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Does Exposure and Response Prevention Behaviorally Activate Patients With Obsessive-Compulsive Disorder? A Preliminary Test

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Exposure and response prevention (ERP) and behavioral activation (BA) are effective treatments for obsessive-compulsive disorder (OCD) and depression, respectively. Patients with OCD often exhibit depression; furthermore, ERP for OCD is associated with reduced depressive symptoms. To our knowledge, no study has examined whether ERP itself functions to behaviorally activate patients with concurrent OCD and depressive symptoms. This prospective study was designed to test the hypotheses that (a) OCD exposure hierarchy completion, increased BA, and depressive symptom reduction would all be related, and (b) pre- to posttreatment changes in BA would mediate the direct effect of OCD hierarchy completion on posttreatment depressive symptoms, even after controlling for pretreatment depressive symptoms, pretreatment BA, pre- to posttreatment reductions in OCD symptoms, treatment duration, and antidepressant medication use. Patients (N = 90) with a primary diagnosis of OCD who received residential ERP for OCD completed a self-report battery at pre- and posttreatment. Exposure hierarchy completion, increases in BA, and decreases in depression were all significantly correlated (rs ranged .33 to .44). The effect of hierarchy completion on posttreatment depressive symptoms was fully mediated by pre- to posttreatment changes in BA. Findings highlight the potential for ERP to exert antidepressant effects by behaviorally activating patients. Limitations, clinical implications, and future directions are discussed.

Keywords: obsessive-compulsive disorder; depression; exposure therapy; behavioral activation

Obsessive-compulsive disorder (OCD) is a psychological condition characterized by obsessions (i.e., distressing, unwanted intrusive thoughts, images, and doubts) and compulsions (i.e., urges to perform repetitive, deliberate rituals and other anxiety-reduction strategies; American Psychiatric Association [APA], 2013). Compulsive rituals are reinforced by the immediate decrease in distress they engender, yet the distress reduction is temporary and compulsions prevent long-term fear extinction (i.e., the state wherein a conditioned fear stimulus no longer elicits a conditioned fear response). OCD symptoms are extremely time-consuming and cause considerable distress and functional impairment for the 2% to 3% of the population who meet diagnostic criteria for this condition (Kessler et al., 2005).

Exposure and response prevention (ERP; "exposure therapy") is the most effective intervention for OCD (e.g., Olatunji, Cisler, & Deacon, 2010). Exposure entails repeated and prolonged confrontation with situations and stimuli that generate OCD-related distress (e.g., books ordered the "wrong way"). Response prevention involves

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resisting urges to perform safety behaviors such as avoidance and compulsive rituals (e.g., ordering or arranging) during and after exposure trials. Traditionally, patients confront feared stimuli in a gradual fashion. This is achieved by creating an *exposure hierarchy*, which is a rank-ordered list of OCD-related stimuli and situations to be systematically encountered during exposure. With the help of a therapist, patients begin with moderately distressing tasks and work up to their most distressing tasks until all hierarchy tasks have been successfully encountered in a variety of contexts. Patient adherence to ERP, which inherently entails completing as many items on the hierarchy as possible, is a critical predictor of OCD treatment outcome (e.g., Abramowitz, Franklin, Zoellner, & DiBernardo, 2002; De Araujo, Ito & Marks, 1996; Tolin, Maltby, Diefenbach, Hannan, & Worhunsky, 2004; Wheaton et al., 2016).

Individuals with OCD often exhibit depressive symptoms (e.g., Yap, Mogan, & Kyrios, 2012); in fact, previous research has documented lifetime co-occurrence rates of depressive disorders among people with OCD to be as high as 50% (e.g., Crino & Andrews, 1996; Nestadt et al., 2001). Studies on the temporal nature of this comorbidity indicate that in most (but not all) cases, OCD symptoms predate depressive symptoms (Bellodi, Sciuto, Diaferia, Ronchi, & Smeraldi, 1992; Demal, Lenz, Mayrhofer, Zapotoczky, & Zitterl, 1993). This finding suggests that depression frequently occurs as a response to the distress and functional impairment associated with OCD. Studies using samples of individuals with OCD consistently show that in addition to reducing OCD symptoms, ERP also leads to improvements in depressive symptoms, often yielding large pre- to posttreatment effects (e.g., Eddy, Dutra, Bradley, & Westen, 2004; Fals-Stewart, Marks, & Schafer, 1993; Franklin, Abramowitz, Kozak, Levitt, & Foa, 2000; Lindsay, Crino, & Andrews, 1997). Although little research has examined the mechanism through which reductions in depressive symptoms occur, most investigators have concluded that depressive symptoms dissipate following the reduction in OCD-related functional impairment and distress achieved during ERP.

