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Does Motivation Impact OCD Symptom Severity? An Exploration of Longitudinal Effects

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Understanding the role of patient motivation in OCD treatment is of clinical importance given the requisite autonomous role of patients in Exposure and Response Prevention. The present study investigated state- and trait-like relations between three variables: two previously established motivational constructs, readiness to change (RTC) and committed action (CA), derived from the University of Rhode Island Change Assessment, and OCD symptom severity as measured by the self-report Yale-Brown Obsessive Compulsive Scale (Y-BOCS-SR). Utilizing a random-intercept cross-lagged panel model (RI-CLPM) design, we assessed autoregressive, within-time correlations, and cross-lagged effects of RTC, CA, and Y-BOCS-SR scores at admission, month 1 of treatment, and discharge from an intensive/residential treatment program for OCD. Results revealed significant autoregressive (i.e., state-like) effects for CA and Y-BOCS-SR, negative within-time correlations between state CA and Y-BOCS-SR across all time points, a positive within-time correlation between state CA and RTC at admission, and a cross-lagged effect between state Y-BOCS-SR at month 1 of treatment and state RTC at discharge. Results also demonstrated that the stability of the RTC variable was attributable to trait-like factors in the present sample. This study is novel in its use of RI-CLPM in an OCD sample and represents an important addition to the literature on the longitudinal impacts of dynamic constructs of motivation. Our findings may provide future researchers with strategies to supplement ERP with CA-driven motivational interviewing.

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Obsessive-compulsive disorder (OCD) is a debilitating mental illness characterized by anxiety-provoking thoughts or images and repetitive actions aimed at reducing distress (American Psychiatric Association, 2013). In the United States, roughly 2.3% of the population is affected by this disorder during their lifetime (Ruscio, Stein, Chiu, & Kessler, 2010). Encouragingly, individuals who receive evidence-based psychotherapy for OCD experience a 60% reduction in their symptom severity (Franklin, Abramowitz, Kozak, Levitt, & Foa, 2000). Exposure and response prevention (ERP; Foa, Yadin, & Lichner, 2012) is the gold-standard treatment for OCD and encourages patients to engage with challenging exposure-based situations repeatedly. As such, successful treatment requires significant commitment from patients. Up to 25% of patients refuse ERP for OCD (Franklin & Foa, 1998), which may reflect perceptions that ERP is too anxiety-provoking for patients who are not determined to repeatedly engage with their fears (Maltby & Tolin, 2003). Thus, understanding the potential role of patient motivation as it relates to ERP may provide meaningful insight into methods to improve treatment engagement and outcomes for individuals with OCD.

Motivation can be defined as the pursuit of a specific goal through a series of actions (Heckhausen & Heckhausen, 2008), and its importance for ongoing behavior change during psychotherapy has been documented in the areas of depression and substance use disorders (e.g., Cox, Blount, Bair, & Hosier, 2000; DiClemente, 1999; Martin, Rohsenow, MacKinnon, Abrams, & Monti, 2006). Patient motivation has been shown to moderate the relationship between successful completion of exercises typical of cognitive behavioral therapy (CBT; i.e., homework) and treatment outcome in substance use disorders (Gonzalez, Schmitz, & DeLaune, 2006). Specifically, Gonzalez and colleagues (2006) found participants who completed CBT homework assignments *and* who were more motivated to change used less cocaine in treatment. However, researchers suggest that motivation remains an understudied construct in anxiety-related psychotherapy interventions (Newman, Crits-Christoph, Gibbons, & Erickson, 2006). Considering the autonomous role of patients in CBT for anxiety and related disorders, understanding the role of motivation may meaningfully inform treatment course, especially for exposure-based psychotherapy. As such, there are calls for increased attention to motivation in the treatment of anxious populations (Abramowitz, 2006; Maltby & Tolin, 2003).

