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The "How" of Exposures: Examining the Relationship Between Exposure Parameters and Outcomes in Obsessive-Compulsive Disorder

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Abstract

Exposure and response prevention (ERP) is the most empirically supported treatment for obsessive-compulsive disorder (OCD). However, details on how to effectively conduct ERP are lacking. The current study aimed to identify exposure parameters associated with better subsequent outcomes in ERP for OCD. We analyzed data from 271 therapy sessions across 46 participants in a randomized controlled trial comparing traditional ERP and ERP conducted from an acceptance and commitment therapy framework (ACT+ERP). Multilevel model results indicated that experiential delivery of acceptance/tolerance practice was associated with higher exposure homework adherence, lower psychological inflexibility, and less OCD symptom severity (except contamination) the following week, underscoring the potential importance of experiential learning in ERP. In addition, exposure parameters had differential effects across symptom dimensions: more collaboration when designing exposures predicted less concern about unacceptable thoughts, whereas explaining the rationale of ERP was associated with less symmetry concerns a week later. While more research is needed to further clarify the workings of ERP, our findings tentatively support use of experiential learning over didactic teaching of acceptance/tolerance and personalization of exposure parameters based on presenting OCD dimension.

Keywords: obsessive-compulsive disorder, exposure and response prevention, exposure parameters, acceptance, tolerance, distress reduction

The "How" of Exposures: Examining the Relationship Between Exposure Parameters and Outcomes in Obsessive-Compulsive Disorder

Exposure and response prevention (ERP), which entails contacting fear-provoking stimuli while preventing use of compulsions to alleviate distress, is widely considered the gold standard treatment for obsessive-compulsive disorder (OCD; Rosa-Alcázar et al., 2008). Despite reliable evidence on the overall effectiveness of ERP, data on specific exposure parameters are scant. Researchers have found that in vivo and imaginal exposure combined (compared to in vivo alone), therapist-guided exposure (compared to self-guided exposure), and exposure adherence predict better outcomes (Abramowitz, 1996; Rosa-Alcázar et al., 2008; Wheaton et al., 2016), but other aspects of how to deliver ERP have not been studied. For example, should exposures be largely determined by clinicians, by clients, or collaboratively? How elaborate should clinicians be when providing the rationale for exposures? Does explicitly coaching rather than describing skills, such as emotional acceptance, improve outcomes? Understanding the effects of exposure parameters is important to maximize ERP effectiveness and efficiency by providing clinicians with concrete and precise direction for successfully implementing this empirically supported treatment.

The extant data on exposure parameters have three key limitations. The first is that these data are extracted from descriptions of protocols used in studies, not direct observation of exposures. Thus, these data are proxies for the independent variables in which we are interested (e.g., the degree to which therapists guide exposures). To the extent that these proxies accurately measure what goes on in sessions, they may be sufficient. However, such descriptions provide a single definition for each exposure parameter per study, rather than considering the more likely scenario that exposure parameters vary across individual sessions and participants. In fact, this

session-level variability that is typically ignored in studies may provide valuable information on how variations in exposure parameters affect outcomes.

As an example, Twohig et al. (2018) examined if adding acceptance and commitment therapy (ACT) to ERP for OCD would improve treatment acceptability and adherence and found no significant differences. However, conducting ERP from an ACT framework entails several modifications (e.g., encouraging acceptance of distress, connecting approach behaviors to personal values), so these findings do not indicate which parts of ACT-based ERP are more critical. In theory, it is possible that ACT-based ERP includes both effective and ineffective parts, and only examining overall outcomes obscures significant effects for specific procedures. Given that these procedures vary by session, considering session-level variability may help to evaluate whether specific procedures are more beneficial when conducting exposures.

The second limitation of existing research is that it has generally neglected to consider differential effects of exposure parameters across symptom dimensions, even though significant evidence suggests there are meaningful differences among OCD presentations with respect to areas such as risk factors, psychiatric comorbidity, and underlying cognitive and behavioral processes (Grisham et al., 2011; Hasler et al., 2005; Poli et al., 2017). For instance, homework adherence in OCD predicted improvement for responsibility for harm, unacceptable thoughts, and symmetry concerns but not contamination concerns (Ojalehto et al., 2020), and some evidence suggests that sexual/religious obsessions do not respond as well to treatment as other symptom dimensions (Mataix-Cols et al., 2002; Rufer et al., 2006). Hence, there is no one "correct" way of delivering ERP that works for the various presentations in OCD. From this perspective, a general treatment protocol—while largely accessible—is inadequate, and the lack

of precision in our conceptualization of ERP may stymie our ability to effectively and efficiently treat the range of clients who struggle with OCD.

The third limitation is that exposure research has largely measured dependent and independent variables of interest globally. Outcome research has primarily focused on status at posttreatment or follow-up, answering questions about who does better overall at the end of treatment. While extremely useful, such information precludes a granular analysis of how therapeutic parameters influence outcomes *over the course of treatment*. For instance, we might want to know if longer in-session exposures increase exposure adherence between therapy sessions, not just if longer exposures (among other factors) generally lead to better outcomes at posttreatment. Such knowledge may be especially helpful when working with clients who do not respond to treatment in expected ways such that clinicians need to troubleshoot and modify their delivery of ERP from session to session. In addition to measuring therapy procedures with greater frequency, it may be useful to measure and evaluate them more precisely with metrics like quantity and style of delivery (e.g., didactic vs. experiential).

Besides empirical data, one source of guidance for how to conduct exposures effectively is theory. Theoretical models underlying ERP include habituation (Foa et al., 2006), acceptance (Twohig, Abramowitz, et al., 2015), and inhibitory learning (Craske et al., 2014), with each approach indicating different ways to conduct exposures. Habituation models emphasize activating fear and then continuing exposures until fear reduction is observed (Foa et al., 2006). Thus, the goal of habituation is fear reduction and to have clients learn that fear will eventually dissipate if they stay in contact with the fear without avoiding it. In contrast, acceptance and inhibitory learning models do not posit fear reduction as a goal. In ACT, exposures are opportunities for clients to learn how to practice psychological flexibility (which entails

acceptance) to live a valued life (Twohig, Abramowitz, et al., 2015). The crux, then, is to respond flexibly to feared stimuli (e.g., approach instead of avoid) in order to engage in meaningful activities, not to decrease fear. The inhibitory learning approach is concerned with maximizing the discrepancy between expected and experienced outcomes and using deepened extinction (combining previous exposures), with criteria for termination being expectancy violation rather than fear reduction (Craske et al., 2014). Depending on the theory to which therapists ascribe, they would underscore different aspects of learning in exposures (e.g., fear reduction vs. more willingness vs. expected outcome did not occur), even if the general concept of fully contacting a feared stimulus is invariant. In fact, the common feature of these models is that they prescribe full engagement in exposures without avoidance (i.e., safety behaviors), albeit with different objectives.