Behavioral Activation Treatment for Depression (BATD; e.g., Lejuez, Hopko, & Hopko, 2001; Lewinsohn, Biglan, & Zeiss, 1976; Martell, Dimidjian, & Herman-Dunn, 2010) is a psychosocial intervention for depression with strong empirical support (Chambless & Hollon, 1998; Mazzucchelli, Kane, & Rees, 2009). As the name suggests, BATD is designed to *behaviorally activate* depressed patients, who are often behaviorally avoidant or inactive, by increasing the frequency and salience of rewarding activities. Although multiple variants exist, most BATD programs include the two[1] core components of (a) activity monitoring and (b) activity scheduling (Kanter et al., 2010). Through activity monitoring, patients track and record the relation between their current activity level and mood, typically on a day-to-day basis. The primary aims of this technique are to (a) provide the clinician with valuable information about baseline functioning (which informs treatment planning) and (b) highlight for the patient the relationship between behavior and emotion. Activity scheduling, on the other hand, is the procedure whereby patients design, plan, and perform specific activities that provide pleasure and/or a sense of mastery. Activity scheduling functions to increase contact with potential reinforcers in the environment by scaffolding patients to engage in behaviors that are not only enjoyable (e.g., spend quality time with a loved one), but also functionally important (e.g., show up for work on time). Many BATD programs call for patients to implement activity scheduling in a hierarchical manner, such that individuals successfully complete easier behaviors (e.g., have coffee with a friend, take the trash bin to the curb) before attempting to engage in more difficult activities (e.g., go on a date with a romantic partner, apply for jobs).

Although ERP and BATD are thought to act upon different mechanisms to ameliorate symptoms (habituation [i.e., the natural decline in fear over time as a result of remaining in a feared situation without engaging in rituals] and differential reinforcement, respectively), some experts have highlighted procedural and functional similarities between these approaches (e.g., Chu et al., 2016; Hopko, Lejuez, & Hopko, 2004; Nixon & Nearmy, 2011; Strachan, Gros, Ruggiero, Lejuez, & Acierno, 2012; Yap et al., 2012). For example, ERP programs for OCD (e.g., Abramowitz, 2006; Foa, Yadin, & Lichner, 2012) typically begin with patient self-monitoring: a written, real-time log of the triggers that engender distress and urges to ritualize. Much like activity monitoring during BATD, self-monitoring in ERP serves the function of helping the patient and clinician identify the relationship between environmental cues, emotional experiences, and behavior. Similarly, progressing up the exposure hierarchy during ERP is akin to gradual activity scheduling in BATD. Patients with OCD thoughtfully plan when to conduct each exposure task, beginning with the easier items and building up to the more challenging tasks. Indeed,

[1] Assessment of values and value-consistent goals is a component of many, but not all, BA treatment programs (Kanter et al., 2010).

the sense of self-efficacy that patients with OCD often experience after successfully tackling a difficult exposure mirrors the sense of personal mastery that follows a successfully completed activity during BATD. Finally, ERP and BATD share the overarching goal of helping patients *engage with* rather than *avoid* challenging stimuli and situations (Jacobson, Martell, & Dimidjian, 2001; Martell, Addis, & Jacobson, 2001). That is, both approaches emphasize the importance of weakening maladaptive, negatively reinforced behaviors (e.g., avoidance) in favor of adopting adaptive behavioral tendencies (e.g., approach and engagement).

