change or control them. Contrary to predictions, these changes occurred during ERP and prior to ACT intervention for at least two and participants. That ERP can strengthen psychological flexibility processes is clearest in the graph for P4 (Figure 1), who exhibited increases in psychological flexibility during ERP—well before the introduction of ACT. These findings are consistent with Twohig et al. (2018) who found no significant difference in increases in psychological flexibility between traditional ERP and ACT-informed ERP for OCD. Consequently, data to-date suggest that both ACT and ERP strengthen psychological flexibility.

A secondary aim of this study was supported: we were able to complete a clinical study within the parameters of an outpatient clinical practice and within shorter sessions more conducive to insurance reimbursement. Based on Farris et al. (2013), Y-BOCS scores indicated

that three of the four participants exhibited clinically significant improvement in OCD symptom severity and could be classified as treatment responders at completion, and two of the four participants could be classified as achieving symptom remission at completion with one additional participant only one point short from meeting symptom remission criteria. The 75% *treatment response* and 50% *symptom remission* rates observed in this study are excellent compared to what is typically found in clinical trials of ERP. For example, Farris et al. (2013) found that 45.9% of participants were treatment responders and 41.7% achieved symptom remission in data pooled from 4 randomized controlled trials of ERP for OCD with 90-120 minute sessions. The outcomes in this study were achieved in an average of 18.75 45-minute sessions, with total treatment time in this study equivalent to approximately eight 120-minute sessions. This is less time than the typical treatment time in clinical trials of ERP which may include fifteen to sixteen 120-minute sessions (e.g., Abramowitz et al., 2003; Twohig et al., 2018) or seventeen 90-minute sessions (e.g., Wheaton, Rosenfield, Foa, & Simpson, 2015). This study provides some evidence that ERP can be effectively modified for delivery in 45-minute sessions. It also provides some limited evidence that a combined ERP/ACT protocol can be successfully delivered outside of a research context.

One measurement-related finding of this study is its use of one-question BSQ items to track daily psychological flexibility processes (Forman et al., 2012). The *cognitive acceptance* and *affective acceptance* BSQ items (i.e., utilization of change vs. acceptance) appeared to capture changes in psychological flexibility across participants. As ratings for these items tended to covary over time, it appears participants either did not perceive a significant difference between these 2 items (e.g., thoughts and feelings) or that they correlate highly. Consequently, it

is possible that a single item reflecting utilization of cognitive and affective acceptance vs. change strategies may be more parsimonious.

In contrast with the daily BSQ items, improvements in psychological flexibility as assessed via validated multi-item measures (i.e., AAQ-II; CFQ; PHLMS) did not consistently indicate improvements in psychological flexibility across participants. On the one hand, this could reflect a strength of single case design methodology in its emphasis on continuous measurement that may be more sensitive to change than the more temporally remote and aggregated measurement common in group designs. On the other hand, this could reflect uncontrolled systematic error as the BSQ items has more limited psychometric information and may not be as robust as the more established self-report measures. We also noted that, in contrast with some of the other measures, improvements in AAQ-II scores did not correspond well to improvements in outcome measures. This might reflect recently published concerns about the discriminant validity of the AAQ-II (Tyndall et al., 2019) and recent reviews finding that context specific versions of the AAQ demonstrate better treatment sensitivity than the generic version used in this study (Ong et al., 2019). Since this study was designed and initiated, an OCD-specific version of the AAQ was developed and would be better suited in future research for this area (Jacoby, Abramowitz, Buchholz, Reuman, & Blakey, 2018).

There are several limitations of this study. The most obvious limitation is the generalizability of four participants to the broader population of individuals with OCD. As ERP and ACT have already been established as effective treatments for OCD, there is less concern for the generalizability of the treatments themselves than the findings related to the processes of change and the reliability and validity of the daily measurement approaches used.

Another limitation is that the study relied largely on self-report measures, aside from the clinician-administered SCID-R and Y-BOCS. The use of daily assessment is an unusual contribution to research on psychological flexibility processes but also a weakness in that our daily assessment methods have relatively unknown reliability and validity. There were also no formal measures of therapist treatment adherence or treatment compliance by the participants. Consequently, we are unable to quantify how well the therapist and participants followed the treatment protocol. For example, it is possible participants continued to engage in ERP during the ACT phase without the researchers' knowledge. However, in all treatments for OCD, it would be nearly impossible to achieve strong outcomes without participants informally approaching fears because this is an important part of treatment.