TRANSTHEORETICAL MODEL OF BEHAVIOR CHANGE

The transtheoretical model posits intentional behavioral modification is a gradual process (Prochaska, 2013; Prochaska & DiClemente, 1982). Progression of behavior change is conceptualized through a series of five stages: (1) *Precontemplation*, no knowledge of problematic behaviors; (2) *Contemplation*, identification of problematic behaviors without a plan for change; (3) *Preparation*, intent to change problematic behaviors; (4) *Action*, modification of problematic behaviors; and (5) *Maintenance*, ongoing and sustained improvements in behavior (Prochaska & DiClemente, 1982). To operationalize these stages, McConnaughy, DiClemente, Prochaska, and Velicer (1989) developed The University of Rhode Island Change Assessment (URICA)—a self-report measure that maps onto four of the five stages of the transtheoretical model. Of note, when researchers assessed the reliability of the five-stage measure, results suggested the preparation stage was captured by items on the contemplation and action stages, so it was dropped from the final measure (McConnaughy, Prochaska, & Velicer, 1983).

The URICA is often used to study motivation as it relates to the treatment of behavioral health issues but is less frequently studied in anxious samples. Few studies have explored specific relations between URICA subscales and CBT for OCD. Results from the studies available suggest that for outpatient CBT treatment, motivational stage at admission does not predict subsequent change in OCD symptom severity (Vogel, Hansen, Stiles, & Götestam, 2006). Further, only OCD severity (i.e., Y-BOCS total score), and not the stage subscales at baseline, predicts treatment outcome (Solem et al., 2016). Results from a correlational study by Monaghan et al. (2015), which utilized a large sample of residential OCD patients, provided a similar narrative: URICA stage at baseline did not relate to symptom severity at discharge. However, high precontemplation scores at baseline (indicative of higher resistance to change) corresponded with higher rates of treatment dropout, supporting the importance of understanding the role of motivation in ERP. Still, research with OCD patients suggests a lack of support for baseline motivation as a predictor of symptom change posttreatment. Support for the impact of motivation on treatment outcome in the substance use literature is mixed (Littell & Girvin, 2002). Given the presumed impact of patient motivation on willingness to engage in treatment (and, thus, successful treatment completion), researchers have suggested the stage-based evaluation of motivation may not capture the multidimensional nature of motivation as a construct, thus warranting

more dynamic methods of measurement (Littell & Girvin, 2002).

The lack of support for the predictive validity of URICA stage subscales on OCD treatment outcome may stem from the statistical approaches used to understand their relation. Motivation is often tested as baseline stage of change to posttreatment symptom severity via bivariate correlations (Monaghan et al., 2015) and multiple regressions (Solem et al., 2016; Vogel et al., 2006). Using these methodologies to understand associations rests on the assumed temporal stability of motivation and symptom severity as variables. However, research assessing motivation throughout treatment for smoking cessation and nutritional behaviors has shown levels of motivation to be variable over time (De Nooijer, Van Assema, De Vet, & Brug, 2005; Hughes, Keely, Fagerstrom, & Callas, 2005). Evidence that variability may exist in treatment patterns in ERP for OCD suggests symptom improvement may not be linear (Aderka, Nickerson, Bøe, & Hofmann, 2012; Collins & Coles, 2017). As such, longitudinal assessments may be more appropriate for capturing variability in these constructs. In fact, a longitudinal study found significant effects for the impact of motivation on OCD symptom severity across treatment (Steketee et al., 2011). Still, previously used analytic approaches cannot provide information about the intricacies of the associations between motivation and symptoms (e.g., differences both across *and* within time periods throughout treatment) or nuances about the constructs themselves (e.g., state and trait-like differences); as such, they may provide an incomplete depiction of the relations between the constructs.

COMPOSITE MEASURES OF MOTIVATION

The understanding of motivation as a dynamic construct has influenced the development of continuous composite measures derived from the URICA. Research suggests composite scores may better capture variability in motivation than stage-specific scores (Carey, Purnine, Maisto, & Carey, 1999; Field, Adinoff, Harris, Ball, & Carroll, 2009; Pantalon, Nich, Frankforter, & Carroll, 2002). The readiness to change (RTC) composite score was developed to account for common patterns of scores reported across stages (e.g., high scores in the action, maintenance, and contemplation subscales and low precontemplation scores; Field et al., 2009). RTC scores have been positively correlated with severe clinical characteristics at baseline, such as substance use (DiClemente, Doyle, & Donovan, 2009; Field et al., 2009; Myers, van der Westhuizen, Naledi, Stein, & Sorsdahl, 2016; Velasquez, Carbonari, & Diclemente, 1999), indicating symptom severity at treatment onset may improve recognition of problematic behaviors and enhance the desire to change. Additionally, in a study by Boswell, Sauer-Zavala, Gallagher, Delgado, and Barlow (2012), RTC mediated the relationship between initial symptom severity and treatment outcome for anxiety disorders. However, there is a lack of research evaluating the predictive validity of RTC on treatment outcome (Blanchard, Morgenstern, Morgan, Labouvie, & Bux, 2003; Field et al., 2009; Pantalon et al., 2002).