Applications of BATD outside of the context of unipolar depression are novel, yet available evidence suggests that BATD is helpful in the context of treatment for depression with concurrent psychiatric conditions (Chen, Liu, Rapee, & Pillay, 2013; Chu et al., 2016; Daughters et al., 2008; Hopko et al., 2004; Jakupcak et al., 2006; Magidson et al., 2011; Nixon & Nearmy, 2011; Strachan et al., 2012) and medical conditions (e.g., Armento & Hopko, 2009; Hopko et al., 2011; Pagoto et al., 2008). Although there is evidence for the effectiveness of integrated ERP and BATD for co-occurring depression and anxiety, no studies to date have examined the extent to which ERP capitalizes on the *psychological mechanism* of behavioral activation (BA). Accordingly, the degree to which ERP leads to improvements in co-occurring depressive symptoms via behaviorally activating anxious patients (such as those with OCD) remains unknown.

There are several reasons to examine the psychological process of BA as a potential mediator of depressive symptom reduction in the context of ERP for clinical anxiety. First, empirical data demonstrating that ERP serves to behaviorally activate patients with clinical anxiety would bolster clinical observations that the principles and practice of ERP and BATD overlap. Second, such findings would also support the investigation of streamlined treatments for clinical anxiety with co-occurring depression. Specifically, strategically applying ERP as a tool to behaviorally activate patients with depression and anxiety disorders might eliminate the need for sequential (or parallel) therapies. Moreover, considering that concurrent depression often interferes with ERP for OCD (e.g., Abramowitz, Franklin, Street, Kozak, & Foa, 2000; Gava et al., 2007; Overbeek, Schruers, Vermetten, & Griez, 2002), tailoring exposures to systematically facilitate both fear extinction and differential reinforcement might improve treatment adherence and outcome for this clinically severe population.

Despite the conceptual and empirical basis to support the idea that ERP for clinical anxiety serves to reduce co-occurring depressive symptoms via increasing activation in (and decreasing avoidance of) rewarding and meaningful activities, we are not aware of any studies that have tested this hypothesis to date. Accordingly, the present study was designed to examine the extent to which ERP ameliorates depressive symptoms that often accompany OCD by increasing BA. On the basis of previous research and the conceptual considerations discussed above, we hypothesized that exposure hierarchy completion, pre- to posttreatment changes in BA, and pre- to posttreatment changes in depressive symptoms would all be significantly correlated. Furthermore, we predicted that pre- to posttreatment changes in BA would mediate the effect of hierarchy completion on posttreatment depressive symptoms, even after controlling for treatment duration, antidepressant medication use during treatment, pretreatment BA, pretreatment depressive symptom severity, and pre- to posttreatment reductions in OCD symptoms.

Method

PARTICIPANTS AND TREATMENT SETTING

We elected to test our hypotheses using data collected from within a residential program specializing in ERP for OCD in which individuals often met criteria for comorbid conditions (e.g., major depression). Although treatment was guided by an empirically supported ERP program for OCD (i.e. Kozak & Foa, 1997), therapists did not follow a standardized treatment manual and treatment duration (i.e., length of stay in the residential program) varied from patient to patient. Although this lack of standardization threatens internal validity, it nicely serves our goal of observing the effects of exposure hierarchy completion on depressive symptoms through BA in a naturalistic clinical setting.

Participants were considered eligible to participate in the current study if they (a) were admitted for residential treatment at the Obsessive-Compulsive Disorders Center at Rogers Memorial Hospital (RMH) in Oconomowoc, Wisconsin with a primary diagnosis of OCD, (b) did not endorse any psychotic symptoms, and (c) completed pre- and posttreatment assessments. All participants provided consent to allow their responses to the measures described below to be used for research purposes. The consent procedures and study measures were approved by both the RMH Human Subjects Committee and the Rogers Center for Research and Training.

The final sample included 90 adults (48.9% women; $n = 44$) who had a mean age of 28.66 years

(*SD* = 11.24). The majority of participants (93.3%; *n* = 84) identified as White, with 3.3% (*n* = 3) identifying as Asian, 2.2% (*n* = 2) identifying as Indian, and 1 participant declining to self-identify with any race/ethnicity. Most participants (73.3%; *n* = 66) were single; 22.2% (*n* = 120 were married and 4.4% (*n* = 4) were divorced or separated. Most participants (*n* = 78; 86.7%) were also taking antidepressant medications during treatment. Psychiatric medications were adjusted upon the on-site psychiatrist's assessments of the patient's needs (information on the precise number of participants whose medication/dosages changed during treatment was unfortunately not available). As seen in Table 1, most (*n* = 54; 60.0%) participants in the sample had secondary (i.e., comorbid) diagnoses, most commonly a mood disorder.