In addition to broader theoretical considerations, several parameters have been proposed for conducting effective exposures, but they largely have not been evaluated empirically. For instance, experiential learning may be more conductive to learning than didactic teaching (Young, 2002), though no studies have directly tested this hypothesis in the context of ERP. Similarly, longer exposure duration represents a higher dosage of the active treatment ingredient and, thus, may lead to better outcomes (Robinson et al., 2020). We may also hypothesize that clients who endorse treatment credibility and who collaboratively set goals and agenda with their therapists would benefit more from treatment (Constantino et al., 2018; Tryon & Winograd, 2011). In particular, providing a reasonable rationale for how exposure works could be used to increase its credibility (Arch et al., 2015).

In the current study, we aimed to shed light on how to effectively conduct exposures in OCD by testing the relative effects of various exposure parameters on session-level outcomes.

For outcomes, we were interested in not only symptom severity, but also hypothesized processes of change in OCD: psychological inflexibility (Twohig, Plumb Vilardaga, et al., 2015) and exposure adherence (Ojalehto et al., 2020; Wheaton et al., 2016). We chose these dependent variables because we wanted to clarify how different parameters influenced various outcomes to increase precision in our understanding of how exposures work. We used data from a randomized controlled trial that compared traditional habituation-based ERP to ERP conducted from an ACT framework (ACT+ERP; Twohig et al., 2018).

This study extends existing research and addresses its limitations by (1) directly extracting data on exposure parameters from therapy session recordings, (2) examining OCD symptom severity by subtype to see if exposure parameters differentially affect symptom dimensions, and (3) considering session-level outcomes over time (i.e., as a trajectory) rather than only at posttreatment. In selecting exposure parameters, we identified variables related to processes targeted in exposures (i.e., acceptance, habituation) and to the setup of exposures (e.g., degree of therapist vs. client input in planning). We predicted that:

(a) regardless of the process being targeted, method of delivery would be more important than quantity (e.g., teaching acceptance experientially would be more effective than talking about it at length);
(b) longer exposures would lead to better outcomes;
(c) collaborating with clients when designing exposures would lead to better outcomes than the therapist dictating terms of exposures; and
(d) providing a clear rationale for exposures would lead to better outcomes than instructing clients to do exposures with little explanation.

Method

Participants

Participants were recruited via paper flyers, online ads, and therapist referrals. To be eligible for the randomized controlled trial, participants had to meet DSM-IV criteria for a principal or co-principal diagnosis of OCD based on the Mini International Neuropsychiatric Interview 5.0 (Sheehan et al., 1998), a semi-structured diagnostic interview, which was administered by a trained assessor. Exclusion criteria included active suicide ideation, severe depression, mania, psychosis, or personality pathology.

To be included in the present study, participants had to have at least one recorded therapy session. Participants who received treatment but whose sessions were not recorded were excluded from analyses. From the initial sample of 58 participants, we excluded three who did not attend their first therapy session and nine whose sessions were not recorded due to experimenter error or who missed most sessions, leaving 46 participants. The mean age of the current sample was 26.8 years (SD = 8.2) and most identified as female, White/European American, and single. Demographic details are provided in Table 1.

Procedures

Participants were randomized to receive 16 twice-weekly 2-hour individual sessions of ERP or ACT+ERP. Therapists were two licensed psychologists and seven master's-level clinical psychology doctoral students; therapists saw an approximately equal number of participants from each condition. The student therapists followed 16-session treatment manuals and were supervised by licensed psychologists throughout the study (see Twohig et al., 2018). The ERP condition was based on the traditional emotional processing approach which emphasizes habituation of anxiety (see Foa & Kozak, 2004). The ACT+ERP condition proceeded from an ACT framework and emphasized acceptance, defusion, present moment awareness, self-as-

context, and values-based motivation (see Twohig, Abramowitz, et al., 2015 for details on development and treatment).

Sessions were conducted at the University of North Carolina at Chapel Hill in Chapel Hill, North Carolina and Utah State University in Logan, Utah. At every session, therapists provided ratings of homework exposure adherence and participants completed standardized measures on psychological inflexibility and OCD symptom severity. Study procedures were approved by the institutional review boards at both universities and participants provided informed consent before enrolling in the study.

Outcome Measures

Patient ERP Adherence Scale (PEAS; Simpson et al., 2010). The PEAS is a therapist-rated measure of between-session adherence to exposures assigned by the therapist. The therapist rates patient adherence on three items: proportion of exposure homework assignments attempted out of total assigned, quality of completed exposures, and proportion of total resisted urges to ritualize. Each item is rated from 1 (*none/poor*) to 7 (*all/excellent*). Higher scores reflect better homework adherence. The PEAS has excellent interrater reliability and good validity, supporting its use as a valid measure of ERP adherence (Simpson et al., 2010).

Acceptance and Action Questionnaire—II (AAQ-II; Bond et al., 2011). The AAQ-II is a measure of psychological inflexibility. Participants rate seven items from 1 (*never true*) to 7 (*always true*); higher scores indicate greater psychological inflexibility. The AAQ-II has demonstrated good psychometrics (Bond et al., 2011). Cronbach's αs in this study ranged from .85 to .92 (Ong et al., 2020).

Dimensional Obsessive-Compulsive Scale (DOCS; Abramowitz et al., 2010). The 20-item DOCS measures severity of OCD symptoms in four dimensions: contamination,

responsibility for harm and mistakes, unacceptable thoughts, and concerns about symmetry/ordering. For each dimension, participants rate five items on severity of avoidance, distress, functionality, time spent on OCD symptoms, and resistance of obsessions and compulsions on a five-point Likert scale. The contamination subscale covers fears related to contamination, germs, and sickness and behaviors associated with alleviating these concerns (e.g., hand washing, cleaning). The responsibility subscale covers fears related to doubts and/or fears about causing preventable harm and efforts to prevent harm (e.g., checking locks, asking for reassurance). The unacceptable thoughts subscale covers intrusive and unwanted thoughts related to topics such as sex or violence and behaviors intended to remove such thoughts (e.g., praying). Lastly, the symmetry/ordering subscale focuses on needs for exactness or balance (i.e., symmetry) and actions performed to ensure symmetry (e.g., counting, arranging objects until it feels "just right"). The DOCS has shown good reliability and validity (Abramowitz et al., 2010) and is sensitive to treatment effects (Rapp et al., 2016). Cronbach's αs in this study ranged from .85 to .96 (Ong et al., 2020).

Data Source

Data were collected from 271 audio or video-recorded therapy sessions across 46 participants with approximately six sessions selected per participant. Every other session during the exposure phase of treatment (Sessions 4-15) was chosen for coding (e.g., sessions 2, 4, 6, 8). Alternating sessions were selected because we expected that change processes would be more likely to shift meaningfully from week to week (sessions occurred twice a week) rather than within a few days. A weekly assessment frequency is also consistent with other studies on processes of change in OCD (Twohig, Plumb Vilardaga, et al., 2015; Twohig et al., 2010). If a session was missing, the following session was selected. If the following session was also

missing, the previous session was selected. For example, if session 4 was missing, then session 5 would be used, but if both sessions 4 and 5 were missing, then session 3 would be selected. The purpose of "replacing" sessions was to maximize representation and power and reduce risk of bias. If the next and previous sessions were also missing or if one of those was already selected to "replace" a different session, the session was not replaced.