Establishing a stable baseline can be difficult in multiple baseline design (e.g., Rizvi & Ferraioli, 2012) and a weakness of this study design was that the treatment phase (i.e., ERP) began regardless of whether a stable baseline had been established during the Baseline phase. This is most problematic for P2, whose graph indicates a relatively stable baseline for 2 weeks followed by a sudden a decelerating slope (i.e., increases in psychological flexibility) *during* the Baseline phase, just prior to beginning ERP. This also corresponded to the participant discontinuing their medication against study protocol, further contaminating the data from this participant. Baselines for the remaining three participants appeared stable. The design of this study is something of a hybrid in that there were two baselines for each participant: (1) a traditional baseline before active treatment (i.e., ERP); and (2) staggered phases of either 4 or 8-sessions of ERP to examine if increase in psychological flexibility occur before the ACT phase. For the purposes of this study, the second baseline—staggered ACT phase—was more important to the study hypotheses than the baseline preceding the initial ERP phase

In summary, it appeared that the psychological flexibility processes were affected by both ACT-specific interventions and ERP. This suggests that improvements in psychological flexibility are not unique to ACT intervention and that ERP may be an effective intervention for increasing psychological flexibility processes. This is consistent with research demonstrating that treatments for OCD may work through a broader range of processes than what is predicted by the theories underlying the treatment (Twohig, Whittal, et al., 2010; Twohig et al., 2018). As a potential future follow-up study, it may be interesting to track psychological flexibility processes in traditional exposure-based treatment without any explicit ACT interventions or to explore the use of exposure alone to strengthen psychological flexibility processes before beginning ACT treatment.

This study supports the feasibility of completing similar kinds of studies within the day-to-day parameters of a typical clinical setting. ERP was delivered in 45-minute sessions, which are more likely to be reimbursed by insurance in the United States than the 90 or 120-minute sessions common to ERP clinical trials (e.g., Abramowitz et al., 2003; Twohig et al., 2018; Wheaton et al., 2015). As results were comparable to those in clinical studies, this study lends support to the effectiveness of ERP delivered in shorter sessions.

With the exception of IRB approval, the study was designed, implemented, and analyzed by the first author with resources available to the average practitioner in private practice. The additional time required to collect daily scores was minimal (~5 minutes per day), and all four participants were conscientious about submitting scores, rarely requiring prompting. The measures were easily scored by hand, and graphing of the data was conducted using standard word processing software. The most timing consuming parts of the process, and the only part that was under-budgeted by the first author, were the writing and revision of the manuscript.

However, the manuscript could be worked on during client cancellations or periods of downtime (e.g. summer when more clients are away). The first author collected the majority of the references cited here through a combination of downloading articles offered on professional listervs, a version of PsycINFO provided through the local public library system, and combing personal and faculty websites of researchers as well as ResearchGate profiles for downloadable copies of articles.

As part of the study, the first author provided free evidence-based treatment for OCD to four individuals, at least two of whom did not have the resources (e.g., insurance; finances) to access specialty care for OCD elsewhere. We hope this study may serve as a model for other behavioral health practitioners on how to conduct research in a practice setting that may also benefit their community. One last piece of practice-based advice: there are aspects of conducting research that one only learns through experience, and the first author wishes he had started the study earlier rather than trying to avoid making mistakes that were ultimately an inevitable part of the process. In sum, the first author recommends erring on the side of learning through doing.

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Table 1

Means and (Standard Deviations) of psychological flexibility processes per phase

Processes	P1 Phases				P2 Phases				P3 Phases				P4 Phases			
	A	B^a	C	B^b	A	B^a	C	B^b	A	B^a	C	B^b	A	B^a	C	B^b
CA	6.35	6.17	5.56	4.78	5.24	3.92	3.32	3.18	5.94	5.84	4.50	3.70	7.00	5.61	4.57	3.88
AA	6.65	6.53	5.48	5.00	5.19	4.04	3.39	3.18	6.00	5.84	4.50	3.70	6.93	5.04	3.14	3.39
CD	3.94	3.87	3.74	3.35	4.67	4.04	3.85	3.68	6.06	5.74	4.56	3.78	3.87	3.94	2.75	2.29
Act	2.53	3.10	2.52	1.92	4.48	3.00	3.34	3.45	5.19	4.58	3.83	3.59	3.53	3.12	2.39	2.59
#	103.83	73.27	81.59	50.06	133.81	52.06	57.93	52.05	127.50	109.35	109.69	82.33	170.67	186.67	159.64	159.18

Phases: A = Baseline; B^a = 1st ERP; C = ACT; B^b = 2nd ERP
Daily Processes: CA = cognitive acceptance; AA = affective acceptance; CD = cognitive defusion; Act = committed action; # = minutes ritualizing