PROCEDURE

Assessment

All participants completed a pre-admission telephone screening with a trained intake staff member, who assessed DSM-IV (APA, 2000) OCD diagnosis and study exclusion criteria. Results from this screening were reviewed by the clinical director of the center (BCR), who holds a doctoral degree in clinical psychology, in order to confirm OCD diagnosis and ensure that the patient was appropriate for admission to the program. Participants were only admitted to the residential OCD treatment program if there was 100% diagnostic agreement between the interviewer and clinical director. Upon admission to the OCD treatment program, participants took part in an in-person, unstructured diagnostic interview with a board-certified psychiatrist who specializes in the diagnosis and treatment of OCD. Each participant also completed a self-report assessment packet that included the study measures described further below, which was re-administered at posttreatment.

Table 1
Secondary Diagnoses of Study Participants

Secondary diagnosis	*n*	(%)
Major depressive disorder	11	(12.20)
Depressive disorder not otherwise specified	15	(16.70)
Other mood disorder	10	(11.10)
General anxiety disorder	3	(3.30)
Social anxiety disorder	2	(2.20)
Panic disorder	1	(1.10)
Anxiety disorder not otherwise specified	1	(1.10)
Tic disorder/Tourette's syndrome	4	(4.40)
Developmental disorder	3	(3.30)
Eating disorder	1	(1.10)
Other psychological disorder	3	(3.30)
No secondary diagnosis	36	(40.00)

Treatment

Treatment consisted of ERP, which was guided by the procedures described by Kozak and Foa (1997) but did not follow a standardized treatment manual. Therapists collaboratively developed a rank-ordered list of situations for exposure that triggered patients' OCD-related distress and then assisted participants in facing these situations in a prolonged, repetitive, and graduated manner while at the same time helping them to resist engaging in avoidance behaviors and/or rituals. Although the majority of treatment involved ERP-related activities, participants also engaged in additional interventions such as psychoeducation, group therapy and homework review, and optional spiritual/recreational activities several times per week. Participants had an average length of stay (i.e., treatment duration) of 60.37 days (*SD* = 29.62).

MEASURES

Self-Report Measures

Quick Inventory of Depressive Symptomology (QIDS; Rush et al., 2003). The QIDS is a brief self-report measure of depressive symptoms. Sixteen items assess nine symptoms of major depression: depressed mood, loss of interest or pleasure, concentration/decision-making difficulties, negative self-outlook, suicidal ideation, low energy/fatigability, sleep disturbance, weight/appetite change, and psychomotor changes. Participants rate the degree to which they experienced each symptom in the past week on a scale of 0 to 3 (the anchors change as appropriate for each symptom item). Total scores range from 0 to 27, such that higher QIDS scores indicate more severe depressive symptoms. The QIDS has demonstrated sound psychometric properties in previous research (e.g., Trivedi et al., 2004). The QIDS demonstrated acceptable internal consistency in the current sample ($\alpha_{pretreatment}$ = .74; $\alpha_{posttreatment}$ = .79). Depression severity in the current sample (*M* = 12.77, *SD* = 5.04) was comparable to that of other OCD inpatient samples (*M* = 13.3, *SD* = 5.40; Brennan et al., 2014).

Behavioral Activation for Depression Scale–Short Form (BADS-SF; Manos, Kanter, & Luo, 2011). The BADS-SF is a 9-item self-report questionnaire, derived from the original BADS (Kanter, Mulick, Busch, Berlin, & Martell, 2007), that measures behavioral activation and avoidance (e.g., "I did things that were enjoyable") in the past week. Participants are asked to rate the frequency/

intensity of each item on a scale of 0 (*not at all*) to 6 (*completely*). Total scores range from 0 to 54, such that higher total BADS-SF scores indicate greater BA. We tabulated BADS-SF difference scores by subtracting pretreatment BADS-SF scores from posttreatment BADS-SF scores (this difference score was specified as the putative mediator in the primary analyses reported below). The BADS-SF has demonstrated good psychometric properties including reliability, construct validity, and predictive validity in previous research (Manos et al., 2011). The BADS-SF demonstrated acceptable internal consistency in the current sample ($\alpha_{pretreatment}$ = .73; $\alpha_{posttreatment}$ = .86).