Session Coding

Coder training. Sessions were coded by four doctoral students and one postbaccalaureate research assistant with training in ERP, ACT, and OCD. As part of coding training, coders read the treatment manuals for both conditions and received didactic training on coding procedures (i.e., how to use the coding protocol). Following this, coders coded several therapy sessions independently then met to discuss ratings in a group. During these meetings, coders identified and corrected any inconsistencies in defining and applying the coding criteria to establish a more objective and reliable coding system. Meetings were held for each therapy session; coders who achieved interrater reliability (i.e., two consecutive ICC ≥ .90 with group-consensus ratings) then proceeded to code sessions independently. Our cutoff of .90 was based on previous research studies that used cutoffs ranging from .55 to .80 to establish acceptable to excellent interrater reliability (Chiu et al., 2009; Liber et al., 2010; Southam-Gerow et al., 2016). Sessions used for coder training were ultimately rated for analysis based on group consensus against established guidelines.

Interrater reliability. Interrater reliability was assessed after every ten sessions of independent coding with a minimum threshold of ICC ≥ .80. If ICC was < .80, coders were given new sessions to code until ICC was ≥ .80 for two consecutive videos; the 10 videos prior to the reliability check were re-coded by different coders who had established interrater reliability. ICC

did not reach .80 six times out of 34 checks (M = .78, SD = .02), and coders who failed to achieve interrater reliability in the first round had ICC ≥ .80 within the next two videos. Overall, mean ICC including remediation (but excluding failed tests since these ratings were discarded) was .91 (SD = .04), indicating excellent interrater reliability.

Coding manual. A coding manual was initially developed based on the ERP and ACT+ERP treatment protocols used in the clinical trial and revised collaboratively following initial group meetings. We clarified definitions of exposure parameters, elaborated on scoring rubrics, and added examples of therapist behaviors tied to each rating to make the manual more objective. All therapy sessions were coded based on this coding manual and coders were unaware of treatment condition to minimize bias.

Target procedures enacted by the therapist were rated for quantity from 1 (*not covered at all*) to 5 (*almost entire session*) and for quality based on method of delivery from 1 (*not covered/inaccurate*) to 5 (*elaboration and experiential/collaborative; functional with respect to client and context; teaches/practices skill in session*). Quality scores were lower for didactic methods. Table 2 shows the section of the coding manual for parameters included in present analyses; the full coding manual can be found on www.utahact.com. For quality, we used a "best score counts" principle where the overall score for a specific procedure was based on the highest rating in the session. For example, if a therapist superficially described tolerance (scored as 2) but later encouraged the client to sit with distress during an exposure (scored as 5), the quality score for acceptance/tolerance would be 5.

Procedures related to theoretical approach. From the ACT framework of exposures, we rated procedures targeting acceptance, which refers to the willingness to experience unpleasant or distressing inner experiences. We also included in this rating procedures targeting tolerance of

uncertainty/distress, which refers to enduring unpleasant or difficult sensations without trying to escape from them. Although these processes are theoretically distinct (Hayes et al., 2006), we put procedures targeting either of them in the same category, because (1) the processes are functionally similar (i.e., encouraging experiencing distress without trying to avoid it) and (2) we believed coding the procedures separately would introduce high levels of subjectivity that would undermine reliability of ratings. Considering a habituation-based model, we rated procedures related to distress reduction, which entailed asking participants to notice decreases in distress over the course of exposures. Attempts to actively reduce distress are contraindicated in both treatment protocols because they constitute safety behaviors and interfere with learning. Each procedure received a quantity and quality (method of delivery) rating per session. Detailed definitions with examples are provided in Table 2.

Parameters related to setup of exposures. We rated collaboration between therapist and participant when designing in-session and out-of-session exposures and clarity of the rationale provided for exposures (see Table 2). We also noted the duration of exposures. An overall collaboration score was calculated using the mean of collaboration scores for in-session and out-of-session exposures. The mean was taken as a more accurate representation of collaboration on exposure setting as therapists and participants sometimes designed exposures in previous sessions (which would have been counted in the out-of-session score of the previous session). We also wanted to differentiate between therapists who consistently formulated exposures with clients (counted in both in-session and out-of-session scores) and those who immediately started exposures with little review or discussion (potentially only counted in a previous out-of-session rating). If no exposure took place during the session, these variables were coded as “not applicable.”

Statistical Analyses

Analyses were conducted with R version 3.6.3 (R Core Team, 2021) in RStudio (RStudio Team, 2020) using the following packages: tidyverse (Wickham, 2017), lmerTest (Kuznetsova et al., 2017), DataCombine (Gandrud, 2016), texreg (Leifeld, 2013), haven (Wickham & Miller, 2016), and furniture (Barrett & Brignone, 2017).

In the present analyses, we combined the ERP and ACT+ERP sessions and coded in-session exposure parameters irrespective of treatment condition. The purpose of doing so was to focus on how exposures were *actually* conducted (i.e., in vivo therapeutic events) rather than how they were *designed* to be conducted (i.e., protocols linked to treatment condition). Furthermore, both conditions relied heavily on exposures and performed equivalently on all outcomes of interest (Twohig et al., 2018). In theory, the only difference between conditions should have been *how* exposures were conducted, and we evaluated this difference empirically by watching and coding therapy sessions. Thus, predictors entered in our models were the more precise observed exposure parameters rather than overall treatment condition.

Selection of predictors. To streamline model building, we examined correlation coefficients for predictors of interest and found a high correlation between the quantity and quality of distress reduction (r = .90), which might have led to unstable model estimates. Given that quantity was more likely to be objectively rated than quality, procedures targeting habituation via distress reduction were represented only by their quantity rating.

Selection of dependent variables. The original dependent variables of interest included proportion of exposures attempted between sessions (PEAS Item 1), quality of exposures attempted between sessions (PEAS Item 2), proportion of urges to ritualize that were successfully resisted (PEAS Item 3), psychological inflexibility (AAQ-II), and OCD dimension

severity (DOCS subscales) reported the following week. Due to a high correlation between PEAS Items 1 and 2 (r = .67), we averaged the two PEAS items to obtain an overall *adherence to exposures between sessions as assigned* score. We chose to average PEAS Items 1 and 2 instead of adding them together, so that coefficients reported in our statistical models for the PEAS Item 3 would be comparable to this new variable. We did not combine PEAS Item 3 as it may have unique predictive power with respect to ERP response (Wheaton et al., 2016).

Multilevel modeling. Multilevel models were used to examine the relationship between in-session exposure parameters and outcomes the next week over the course of treatment. To model this temporal relationship, we used a lagged data set in which observed exposure parameters from Week k were used to predict outcomes at Week k + 1. We conceptualized the data as having a nested structure with in-session variables on level 1 (within-person) and participants as clusters on level 2. Level of significance was set at p = .05. In addition, random intercepts and random slopes were specified by participant to account for inter-individual variability in baseline presentation and treatment trajectory.