Given that there may be meaningful differences between motivational desires to change and actual behavioral modification, the committed action (CA) composite score was developed to capture one's commitment to behavioral change after considering one's doubts about self-efficacy for change (Pantalon et al., 2002). Whereas the preparation stage of the transtheoretical model assesses one's intention to change irrespective of the other stages, the CA composite score enables researchers to account for stage-specific variability across the contemplation and action subscales with a single, dynamic score. The utility of CA has been demonstrated in the substance abuse literature, finding committed action to be negatively correlated with both baseline symptom severity (Field, Duncan, Washington, & Adinoff, 2007; Pantalon et al., 2002) and improved treatment outcome (Pantalon et al.). Nonetheless, the predictive validity of CA, especially in the OCD and broader anxiety literature, is understudied and further examination of this construct in treatment outcome research is needed.

Research suggests committed action may measure a different component of motivation than readiness to change; readiness to change scores may indicate a patient's recognition of the problem and desire to change, whereas committed action scores may capture a commitment and intention to change. Readiness to change may be a precursor to committed action motivational experiences. In calculating the composite scores, RTC includes hesitation for behavior change, which is characteristic of the contemplation subscale of the URICA, while CA removes this hesitation by subtracting the contemplation subscale from the action subscale. The progression from RTC to CA regarding motivational experiences may be further exemplified in treatment, given readiness to change has been hypothesized to predict treatment initiation and committed action to predict treatment engagement and completion (Field et al., 2007). Patients may graduate from readiness to change to committed action motivational experiences as they undergo successful treatment. Though no previous research has assessed the transition from readiness to change to committed action, the constructs may co-exist as motivational experiences,

with one more prevalent than the other at various points throughout treatment.

CURRENT STUDY

Although composite measures provide a more comprehensive understanding of motivation, to our knowledge, previous work has only assessed the utility of RTC (and not CA) in patients with OCD. Specifically, Steketee and colleagues (2011) found greater improvement in OCD symptom severity for patients who reported the highest levels of readiness to change during the first weeks of comprehensive cognitive therapy. Furthermore, research on the longitudinal relationships between measures of motivation and symptoms of OCD during ERP treatment is limited. Given the presumed clinical importance of motivation in ERP treatment (Abramowitz, 2006; Maltby & Tolin, 2003; Monaghan et al., 2015), a greater understanding of these relationships may help identify periods where utilizing motivation-enhancing techniques (e.g., motivational interviewing) could be useful in improving treatment engagement and OCD symptom severity.

In short, despite evidence suggesting motivation plays an important role in treatment outcomes, the work exploring these relationships in anxiety broadly, and OCD specifically, is limited. Thus, the goal of this study was to evaluate the relationship between two dynamic motivational constructs (i.e., RTC and CA) and self-reported OCD symptom severity during treatment at an intensive/residential treatment program. In utilizing a random-intercept cross-lagged panel design (RI-CLPM) within the structural equation modeling framework, we explored autoregressive, within-time correlations, and cross-lagged paths between time-variant, state-like and time-invariant, trait-like effects of RTC, CA, and self-reported OCD severity scores (Y-BOCS-SR) at baseline, month 1 of treatment, and discharge.