Dimensional Obsessive-Compulsive Scale (DOCS; Abramowitz et al., 2010). The DOCS is a 20-item self-report measure of OCD symptom dimensions (i.e., concerns about germs and contamination; being responsible for harm, injury, or bad luck; unacceptable thoughts; and symmetry, completeness, and the need for things to be "just right"). Participants rate the degree to which they experienced each symptom in the past month on a scale of 0 to 4 (the anchors change as appropriate for each symptom item). Total scores range from 0 to 80, such that higher DOCS scores indicate more severe OCD symptoms. The DOCS has demonstrated excellent reliability in clinical samples (αs = .94-.96) and the measure converges well with other measures of OCD symptoms (Abramowitz et al., 2010). The DOCS demonstrated good to excellent internal consistency in the current sample ($\alpha_{pretreatment}$ = .90; $\alpha_{posttreatment}$ = .90). OCD symptom severity in the current sample (M = 30.81, SD = 15.45) was comparable to that of other clinical samples (M = 30.06, SD = 15.49; Abramowitz et al.).

Treatment Variables

Hierarchy completion. Hierarchy completion was calculated as the percentage of tasks listed on a patient's exposure hierarchy that were successfully completed during ERP. For a task to be considered "successfully completed," patients must have reported minimal to no anxiety/panic (i.e., scores of 0 or 1) on a 0 (*no anxiety/panic*) to 7 (*maximum anxiety/panic*) scale for several consecutive trials. Residential patients at RMH typically have exposure hierarchies of 100 items or more, with tasks being relatively evenly distributed across anticipated anxiety/panic levels.

Length of stay. Length of stay (in days) at the residential treatment program was measured in order to control for treatment duration in primary analyses.

Antidepressant medication use. A dummy code variable was created in order to control for antidepressant medication use (0 = not taking prescribed antidepressant medication, 1 = taking prescribed antidepressant medication) during treatment stay in primary analyses.

Results

PRELIMINARY ANALYSES

Descriptive statistics are presented in Table 2. The sample exhibited moderate (Rush et al., 2003) pretreatment depressive symptoms as measured by the QIDS. A series of independent samples t-tests did not detect a significant effect of gender on any study variables (all ps > .15). A paired samples t-test showed a large, significant reduction in OCD symptoms from pre- to posttreatment, $t(89)$ = 13.38, p < .001, d = 1.41. A paired samples t-test also showed that the reduction in the sample's depressive symptom severity from pre- to posttreatment was large and statistically significant, $t(89)$ = 10.08, p < .001, d = 1.06.

CORRELATIONAL ANALYSES

Zero-order correlations between all study measures are presented in Table 3. Consistent with our hypotheses, hierarchy completion percentage, changes in BA, and changes in depressive symptoms were all significantly correlated, such that greater ERP progress and improved BA were associated with greater reduction in depressive symptoms (ps ≤ .05). No correlation coefficient surpassed a value of ±.60, suggesting that although most variables were related to each other, they were not redundant.

MEDIATION ANALYSIS

A simple mediation analysis using ordinary least squares path analysis was performed using Preacher and Hayes's (2008) SPSS Macro for Multiple Mediation. As shown in Figure 1, patients who completed a greater percentage of their exposure hierarchy reported fewer depressive symptoms at posttreatment (c = -.059, p = .031). However, patients who completed a greater percentage of their exposure hierarchy evidenced greater changes in BA (a = .169, p = .010), and patients who evidenced greater pre- to posttreatment changes in BA reported fewer posttreatment depressive symptoms (b = -.176, p = .008). The indirect effect of hierarchy completion on posttreatment depressive symptoms through increased BA was statistically significant (ab = -.030); a bias-corrected bootstrap confidence interval based on 1,000 bootstrap samples and α = .05 did not include zero (-.079 to -.007). After accounting for the mediation effect, the direct effect of hierarchy completion on