All models included the six selected predictors of interest measured at Week k on level 1:

(1) quantity of acceptance/tolerance procedures,

(2) quality of acceptance/tolerance procedures,

(3) quantity of distress reduction procedures,

(4) duration of in-session exposures,

(5) collaboration in setting up exposures, and

(6) quality of rationale for exposures.

In addition, a covariate was added to account for the fixed effect of time. Including all predictors in the same model means the coefficient estimate for a specific predictor represents change in the

dependent variable associated with a one-unit increase in that predictor partialing out all other predictors (i.e., with other predictors held constant). In other words, the coefficient estimate reflects the unique contribution of each predictor to variance in the dependent variable.

Data on dependent variables were collected the following week (i.e., at Week k + 1) and included:

(1) adherence to exposures between sessions as assigned (mean of PEAS Items 1 and 2),

(2) proportion of urges to ritualize that were successfully resisted (PEAS Item 3),

(3) psychological inflexibility (AAQ-II), and

(4) OCD severity in each symptom dimension (i.e., DOCS subscales for contamination, responsibility for harm, unacceptable thoughts, and concerns about symmetry).

Thus, predictor variables temporally preceded dependent variables by a week in our lagged models.

Results

Description of Exposure Parameters

Acceptance/tolerance procedures had a mean quantity rating of 3.68 (*SD* = 1.03) and mean quality rating of 4.27 (*SD* = 1.07), whereas habituation via distress reduction procedures had a mean quantity rating of 1.76 (*SD* = 1.02) and mean quality rating of 1.97 (*SD* = 1.36), indicating that distress reduction was encouraged less frequently than acceptance/tolerance. This could be because both the ACT+ERP and ERP conditions targeted acceptance/tolerance, whereas only the habituation-based ERP condition targeted distress reduction. The mean rating for providing a rationale for exposures was 3.78 (*SD* = 1.16) and that for collaborating with clients when designing exposures was 4.17 (*SD* = 0.84), indicating therapists targeted these elements well. The average time spent on exposures in session was 28.68 minutes (*SD* = 19.26).

Multilevel Models

Coefficient estimates and 95% confidence intervals from multilevel models are reported in Table 3.

Exposure adherence. Higher quality of acceptance/tolerance procedures predicted better adherence to exposures attempted between sessions as assigned ($B = 0.17$, $p < .001$) and better response prevention during exposures attempted between sessions ($B = 0.28$, $p < .001$). More acceptance/tolerance procedures ($B = -0.19$, $p < .001$) were associated with less response prevention during homework exposures. Greater quantity of distress reduction procedures ($B = 0.16$, $p = .003$) and more collaboration when designing exposures ($B = 0.15$, $p < .009$) predicted better adherence to exposures attempted between sessions as assigned, whereas longer in-session exposures ($B = -0.01$, $p < .001$) was associated with worse exposure adherence.

Psychological inflexibility. Higher quality of acceptance/tolerance procedures ($B = -0.48$, $p < .001$), more distress reduction procedures ($B = -0.73$, $p < .001$), more collaboration when designing exposures ($B = -0.44$, $p < .001$), and providing a clearer rationale for exposures ($B = -0.43$, $p < .001$) were associated with less psychological inflexibility the next week, whereas longer in-session exposures ($B = 0.02$, $p = .006$) predicted greater self-reported psychological inflexibility.

OCD symptom severity.

Contamination. Longer exposure duration ($B = -0.02$, $p < .001$) predicted fewer concerns about contamination. More distress reduction procedures ($B = 0.26$, $p < .001$) and clearer rationale for exposures ($B = 0.09$, $p = .020$) were associated with more concerns about contamination the next week.

Responsibility for harm. Higher quality of acceptance/tolerance procedures (B = -0.15, p = .004) predicted fewer self-reported concerns about responsibility for harm the next week. Greater quantity of acceptance/tolerance procedures (B = 0.25, p < .001) was associated with more concerns about responsibility for harm.

Unacceptable thoughts. Higher quality of acceptance/tolerance procedures (B = -0.20, p < .001) and greater collaboration when planning exposures (B = -0.19, p = .002) predicted fewer self-reported concerns about unacceptable thoughts the next week. Greater quantity of acceptance/tolerance (B = 0.21, p < .001) and longer exposures (B = 0.01, p = .037) were associated with more concerns about unacceptable thoughts.

Symmetry. Higher quality of acceptance/tolerance procedures (B = -0.18, p < .001), longer exposures (B = -0.01, p < .001), and clearer rationale for exposures (B = -0.08, p = .007) predicted fewer concerns about symmetry the following week.

Discussion

In the present study, we examined the relationship between exposure parameters and outcomes a week later over the course of ERP for OCD. The objective was to identify exposure parameters associated with better subsequent outcomes to guide future iterations of exposure-based therapy for OCD and refine our theoretical understanding of how exposure works. Consistent with predictions (a) and (c), experiential rather than didactic methods of delivery and collaboration when designing exposures consistently predicted positive outcomes a week later, even when partialing out other parameters. In fact, merely increasing the quantity of therapeutic procedures did not reliably lead to more improvement, contrary to prediction (b). Similarly, exposure duration and quality of rationale provided for exposures had inconsistent effects on outcomes, indicating mixed support for prediction (d).

Our results corroborate theoretical models of exposure which emphasize new or corrective learning through direct, experiential contact with environmental contingencies (Craske et al., 2014; Foa et al., 2006) or direct application and practice of skills (Twohig, Abramowitz, et al., 2015) in the context of sustained direct contact with fear-eliciting stimuli. Notably, it appeared that *quality* of acceptance/tolerance procedures was more crucial than their *quantity*. Whereas quality of acceptance/tolerance procedures was associated with better exposure adherence and response prevention, less psychological inflexibility, and more symptom improvement in most domains, more focus on acceptance/tolerance was associated with less response prevention between sessions and worse symptom severity in the dimensions of responsibility for harm and unacceptable thoughts. These effects were observed even after accounting for other exposure parameters, which means that, for the same amount of focus on acceptance/tolerance, higher quality improved outcomes. Thus, leaning on experiential exercises and direct learning may be critical to achieving better outcomes over time in ERP.

The distinction between quality and quantity may be partly reflected in the difference between guiding participants to fully engage in an exposure without avoidance and having them engage in an exposure while subtly practicing some form of avoidance (e.g., discussing acceptance/tolerance rather than practicing it, mentally reassuring oneself about safety concerns). As such, even though clients are technically in contact with feared stimuli, safety behaviors prevent them from fully feeling the anxiety. Safety behaviors are contraindicated from habituation (Benito & Walther, 2015) and acceptance-based perspectives (Twohig, Abramowitz, et al., 2015) because such avoidance interferes with the hypothesized process of change in both approaches, which entails clients learning that they can cope with anxiety without avoidance. Moreover, experimental research has found that safety behaviors resulted in increased symptoms

and behavioral avoidance for fear of contamination and health anxiety (Deacon & Maack, 2008; Olatunji et al., 2011).