Methods

PARTICIPANTS

Participants were 496 patients (50% male, 50% female) with a mean age of 34 (*SD* = 13.81) who sought intensive/residential treatment for OCD and related disorders between December 2008 and July 2013. Our sample was homogenous, with self-reported race as 90% White, 5% Asian, 1% Black or African-American, 0.8% American Indian or Alaskan Native, 0.4% Native Hawaiian or Pacific Islander, and 1% Other. Patients' length of stay in the program ranged from 0 days to 122 days with a median of 50.5 days and an average of 50.76 days (*SD* = 25.83). Length of stay in this program depended on clinical necessity and insurance coverage. Average OCD severity scores at admission were in the severe range (*M* = 25.92, *SD* = 6.77), based on the Yale-Brown Obsessive Compulsive Scale (self-report version; Y-BOCS-SR). Attrition for the Y-BOCS-SR and URICA measures are reported in Table 1. Of note, attrition for this sample can mostly be attributed to individuals who left the intensive/residential treatment program. A majority of the sample received therapy for psychiatric illness (96%); previous outpatient treatments included 6% medication only, 11% psychotherapy only, and 67% combined medication and psychotherapy. Additionally, 53% of the sample self-reported previous hospitalization due to psychiatric illness.

TREATMENT

All participants were seeking intensive/residential treatment for OCD and worked with a multidisciplinary team (e.g., primary behavior therapist, psychiatrist, and family therapist). The treatment approach was built on the foundations of ERP with patients engaging in 2 to 4 hours of exposure practice daily, in addition to a minimum of two behavior therapist meetings per week. Exposure practices included coached sessions, utilizing both trained behavioral coaches who assisted participants in completing the exposure plans created by their treatment team and self-directed/independent exposure sessions. Participants attended daily group therapy sessions, including general psychoeducation/CBT-oriented groups and symptom-specific groups (i.e., bathroom habits, hoarding, scrupulosity).

MEASURES

University of Rhode Island Change Assessment (URICA; McConnaughy et al., 1989)

The URICA is a 32-item self-report measure that assesses readiness to engage in behavioral change as it relates to the stages of change (precontemplation,

Table 1
Attrition at Admission, Month 1 of Treatment, and Discharge for Y-BOCS-SR and URICA

	Admission N	Admission %	Month 1 N	Month 1 %	Discharge N	Discharge %
Y-BOCS-SR	408	17.7%	143	71.1%	306	38.3%
URICA	483	2.6%	179	63.9%	348	29.8%

Note. Total N is 496. N indicates the total number of participants at admission, month 1 of treatment, and discharge. Percentage indicates the percent of the total missing at admission, month 1 of treatment, and discharge.

contemplation, action, and maintenance). Examples of items from the stages of change are as follows: "As far as I'm concerned, I don't have any problems that need changing (precontemplation)," "I think I might be ready for some self-improvement (contemplation)," "I am really working hard to change (action)," "I'm here to prevent myself from having a relapse of my problem (maintenance)." Items were rated on a 5-point Likert scale, ranging from 1 = *strongly disagree* to 5 = *strongly agree*. The four subscales consist of eight items each, and the highest subscale score is indicative of an individual's stage of change. However, rather than assessing motivation as discrete stages of change, we utilized the RTC and CA continuous composite measures as defined in previous research. RTC was calculated by subtracting precontemplation subscale scores from the contemplation, maintenance, and action subscale scores (Connors et al., 2000; Field et al., 2007; Project MATCH Research Group, 1997). Of note, the precontemplation subscale is subtracted from the other subscales due to its reverse-wording (i.e., higher scores indicate more resistance to change). CA was calculated by subtracting the contemplation subscale score from the action subscale score (Field et al., 2007; Field et al., 2009; Pantalon et al., 2002). RTC scores range from 16 to 112 and CA scores from -32 to 32. The URICA has shown good internal consistency in anxious samples (α =.79; Dozois, Westra, Collins, Fung, & Garry, 2004). Evaluation of internal consistency in our sample demonstrated similar levels to previous findings (α =.75).

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

The Y-BOCS measure consists of 10 items that assess OCD symptom severity. Participants responded to questions about the frequency and distress of their obsessions and compulsions in the last week (e.g., "How much time do you spend performing compulsive behaviors?" or "How much distress do your obsessive thoughts cause you?"). Y-BOCS total scores range from 0 to 40, with higher scores indicating more severe OCD symptoms. This study utilized the self-report version of the Y-BOCS (Y-BOCS-SR), which has shown excellent internal consistency in an OCD primary diagnosis sample (α =.88) and strong convergent validity with the clinician-administered version (*r* =.75; Federici et al., 2010). In the present sample, the self-report version of the Y-BOCS evidenced excellent internal consistency (α =.87).