Figure 1
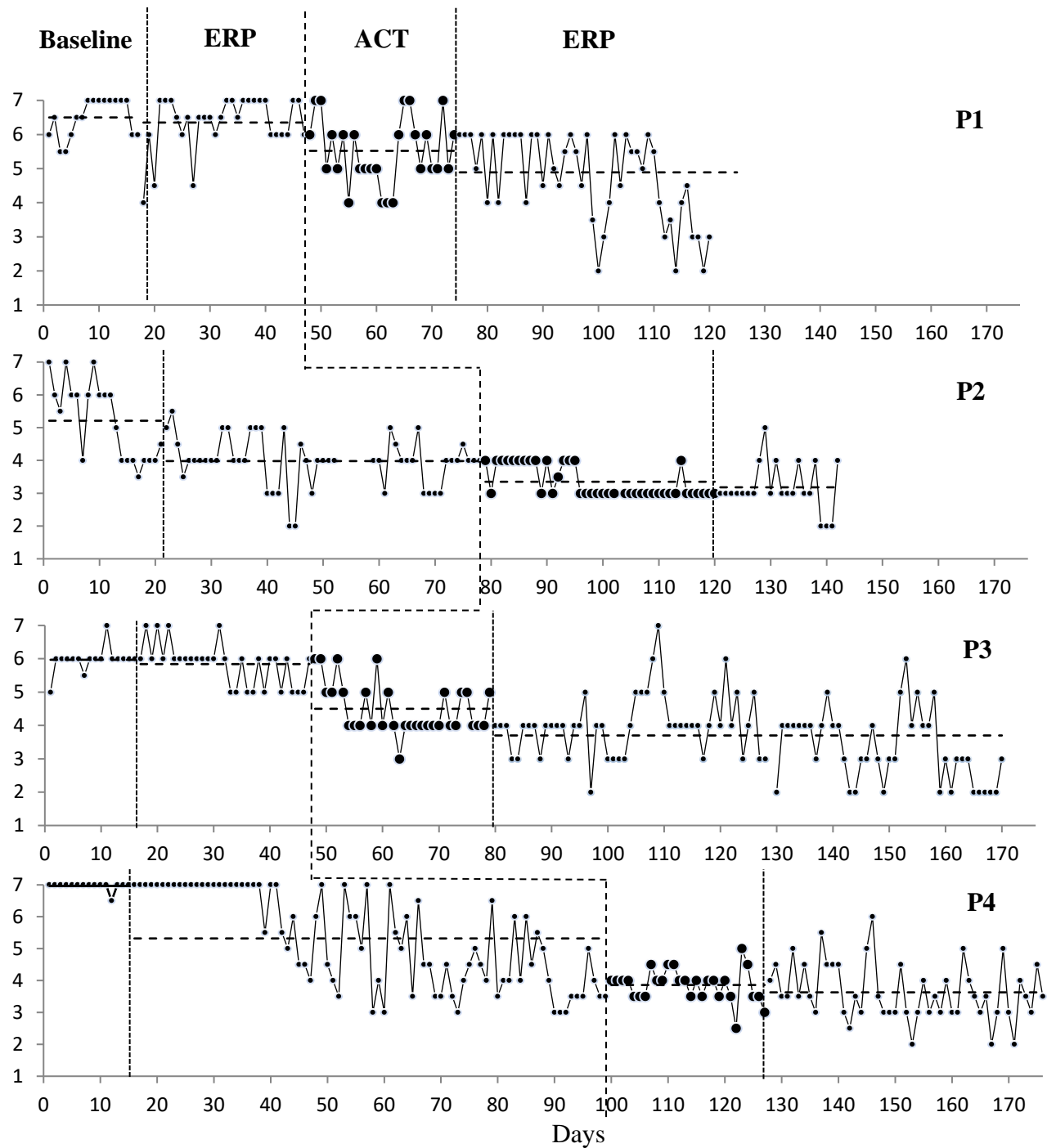
Daily ratings of BSQ psychological flexibility processes scores. Decreasing scores (e.g., 1) reflects shift towards increase in psychological flexibility. Means are represented by dashed lines for each phase. ACT phase represented by larger dots.

Table 2

Assessment scores for pre-, mid-, and post-treatment

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Participant	P1				P2				P3				P4			
	Pre	Mid	Post	Δ	Pre	Mid	Post	Δ	Pre	Mid	Post	Δ	Pre	Mid	Post	Δ
Y-BOCS	20	18	8	-60%	22	19	18	-18%	25	16	13	-48%	30	22	15	-50%
OCI-R	32	27	20	-38%	25	32	21	-16%	34	23	15	-56%	38	30	16	-58%
AAQ-II	39	42	32	-18%	39	49	35	-10%	34	24	18	-47%	25	29	26	4%
CFQ	38	44	35	-8%	41	*refused*	28	-32%	45	28	16	-64%	44	32	27	-39%
PHLMS																
Aware	44	45	47	7%	31*	26**	32	3%	37	37	34	-8%	37	35	34	-8%
Accept	16	19	27	69%	14	29	26	86%	16	31	34	113%	22	27	29	32%

_____

Y-BOCS = Yale-Brown Obsessive Compulsive Scale; Obsessive-Compulsive Inventory – Revised; AAQ-II = Acceptance and Action Questionnaire - II; CFQ = Cognitive Fusion Questionnaire – 7; PHLMS = Philadelphia Mindfulness Scale; OCI-R.
* 1 item blank - "not sure"
** 2 items blank - "not sure"-