For the domains of responsibility for harm and unacceptable thoughts, assuming the same quality of acceptance/tolerance, spending more time on acceptance/tolerance was associated with worse subsequent outcomes. These two domains are unique in that the feared stimuli are primarily intangible (e.g., feelings of uncertainty, thoughts of being a "bad" person), and so may be more difficult to access without explicit experiential instruction. As such, with less experiential guidance (i.e., lower quality of acceptance/tolerance), exposures may instead function as time spent on safety behaviors, didactic teaching, or tangential talk, which have been found to lead to poorer clinical outcomes (Benito et al., 2021). Furthermore, experiential learning is critical to successful skill acquisition from an ACT framework (Twohig, Abramowitz, et al., 2015), so less experiential guidance may also interfere with new acceptance-based learning. Conversely, participants' being able to meaningfully interact with feared stimuli through experiential delivery of acceptance/tolerance procedures may produce sufficient gains such that increased time spent contacting them may not have significant incremental benefit.

With regard to differential effects on OCD dimensions, contamination was the only domain not associated with quality of acceptance/tolerance and increased following greater focus on distress reduction. Providing a clearer rationale for exposures predicted more contamination symptoms a week later, whereas longer duration predicted fewer contamination symptoms the following week. It may be that the simplicity of contamination ERP (i.e., touch contaminated item and refrain from washing) relies less on framing exposures or teaching specific skills and more on staying in the exposures longer.

Collaboration when defining exposures was associated with decreased concerns about unacceptable thoughts a week later. This may have to do with the morality aspect of exposures to unacceptable thoughts. Unlike other exposures, there is a chance that engaging in exposures to unacceptable thoughts crosses a moral boundary. As such, the client's delineation between moral and immoral behavior needs to be respected if it is consistent with the client's cultural context and not solely about obsessive fears. For instance, reading Satanic verses as an exposure may be considered acceptable—albeit discouraged—in one belief system but a literal act of sinning in a different belief system. Working with clients to explicitly define the boundaries of unacceptable thought exposures may be particularly important to ensure the target stimuli are *thoughts* or *fears* of sinning rather than sinning itself (Abramowitz & Jacoby, 2014).

Providing a clear rationale was associated with decreased symmetry concerns the following week. Symmetry concerns are commonly characterized by a perceived need for order or the "right" way of doing things and have been found to be associated with perfectionism and intolerance of uncertainty (Wheaton et al., 2010). Thus, it is possible that the explicit structure afforded by a clear rationale may have been especially important for clients presenting with symmetry concerns.

At the same time, because we did not experimentally manipulate therapeutic procedures, it is possible that procedures reflected a broader treatment dynamic that was not reflected in our lagged models. For instance, worse outcomes may indicate that participants are not responding to treatment, which could lead therapists to spend more time on acceptance/tolerance in more sessions, and this relationship would only be partially captured by our lagged models. Similarly, more contamination symptoms could result in therapists spending more time explaining the

rationale for exposures in more sessions, and our results would only show one aspect of this dynamic.

Limitations

First, our predictors were subjectively rated and while we maintained interrater reliability within the study team, other researchers and clinicians may disagree with our assessment of in vivo therapy procedures. Using fidelity evaluation methods based on machine intelligence and concepts defined by experts a priori might provide an alternative, standardized way to rate quantity and quality of therapy procedures (Atkins et al., 2014). Second, we classified any therapist encouragement of openness, willingness, or endurance of discomfort without trying to alleviate it as practice or teaching of acceptance and tolerance. However, it could be argued that acceptance and tolerance are distinct: acceptance is a specific stance of active openness to discomfort, whereas tolerance entails "suffering through" pain. While it may be interesting to examine if these two procedures have differential effects on outcomes, studies have shown high overlap between the two constructs (Carpenter et al., 2019; Correa-Fernández et al., 2020), suggesting these discrepancies may be more theoretical than clinically meaningful. Third, our sample of therapy sessions did not include participants who did not provide outcome data due to attrition. As such, our results only apply to those who remained in therapy and are likely more relevant to clients who remain in treatment. Generalizability of current findings to clients who drop out of ERP may be limited and exposure parameters that promote retention still need to be clarified. Fourth, most of our sample identified as female and were highly educated, limiting generalizability of current findings to other populations. Fifth, therapist characteristics could be a confounding variable. For example, therapists who were better able to teach acceptance experientially may have demonstrated other qualities that positively influenced treatment

outcomes. However, given that we had nine study therapists, it seems more likely that procedures prescribed by the treatment manual rather than characteristics shared by multiple therapists explained current findings. Finally, we examined multiple models without correcting alpha values. We consider this appropriate given the exploratory nature of this study; the risk of ignoring important parameters (i.e., Type II error) is more problematic relative to study aims than the risk of overstating potential benefits of parameters (i.e., Type I error). However, this makes it particularly important to replicate these findings in confirmatory research.

Conclusion

Overall, our findings indicated that experiential delivery of acceptance/tolerance in ERP was associated with increased exposure adherence, psychological inflexibility, and symptom severity measured a week later. These findings suggest that therapists may be able to enhance treatment effectiveness by facilitating direct learning when they do exposures with clients and avoiding substituting quantity (e.g., long explanations) for quality (e.g., clarifying skills to be learned through modeling and practice). Accordingly, it may be possible to increase the efficiency of ERP for certain presentations by making exposures more experiential and shortening their duration. With respect to specific dimensions, collaboration when designing exposures may be useful for unacceptable thoughts and providing a clear rationale may be important for symmetry concerns.

References

Abramowitz, J. S. (1996). Variants of exposure and response prevention in the treatment of obsessive-compulsive disorder: A meta-analysis. *Behavior Therapy, 27*, 583-600. https://doi.org/10.1016/S0005-7894(96)80045-1

Abramowitz, J. S., Deacon, B. J., Olatunji, B. O., Wheaton, M. G., Berman, N. C., Losardo, D., Timpano, K. R., McGrath, P. B., Riemann, B. C., Adams, T., Bjorgvinsson, T., Storch, E. A., & Hale, L. R. (2010). Assessment of obsessive-compulsive symptom dimensions: Development and evaluation of the Dimensional Obsessive-Compulsive Scale. *Psychological Assessment 22*(1), 180-198. https://doi.org/10.1037/a0018260

Abramowitz, J. S., & Jacoby, R. J. (2014). Scrupulosity: A cognitive–behavioral analysis and implications for treatment. *Journal of Obsessive-Compulsive and Related Disorders, 3*(2), 140-149. https://doi.org/10.1016/j.jocrd.2013.12.007

Arch, J. J., Twohig, M. P., Deacon, B. J., Landy, L. N., & Bluett, E. J. (2015). The credibility of exposure therapy: Does the theoretical rationale matter? *Behaviour Research and Therapy, 72*, 81-92. https://doi.org/10.1016/j.brat.2015.05.008

Atkins, D. C., Steyvers, M., Imel, Z. E., & Smyth, P. (2014). Scaling up the evaluation of psychotherapy: Evaluating motivational interviewing fidelity via statistical text classification. *Implementation Science, 9*(1), 49. https://doi.org/10.1186/1748-5908-9-49

Barrett, T. S., & Brignone, E. (2017). Furniture for quantitative scientists. *R Journal, 9*, 142-148.