Table 2
Means, Standard Deviations, and Distribution of Study Variables

Measure	Mean	(*SD*)	Min	Max	Skew	Kurtosis
Length of stay	60.37	29.62	9	144	0.54	0.03
Hierarchy completion	63.66	17.48	17	100	-0.38	0.21
Pretreatment QIDS	12.77	5.04	1	25	0.13	-0.31
Posttreatment QIDS	6.20	4.39	0	21	1.09	1.19
QIDS difference	-6.57	4.66	-17	8	0.19	0.07
Pretreatment DOCS	30.81	15.45	0	68	0.51	-0.04
Germs and contamination	8.38	6.12	0	20	0.16	-1.11
Responsibility for harm	7.48	5.87	0	20	0.30	-0.94
Unacceptable thoughts	9.29	6.51	0	20	-0.05	-1.34
Symmetry	5.67	5.51	0	20	0.77	-0.44
Posttreatment DOCS	16.71	11.17	0	45	0.59	-0.20
Germs and contamination	4.06	4.46	0	20	1.09	0.84
Responsibility for harm	3.92	4.17	0	15	0.95	0.01
Unacceptable thoughts	5.88	4.47	0	15	0.22	-0.94
Symmetry	2.86	3.42	0	16	1.58	2.71
DOCS difference	-14.10	13.27	-50	13	-0.52	0.22
Pretreatment BADS-SF	25.57	8.76	6	48	0.23	0.01
Posttreatment BADS-SF	35.51	9.31	16	54	0.08	-0.69
BADS-SF difference	10.14	9.88	-29	36	-0.47	3.21

Note. QIDS = Quick Inventory of Depressive Symptomatology; BADS-SF = Behavioral Activation for Depression Scale – Short Form; DOCS = Dimensional Obsessive-Compulsive Scale; Min = Observed minimum value; Max = Observed maximum value.

posttreatment depressive symptoms was no longer significant (c' = -.029, p = .270).

Discussion

The present study was designed to test the hypothesis that among patients receiving residential treatment for OCD, the therapeutic effect of ERP on co-occurring depressive symptoms would be explained by pre- to posttreatment changes in BA. Results supported our first hypothesis, in that hierarchy completion, changes in BA, and changes in depressive symptoms were all significantly correlated in the expected directions. Our second hypothesis, that the effect of hierarchy completion on posttreatment depressive symptoms would be mediated by changes in BA, was also supported. Specifically, the indirect path of hierarchy completion through changes in BA was statistically significant, even after controlling for pretreatment BA, pretreatment depressive symptoms, OCD symptom improvement, and antidepressant medication use. After accounting for this indirect

Table 3
Zero-Order Bivariate Correlations among Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Hierarchy completion	-										
2. Length of stay	.25*	-									
3. Antidepressant use	.11	.15	-								
4. Pretreatment QIDS	.16	.14	< .01	-							
5. Posttreatment QIDS	-.18	-.02	-.01	.52**	-						
6. QIDS difference	-.37**	-.17	< .01	-.59**	.38**	-					
7. Pretreatment DOCS	.03	.26*	-.01	.45**	.31**	-.20	-				
8. Posttreatment DOCS	-.30*	.30**	.09	.27*	.48**	.16	.54**	-			
9. DOCS difference	-.30*	-.06	.09	-.30**	.04	.36**	-.71**	.21*	-		
10. Pretreatment BADS-SF	-.08	.00	.06	-.59**	-.35**	.31*	-.34**	-.25*	.21	-	
11. Posttreatment BADS-SF	.27*	-.11	.07	-.28*	-.56**	-.19	-.21	-.51**	-.20	.43**	-
12. BADS-SF difference	.33*	-.09	.02	.19	-.28*	-.44**	0.07	-.28*	-.36**	-.48**	.59**

Note. QIDS = Quick Inventory of Depressive Symptomatology; BADS-SF = Behavioral Activation for Depression Scale – Short Form; DOCS = Dimensional Obsessive-Compulsive Scale; * $p < .05$; ** $p < .01$.