DESIGN AND PROCEDURE

At the time of the study, participants were seeking intensive/residential treatment for OCD and provided informed consent for their data to be used for research. Participants were administered self-report versions of the Y-BOCS and URICA as part of a larger assessment battery at admission, discharge, and 1-month intervals across the duration of their treatment stay. The REDCap electronic data management system (Harris et al., 2009) was used to capture and manage participant data. REDCap is a HIPAA-compliant, web-based tool hosted by Partners HealthCare Research Computing, Enterprise Research Infrastructure & Services (ERIS) group.

Calculation

STATISTICAL ANALYSIS

To explore the reciprocal and longitudinal relations between motivation variables and OCD severity, we used the random intercepts cross-lagged panel model (RI-CLPM) approach, within a structural equation model framework (Hamaker, Kuiper, & Grasman, 2015). The RI-CLPM model separates the variance of observed variables into two parts: (a) trait-like, time-invariant or "between-person level" variance and (b) state-like, time-variant or "within-person level" variance. Psychological constructs likely have stable individual differences over time (either across the lifespan and/or for the duration of the study; Hamaker et al., 2015). If these stable, trait-like effects are present and not accounted for, path estimates of autoregressive and cross-lagged paths will be confounded. We then compared this model to the traditional cross-lagged model (CLPM), which does not partition trait- and state-like variance.

Following Hamaker and colleagues' (2015) procedures for creating the RI-CLPM, we created three overarching random intercept latent factors to represent trait-like effects of RTC, CA, and Y-BOCS-SR. The observed scores of these variables were the indicators of their respective factor, and factor loadings were constrained to 1 to reflect consistency in trait-like effects over time. We then modeled state-like or within-person effects by regressing each observed variable onto its *own* latent factor, and all factor loadings were constrained to one. For example, RTC at admission was regressed onto its own latent factor, RTC at month 1 of treatment was regressed onto its own latent factor, and so on. Variances of the observed variables were constrained to zero; therefore, all variance in the observed variables was captured by the trait-like and state-like latent factor structure. The within-time correlations, autoregressive paths, and cross-lagged paths were specified between these latent factors. With specifying separate variances, the RI-CLPM model tests whether the relations between variables reflect a within-person,

time-variant linkage or a time-invariant, trait-like difference between persons. Given the intervals between time points (i.e., admission to month 1 of treatment; month 1 of treatment to discharge) varied in length, we did not constrain paths to be equal over time for either autoregressive or cross-lagged paths. In Figure 1, we illustrated the RI-CLPM model using only two of the three study variables, due to the complexity of model depiction. In Figure 2, we depicted the traditional CLPM also only using two variables for consistency.

The correlations between the random intercept latent factors reflect how the trait-like or between-person effects are related to one another. The autoregressive parameters measure the amount of within-person carry-over effects across time points. These paths reflect the extent to which state-like or within-person deviations in RTC, CA, and Y-BOCS-SR can be predicted by their own previous deviations in RTC, CA, and Y-BOCS-SR, respectively. Furthermore, positive estimates indicate when a person scores above their expected score at a