Benito, K. G., Machan, J., Freeman, J. B., Garcia, A. M., Walther, M., Frank, H., Wellen, B., Stewart, E., Edmunds, J., Sapyta, J., & Franklin, M. E. (2021). Therapist behavior during exposure tasks predicts habituation and clinical outcome in three randomized controlled trials for pediatric OCD. *Behavior Therapy, 52*(3), 523-538. https://doi.org/10.1016/j.beth.2020.07.004

Benito, K. G., & Walther, M. (2015). Therapeutic process during exposure: Habituation model. *Journal of Obsessive-Compulsive and Related Disorders, 6*, 147-157. https://doi.org/10.1016/j.jocrd.2015.01.006

Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. M., Guenole, N., Orcutt, H. K., Waltz, T., & Zettle, R. D. (2011). Preliminary psychometric properties of the Acceptance and Action Questionnaire-II: A revised measure of psychological inflexibility and experiential avoidance. *Behavior Therapy, 42*(4), 676-688. https://doi.org/10.1016/j.beth.2011.03.007

Carpenter, J. K., Sanford, J., & Hofmann, S. G. (2019). The effect of a brief mindfulness training on distress tolerance and stress reactivity. *Behavior Therapy, 50*(3), 630-645. https://doi.org/10.1016/j.beth.2018.10.003

Chiu, A. W., McLeod, B. D., Har, K., Wood, J. J. J. J. o. C. P., & Psychiatry. (2009). Child–therapist alliance and clinical outcomes in cognitive behavioral therapy for child anxiety disorders. *The Journal of Child Psychology and Psychiatry, 50*(6), 751-758.

Constantino, M. J., Coyne, A. E., Boswell, J. F., Iles, B. R., & Vîslă, A. (2018). A meta-analysis of the association between patients' early perception of treatment credibility and their posttreatment outcomes. *Psychotherapy, 55*(4), 486-495. https://doi.org/10.1037/pst0000168

Correa-Fernández, V., McNeel, M., Sandoval, J. R., Tavakoli, N., Kahambwe, J. K., & Kim, H. (2020). Acceptance and Action Questionnaire II: Measurement invariance and associations with distress tolerance among an ethnically diverse university sample. *Journal of Contextual Behavioral Science*. https://doi.org/10.1016/j.jcbs.2020.04.002

Craske, M. G., Treanor, M., Conway, C. C., Zbozinek, T., & Vervliet, B. (2014). Maximizing exposure therapy: An inhibitory learning approach. *Behaviour Research and Therapy, 58*, 10-23. https://doi.org/10.1016/j.brat.2014.04.006

Deacon, B., & Maack, D. J. (2008). The effects of safety behaviors on the fear of contamination: An experimental investigation. *Behaviour Research and Therapy, 46*(4), 537-547. https://doi.org/10.1016/j.brat.2008.01.010

Foa, E. B., Huppert, J. D., & Cahill, S. P. (2006). Emotional Processing Theory: An Update. In B. O. Rothbaum & B. O. Rothbaum (Eds.), *Pathological Anxiety: Emotional processing in etiology and treatment.* (pp. 3-24). Guilford Press.

Foa, E. B., & Kozak, M. J. (2004). *Mastery of obsessive-compulsive disorder: A cognitive-behavioral approach*. Oxford University Press.

Gandrud, C. (2016). *DataCombine: Tools for easily combining and cleaning data sets*. https://CRAN.R-project.org/package=DataCombine

Grisham, J. R., Fullana, M. A., Mataix-Cols, D., Moffitt, T. E., Caspi, A., & Poulton, R. (2011). Risk factors prospectively associated with adult obsessive-compulsive symptom dimensions and obsessive-compulsive disorder. *Psychological medicine, 41*(12), 2495. https://doi.org/10.1017/S0033291711000894

Hasler, G., LaSalle-Ricci, V. H., Ronquillo, J. G., Crawley, S. A., Cochran, L. W., Kazuba, D., Greenberg, B. D., & Murphy, D. L. (2005). Obsessive–compulsive disorder symptom dimensions show specific relationships to psychiatric comorbidity. *Psychiatry Research, 135*(2), 121-132. https://doi.org/10.1016/j.psychres.2005.03.003

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes and outcomes. *Behaviour Research and Therapy, 44*(1), 1-25. https://doi.org/10.1016/j.brat.2005.06.006

Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2017). lmerTest package: Tests in linear mixed effects models. *Journal of Statistical Software, 82*(13), 1-26. https://doi.org/10.18637/jss.v082.i13

Leifeld, P. (2013). texreg: Conversion of statistical model output in R to LaTeX and HTML tables. *Journal of Statistical Software, 55*(8), 1-24. https://doi.org/10.18637/jss.v055.i08

Liber, J. M., McLeod, B. D., Van Widenfelt, B. M., Goedhart, A. W., van der Leeden, A. J., Utens, E. M., & Treffers, P. D. (2010). Examining the relation between the therapeutic alliance, treatment adherence, and outcome of cognitive behavioral therapy for children with anxiety disorders. *Behavior Therapy, 41*(2), 172-186.

Mataix-Cols, D., Marks, I. M., Greist, J. H., Kobak, K. A., & Baer, L. (2002). Obsessive-compulsive symptom dimensions as predictors of compliance with and response to behaviour therapy: Results from a controlled trial. *Psychotherapy and Psychosomatics, 71*(5), 255-262. https://doi.org/10.1159/000064812

Ojalehto, H. J., Abramowitz, J. S., Hellberg, S. N., Buchholz, J. L., & Twohig, M. P. (2020). Adherence to exposure and response prevention as a predictor of improvement in obsessive-compulsive symptom dimensions. *Journal of Anxiety Disorders, 72*, 102210. https://doi.org/10.1016/j.janxdis.2020.102210

Olatunji, B. O., Etzel, E. N., Tomarken, A. J., Ciesielski, B. G., & Deacon, B. (2011). The effects of safety behaviors on health anxiety: An experimental investigation. *Behaviour Research and Therapy, 49*(11), 719-728. https://doi.org/10.1016/j.brat.2011.07.008

Ong, C. W., Blakey, S. M., Smith, B. M., Morrison, K. L., Bluett, E. J., Abramowitz, J. S., & Twohig, M. P. (2020). Moderators and processes of change in traditional exposure and response prevention (ERP) versus acceptance and commitment therapy-informed ERP for obsessive-compulsive disorder. *Journal of Obsessive-Compulsive and Related Disorders, 24*, 100499. https://doi.org/10.1016/j.jocrd.2019.100499

Poli, A., Melli, G., Ghisi, M., Bottesi, G., & Sica, C. (2017). Anxiety sensitivity and obsessive-compulsive symptom dimensions: Further evidence of specific relationships in a clinical sample. *Personality and Individual Differences, 109*, 130-136. https://doi.org/10.1016/j.paid.2017.01.002