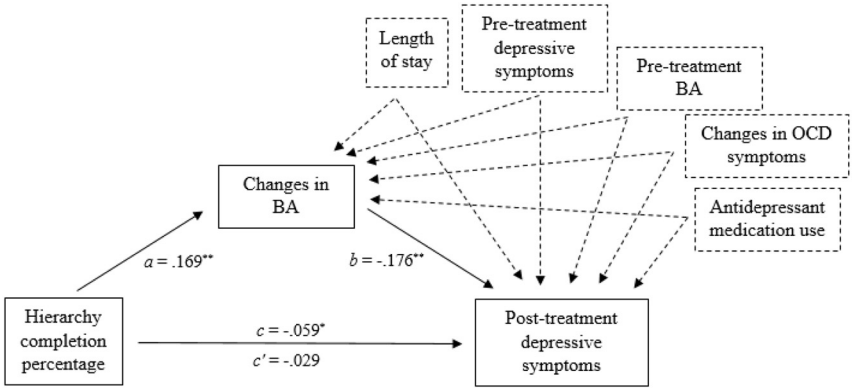

FIGURE 1 Simple mediation model in which the effect of hierarchy completion and posttreatment depression scores is mediated by changes in behavioral activation (BA). Path coefficients are included for the direct and indirect effects. Dashed boxes and lines represent model covariates. * $p < .05$; ** $p \leq .01$.

(mediation) effect, the direct effect of hierarchy completion on posttreatment depressive symptoms was no longer significant.

Behavioral models of depression posit that depressed mood is maintained by a decrease in response contingent positive reinforcement (e.g., Lewinsohn, 1975). Accordingly, BATD aims to strategically increase patients' contact with potential reinforcers via the gradual reduction of avoidance behaviors and concurrent increase in rewarding activities that engender pleasure, a sense of accomplishment, and/or are in support of the patient's values. Although some experts have suggested that BATD could be helpful for patients with co-occurring OCD and depression (e.g., Roth Ledley, Pai, & Franklin, 2007; Yap et al., 2012), results from the current study suggest that ERP *itself* could serve to behaviorally activate patients, thereby reducing depression alongside OCD symptoms. These findings are not surprising, given that the overall goal of ERP is to reduce avoidance (and other symptoms) through self-monitoring and progression up an exposure hierarchy—procedural analogues to daily monitoring and activity scheduling included in BATD. Accordingly, not only might depression symptoms dissipate as OCD-related distress and functional impairment decreases, as typically assumed, but depressive symptoms could also improve as the patient engages in ERP activities that are functionally important (e.g., drive to work without driving back to ensure that no pedestrians were accidentally hit), pleasurable (e.g., play with children at a public playground without worrying about contamination), and/or engender a sense of mastery (e.g., complete a difficult task at the top of the hierarchy). It could also be that with the reduction in time spent obsessing and performing compulsive rituals, patients have more time to engage in ERP-*unrelated* activities that are important and/or pleasurable. With regard to those BATD programs that include a values component, ERP possibly mitigates depressive symptoms to the extent that patients with OCD are able to engage in previously avoided yet meaningful activities that are in line with their values (Twohig, 2009; Yap et al., 2012).

Given the growing interest in integrated treatment protocols to simultaneously address multiple related syndromes (e.g., Barlow et al., 2011; Chu et al., 2016; Norton, 2009), future research should continue to examine the transdiagnostic benefits of ERP. That is not to say that ERP is a hammer for every nail; ERP is not appropriate or useful for certain types of emotional problems (Abramowitz, 2013). Rather, it might be advantageous for a therapist to strategically apply empirically supported procedures to treat concurrent and related dysfunction on a patient-specific basis following a conceptually driven functional assessment. Future research should continue to investigate ways to optimize the therapeutic function of related treatment approaches and procedures. Given that OCD and mood disorders frequently co-occur (Ruscio, Stein, Chiu, & Kessler, 2010), future researchers might also assess BA (and other conceptually relevant mechanisms) when determining the efficacy of evidence-based treatments for OCD.