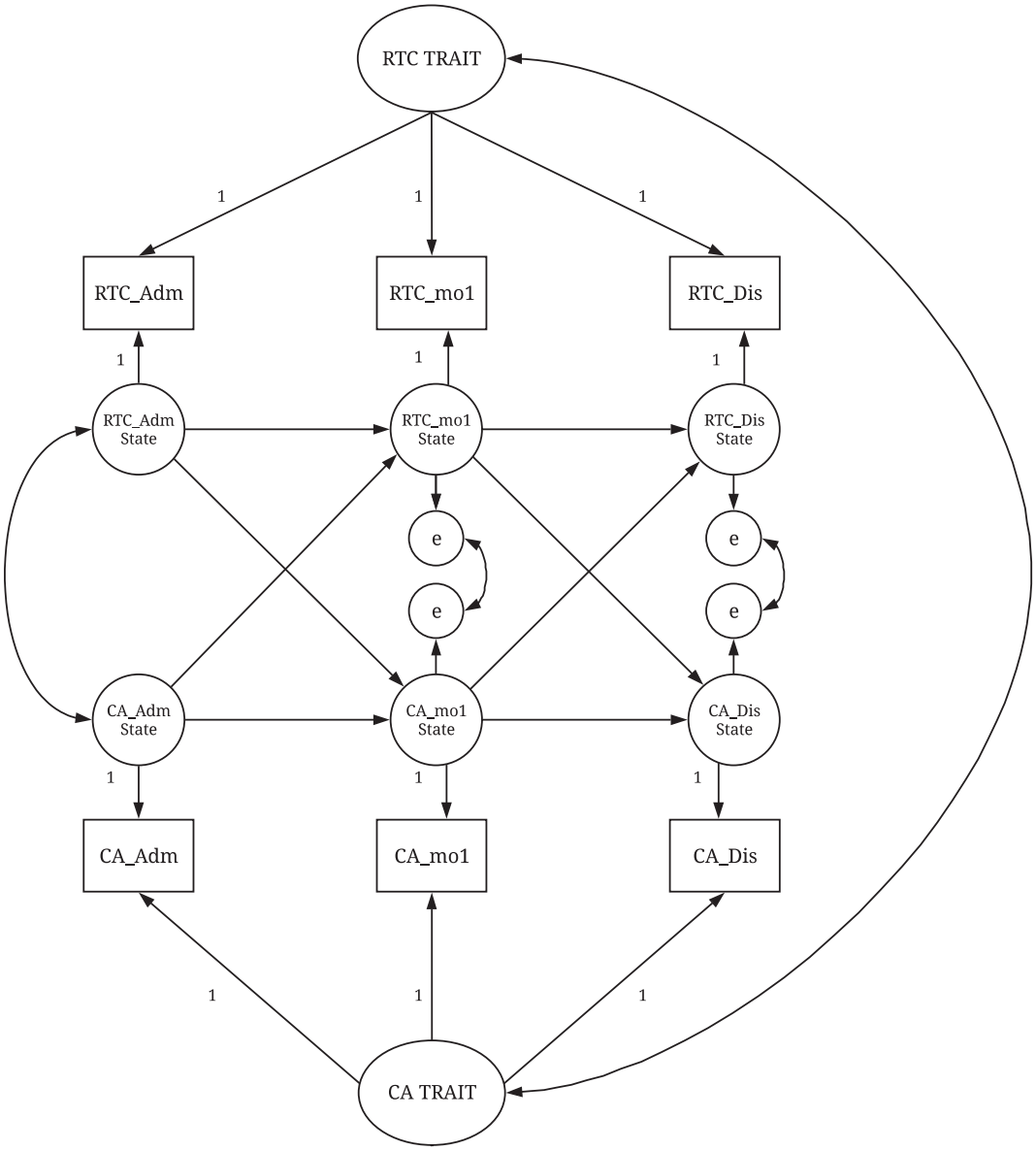

FIGURE 1 RI-CLPM showing relation between readiness to change (RTC) and committed action (CA) at admission (Adm), month 1 of treatment (mo1), and discharge (Dis). The figure displays two random intercepts (RTC Trait and CA Trait) that reflect trait-like, between person processes. State-like, within person processes are reflected by the autoregressive paths between latent factors across time points, cross-lagged paths between latent constructs across time points, within-time correlation between latent constructs at admission, and the residual correlations between latent factors at month 1 of treatment and discharge.