R Core Team. (2021). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. https://www.R-project.org/

Rapp, A. M., Bergman, R. L., Piacentini, J., & McGuire, J. F. (2016). Evidence-based assessment of obsessive–compulsive disorder. *Journal of Central Nervous System Disease, 8*, JCNSD.S38359. https://doi.org/10.4137/JCNSD.S38359

Robinson, L., Kellett, S., & Delgadillo, J. (2020). Dose-response patterns in low and high intensity cognitive behavioral therapy for common mental health problems. *Depression and Anxiety, 37*(3), 285-294. https://doi.org/10.1002/da.22999

Rosa-Alcázar, A. I., Sánchez-Meca, J., Gómez-Conesa, A., & Marín-Martínez, F. (2008). Psychological treatment of obsessive-compulsive disorder: A meta-analysis. *Clinical Psychology Review, 28*, 1310-1325. https://doi.org/10.1016/j.cpr.2008.07.001

RStudio Team. (2020). *RStudio: Integrated Development for R*. RStudio, Inc. http://www.rstudio.com/

Rufer, M., Fricke, S., Moritz, S., Kloss, M., & Hand, I. (2006). Symptom dimensions in obsessive–compulsive disorder: Prediction of cognitive-behavior therapy outcome. *Acta Psychiatrica Scandinavica, 113*(5), 440-446. https://doi.org/10.1111/j.1600-0447.2005.00682.x

Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., Hergueta, T., Baker, R., & Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (M.I.N.I.): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *The Journal of Clinical Psychiatry, 59* 22-33.

Simpson, H. B., Maher, M. J., Page, J. R., Gibbons, C. J., Franklin, M. E., & Foa, E. B. (2010). Development of a patient adherence scale for exposure and response prevention therapy. *Behavior Therapy, 41*(1), 30-37. https://doi.org/10.1016/j.beth.2008.12.002

Southam-Gerow, M. A., McLeod, B. D., Arnold, C. C., Rodríguez, A., Cox, J. R., Reise, S. P., Bonifay, W. E., Weisz, J. R., & Kendall, P. C. J. P. a. (2016). Initial development of a treatment adherence measure for cognitive–behavioral therapy for child anxiety. *Psychological Assessment, 28*(1), 70.

Tryon, G. S., & Winograd, G. (2011). Goal consensus and collaboration. *Psychotherapy, 48*(1), 50-57. https://doi.org/10.1037/a0022061

Twohig, M. P., Abramowitz, J. S., Bluett, E. J., Fabricant, L. E., Jacoby, R. J., Morrison, K. L., Reuman, L., & Smith, B. M. (2015). Exposure therapy for OCD from an acceptance and commitment therapy (ACT) framework. *Journal of Obsessive-Compulsive and Related Disorders, 6*, 167-173. https://doi.org/10.1016/j.jocrd.2014.12.007

Twohig, M. P., Abramowitz, J. S., Smith, B. M., Fabricant, L. E., Jacoby, R. J., Morrison, K. L., Bluett, E. J., Reuman, L., Blakey, S. M., & Lederman, T. (2018). Adding acceptance and commitment therapy to exposure and response prevention for obsessive-compulsive disorder: A randomized controlled trial. *Behaviour Research and Therapy, 108*, 1-9. https://doi.org/10.1016/j.brat.2018.06.005

Twohig, M. P., Plumb Vilardaga, J. C., Levin, M. E., & Hayes, S. C. (2015). Changes in psychological flexibility during acceptance and commitment therapy for obsessive

compulsive disorder. *Journal of Contextual Behavioral Science, 4*(3), 196-202. https://doi.org/10.1016/j.jcbs.2015.07.001

Twohig, M. P., Whittal, M. L., Cox, J. M., & Gunter, R. (2010, 2010/06/15/). An initial investigation into the processes of change in ACT, CT, and ERP for OCD. *International Journal of Behavioral Consultation and Therapy, 6*(1), 67-83. https://doi.org/10.1037/h0100898

Wheaton, M. G., Abramowitz, J. S., Berman, N. C., Riemann, B. C., & Hale, L. R. (2010). The relationship between obsessive beliefs and symptom dimensions in obsessive-compulsive disorder. *Behaviour Research and Therapy, 48*(10), 949-954. https://doi.org/10.1016/j.brat.2010.05.027

Wheaton, M. G., Galfalvy, H., Steinman, S. A., Wall, M. M., Foa, E. B., & Simpson, H. B. (2016, 2016/10/01/). Patient adherence and treatment outcome with exposure and response prevention for OCD: Which components of adherence matter and who becomes well? *Behaviour Research and Therapy, 85*, 6-12. https://doi.org/10.1016/j.brat.2016.07.010

Wickham, H. (2017). *tidyverse: Easily install and load 'Tidyverse' packages. R package version 1.1.1.* http://CRAN.R-project.org/package=tidyverse

Wickham, H., & Miller, E. (2016). haven: Import and export 'SPSS', 'Stata' and 'SAS' files. R package version 1.0.0. http://CRAN.R-project.org/package=haven

Young, M. R. (2002, 2002/03/01). Experiential learning=Hands-on+minds-on. *Marketing Education Review, 12*(1), 43-51. https://doi.org/10.1080/10528008.2002.11488770

Table 1
Sample Description

	Mean/Count (SD/%)[a]
Age	26.76 (8.16)
Gender	
Female	29 (63%)
Male	16 (34.8%)
Marital status	
Single	27 (58.7%)
Married	16 (34.8%)
Separated	1 (2.2%)
Remarried	1 (2.2%)
Ethnic identity	
Black/African American	2 (4.3%)
Asian/Asian American	1 (2.2%)
White/European American	36 (78.3%)
Hispanic/Latinx	4 (8.7%)
Indigenous/Native American	1 (2.2%)
Not listed	1 (2.2%)
Employment status	
Unemployed/Not working	3 (6.5%)
Part-time	10 (21.7%)
Full-time	18 (39.1%)
Student	14 (30.4%)
Highest education level	
Ph.D./M.D. or equivalent	1 (2.2%)
M.A./M.S. or equivalent	3 (6.5%)
Some graduate school	8 (17.4%)
B.A./B.S. or equivalent	12 (26.1%)
Associate degree	2 (4.3%)
Some college	15 (32.6%)
High school diploma or equivalent	4 (8.7%)
Religious affiliation	
Catholic	6 (13%)
The Church of Jesus Christ of Latter-day Saints	16 (34.8%)
Protestant (Christian)	6 (13%)
Jewish	2 (4.3%)
Islam	1 (2.2%)
Not listed	2 (4.3%)
Not religious	10 (21.7%)

Household income	
$50,000 or higher	14 (30.4%)
$30,001-50,000	13 (28.2%)
$15,001-30,000	9 (19.6%)
$5,001-15,000	2 (4.4%)
$5,000 or less	5 (10.9%)

[a] Percentages may not add up to 100% due to missing data.