This study had several strengths, including the use of a clinical sample, longitudinal design, and measures of symptoms *and* a purported mechanism of change. Nevertheless, this study's findings should be interpreted in light of several limitations. One limitation of this research is the reliance on self-report measures administered at pre- and posttreatment only; future research should administer assessments at additional time points (e.g., session-by-session). Session-by-session data would also allow

for time-lagged analyses that could better elucidate the sequence and effects of changes in OCD symptoms, BA, and depressive symptoms over the course of treatment. Furthermore, although there is preliminary support for the psychometric properties of the BADS-SF, there are also certain limitations to this measure, which deserves additional research attention (e.g., Fuhr Hautzinger, Krisch, Berking, & Ebert, 2016). That said, the primary limitation noted with the short form relates to its factor structure and the use of subscales. For that reason, we have used the total scale score, as is recommended in the initial development and validation article (Manos et al., 2011). Nevertheless, we cannot be certain that our pattern of findings would be identical if we had used the original BADS (Kanter et al., 2007) instead of the short form.

Data were collected from within a naturalistic treatment setting, which confers advantages (e.g., greater external validity) as well as disadvantages (e.g., threatened internal validity). Although participants received treatment at a specialty clinic known for its residential ERP for OCD program (and the efficacy of ERP for OCD is well-established; Olatunji et al., 2010), treatment was not delivered in a standardized manner and we did not have access to data typically gathered in randomized controlled trials (e.g., treatment fidelity, data about the specific hierarchy items and subjective distress reported across exposure trials). Future studies should use more controlled methodology and supplement self-report data by incorporating clinician- or observer-rated assessments or behavioral measures. Future research could also include a more comprehensive assessment of specific OCD subtypes that might be more strongly related to OCD and/or depressive symptom severity (e.g., scrupulosity concerns).

Additionally, because we did not assess whether depressive symptoms preceded or followed the development of OCD symptoms (i.e., we only required that OCD be the primary diagnosis), our data do not speak to whether the effect of ERP on BA differs as a function of the relative temporal onset of OCD and depressive symptoms. It could be that ERP only serves to behaviorally activate patients whose depressive symptoms derive from OCD-related functional impairment. We also do not know if ERP promotes increased BA similarly across OCD symptom dimensions (e.g., harming obsessions versus "not just right experiences").

Although we used a longitudinal data set to test a conceptually driven hypothesis based on previous empirical and conceptual work, we cannot rule out alternative pathways, models, or variables that might better explain our observed effects. For example, it could be that (a) reductions in OCD symptoms led to reduced depression via improved quality of life, (b) ERP-related increases in BA resulted in improved quality of life, which drove decreases in depression, or (c) improvements in depressive symptoms resulted from the reduction of OCD-related distress (i.e., habituation) during treatment. In light of accumulated evidence that habituation is not a reliable predictor of treatment outcome, however, this last explanation is less likely (Baker, Mystkowski, Culver, Yi, Mortazavi, & Craske, 2010; Craske et al., 2008). Indeed, this study's requirement that a meaningful reduction in self-reported distress occur for an exposure task to be deemed "successfully completed" may be considered another limitation. Future research including measures of quality of life—as well as other conceptually related variables such as neuroticism (e.g., Griffith et al., 2010) and experiential avoidance (e.g., Hayes, Wilson, Gifford, Follette, & Strosahl, 1996)—would help to shed additional light on ERP's antidepressant potential.

In conclusion, we found that in a sample of patients receiving residential ERP for OCD, the effect of ERP on reductions in co-occurring depressive symptoms was statistically mediated by changes in BA from pre- to posttreatment. In light of the limitations discussed above, this preliminary study should be considered a "first step" and inform a more controlled investigation of the potential for ERP to simultaneously ameliorate OCD and depressive symptoms by promoting fear extinction *and* BA. It would be especially important to improve upon the current study's design in order to establish temporal precedence and rule out explanatory models and variables. Thus, future research examining the potential for ERP to behaviorally activate patients with concurrent OCD and depressed mood using a standardized ERP protocol, more comprehensive assessment, and diverse clinical samples in both inpatient and outpatient treatment settings is warranted. Given that ERP is effective in the treatment of several anxiety-related disorders (Olatunji et al., 2010), future research might also examine whether ERP behaviorally activates patients with other anxiety problems.

Conflict of Interest Statement

All authors declare that no actual or potential conflict of interest including any financial, personal or other relationships with other people or organizations within three (3) years of beginning this work could have inappropriately influenced, or be perceived to have influenced, this work.

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