Table 2
Coding Manual

Variable	Description	Quality	Examples
Acceptance /tolerance	Encourages openness, willingness, or endurance of difficult sensations	1 = not covered/inaccurate 2 = superficial mention; topographical (talking about concepts in a way disconnected from client's experience) 3 = slight elaboration; topographical (talking about concepts in a way disconnected from client's experience) 4 = elaboration and didactic (instructing rather than doing); functional with respect to client and context 5 = elaboration and experiential/collaborative; functional with respect to client and context; teaches/practices skill in session	• "What we're here to learn is that anxiety is manageable." • "We're here to practice willingness to experience discomfort." • "Willingness means that you let your anxiety be there, without doing anything to fight it or make it go away." • "Trying to control these obsessions doesn't work, we know that." • "In this exposure, I want you to try tolerating/opening up to uncertainty." • Reinforces willingness/tolerance outside of session: "Good job allowing discomfort to be there without trying to wash your hands to make it go away." • "Based on your experience, how much control do you have over whether anxiety shows up in your life?" • Reinforces willingness/tolerance in session: "Good job sitting with discomfort right now without trying to push it away."
Distress reduction	Reinforces reduction of distress and/or encourages attempts to reduce distress	1 = not covered/inaccurate 2 = superficial mention; topographical (talking about concepts in a way disconnected from client's experience) 3 = slight elaboration; topographical (talking about concepts in a way disconnected from client's experience) 4 = elaboration and didactic (instructing rather than doing); functional with respect to client and context 5 = elaboration and experiential/collaborative; functional with respect to client and	• "In this treatment, you'll see distress going down." • "You have some control over your level of distress." • "By staying in the exposures and not taking any shortcuts to lessen your anxiety, you'll find that your anxiety naturally goes down over time—no matter how distressed you are to start with." • Comments on distress reduction after the fact: "Notice that your distress went down during the exposure." • Asks client to notice distress reduction in the moment: "Do you notice if your distress is going down the longer you sit with it?"

		context; teaches/practices skill in session 1 = therapist unilaterally defines parameters without checking in with client 2 = therapist unilaterally defines parameters and briefly checks in with client; client does not provide any input	• Asks client to reflect on changes in distress: "What happened to your distress during the exposure? What do you take away from that?"
Collaboration with client in setting parameters	Refers to therapist behaviors that elicit client participation when setting parameters of exposure tasks *Give an overall rating	3 = therapist unilaterally defines parameters and modifies them based on client's feedback; client provides minimal input (e.g., passively agrees) 4 = therapist and client discuss parameters from the start; client provides some input (more than "yes") but most of the parameters are still determined by the therapist 5 = therapist and client discuss parameters from the start; client actively provides input (e.g., gets to decide specific parameters, suggests tasks); client explicitly agrees to parameters	
Rationale	Refers to setting up the exposure in a clear and coherent way; must reference exposure exercises not just therapy in general; includes rationale for exposure in general, not just exposure in session; rationale includes reasons, context, and skills to be practiced	1 = not covered 2 = rationale was briefly and superficially mentioned 3 = rationale was explained but not clearly/completely	• Mentions skill without explaining skill and without context: "Practice being open to thoughts." • Mentions primary components of exposure rationale but only briefly: "This is about practicing tolerating uncertainty and learning that the risk you are facing is manageable." • Provides instructions for specific exposure but does not link to overall purpose of exposure: "When visualizing, include as many details as possible, as if you're actually in the room."

*Can occur at any time in the session (before, during, or after exposure exercise) *Do not penalize for theoretically inconsistent rationale (do so under intervention-specific skills) Out-of-session = homework	4 = rationale was clear and one-sided 5 = rationale was clear; therapist checked client's understanding with open-ended questions	• Describes purpose behind exposures specifically and in detail: "The reason we're doing these exposures is to practice what to do when these inner experiences are yelling at you, in a way that is more consistent with what you care about in life. I want to help you learn how to respond to the OCD thoughts more effectively when they show up, which could mean being open to them and noticing them without giving them power over your life." • The above, plus an open-ended check-in question like, "Why would this be useful to you?"

Table 3
Coefficient Estimates and 95% Confidence Intervals From Multilevel Models

	PEAS: Exposure Adherence	PEAS: Urges Resisted	AAQ-II	DOCS: Contamination	DOCS: Responsibility for Harm	DOCS: Unacceptable Thoughts	DOCS: Symmetry
Session	-0.02 [-0.07; 0.04]	**0.06 [0.00; 0.11]***	**-0.48 [-0.67; -0.28]***	**-0.24 [-0.36; -0.11]***	**-0.20 [-0.28; -0.11]***	**-0.25 [-0.38; -0.12]***	**-0.18 [-0.25; -0.12]***
Acceptance /tolerance (quantity)	-0.03 [-0.13; 0.07]	**-0.19 [-0.29; -0.10]***	-0.08 [-0.28; 0.13]	0.01 [-0.10; 0.13]	**0.25 [0.13; 0.37]***	**0.21 [0.10; 0.32]***	0.06 [-0.03; 0.16]
Acceptance /tolerance (quality)	**0.17 [0.08; 0.26]***	**0.28 [0.19; 0.36]***	**-0.48 [-0.66; -0.30]***	0.04 [-0.06; 0.14]	**-0.15 [-0.26; -0.05]***	**-0.20 [-0.29; -0.10]***	**-0.18 [-0.27; -0.10]***
Distress reduction (quantity)	**0.16 [0.05; 0.26]***	-0.08 [-0.18; 0.01]	**-0.73 [-0.95; -0.51]***	**0.26 [0.13; 0.39]***	-0.01 [-0.15; 0.12]	-0.10 [-0.22; 0.03]	-0.07 [-0.17; 0.04]
Duration	**-0.01 [-0.02; -0.00]***	-0.00 [-0.01; 0.00]	**0.02 [0.00; 0.03]***	**-0.02 [-0.02; -0.01]***	-0.00 [-0.01; 0.01]	**0.01 [0.00; 0.01]***	**-0.01 [-0.02; -0.00]***
Collaboration	**0.15 [0.04; 0.26]***	0.06 [-0.04; 0.16]	**-0.44 [-0.66; -0.22]***	-0.08 [-0.20; 0.05]	0.09 [-0.04; 0.22]	**-0.19 [-0.31; -0.07]***	0.10 [-0.00; 0.20]
Rationale	0.00 [-0.07; 0.07]	-0.02 [-0.08; 0.04]	**-0.43 [-0.56; -0.30]***	**0.09 [0.01; 0.17]***	0.02 [-0.06; 0.10]	-0.01 [-0.08; 0.07]	**-0.08 [-0.15; -0.02]***
BIC	3998.53	3546.54	6093.01	4486.40	4605.64	4515.17	3961.46
Number of observations	1289	1248	1339	1321	1321	1339	1321
Number of participants	46	46	46	46	46	46	46

* 0 outside the confidence interval.

Note. PEAS = Patient ERP Adherence Scale; AAQ-II = Acceptance and Action Questionnaire—II; DOCS = Dimensional Obsessive-Compulsive Scale.