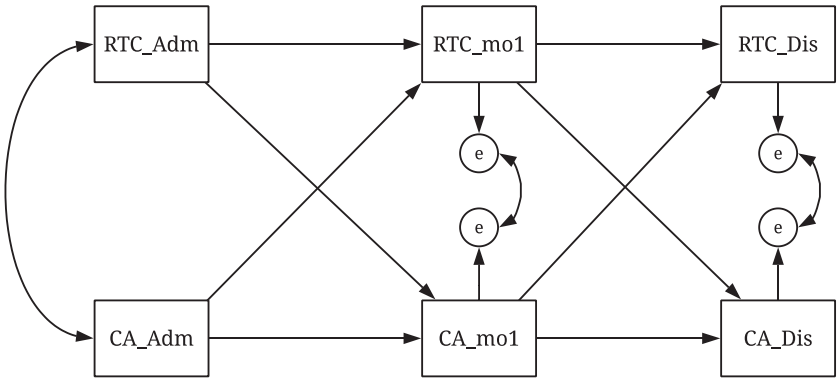

FIGURE 2 Traditional CLPM showing two of the three measured variables: readiness to change (RTC) and committed action (CA) at admission (Adm), month 1 of treatment (mo1), and discharge (Dis).

previous time point, they are likely to score above their expected score again at the next time point. The cross-lagged parameters indicate the degree to which an individual's expected score on *y* can be predicted by previous deviations of their expected score on *x* while controlling for deviations of the individual's previous expected score on *y*. The within-person correlations at admission reflect the extent to which an individual's deviation from their own expected score on one variable is associated with the deviation from their own expected score on another variable. The correlated residuals at later time points reflect the extent to which they are related due to unmeasured state-like effects.

We used Mplus Version 7.4 with full information maximum likelihood to account for missing data. The root mean square error of approximation (RMSEA), the comparative fit index (CFI), the Tucker-Lewis index (TLI), and the standardized root mean square residual (SRMR) were used to determine acceptable absolute fit of the models. A significant chi-square statistic indicates poor fit; however, this test is sensitive to large sample size and may reject the null hypothesis (suggesting poor fit) when other indicators suggest adequate fit. RMSEA values between .05 and .08 reflect reasonable fit and values < .05 suggest a good fit. CFI and TLI values > .90 suggest acceptable fit and values > .95 are considered a good fit. SRMR values < .08 are considered an adequate fit (Hu & Bentler, 1999).

The traditional cross-lagged panel model (CLPM) is nested within the RI-CLPM, so we performed a chi-square difference test to compare the fit of the RI-CLPM with the traditional CLPM (Satorra, 2000). This comparison tested whether removing the random intercepts significantly deteriorated model fit. In other words, we tested whether it was important to account for trait-like effects in the model.

Results

DESCRIPTIVE ANALYSES

Descriptive statistics, including means and standard deviations at admission, month 1 of treatment, and discharge for Y-BOCS-SR, CA, and RTC are presented in Table 2.

RI-CLPM ANALYSIS

The random-intercepts cross-lagged model (RI-CLPM) provided a good fit to the data; however, two of the three random intercepts (i.e., CA and Y-BOCS-SR) had variances below zero. Therefore, the model was rerun with these variances constrained to zero; results showed an adequate to good fit to the data: CFI = 0.99, TLI = 0.97, RMSEA = 0.03 (CI: 0.00 to 0.07), SRMR = 0.03. Additionally, dropping the random intercepts for CA and Y-BOCS-SR did not significantly deteriorate model fit, suggesting stability in these variables over time were not due to trait-like effects, $\chi^2(5, 496) = 9.77$, $p = .08$.

Table 2
Descriptive Statistics for Admission, Month 1 of Treatment, and Discharge

	N	*M*	*SD*
RTC_Adm	483	75.83	11.01
CA_Adm	495	-2.31	4.24
YB_Adm	408	25.92	6.77
RTC_Mo1	179	77.55	9.65
CA_Mo1	185	.63	3.37
YB_Mo1	143	20.16	6.42
RTC_Dis	348	76.21	10.43
CA_Dis	354	1.55	3.92
YB_Dis	306	16.31	6.46

Note. Abbreviations are as follows: readiness to change (RTC), committed action (CA), self-reported OCD symptom severity (YB) at admission (Adm), month 1 of treatment (mo1), and discharge (Dis).

Furthermore, the retained RI-CLPM was compared to the traditional CLPM, which did not include any random intercepts. The CLPM was a significantly worse fit to the data, suggesting that partitioning trait-like and state-like variance for RTC was indicated, $\chi^2(1, 496) = 9.44$, $p = .002$. The final RI-CLPM model is shown in Figure 3.

Standardized estimates of the autoregressive and cross-lagged paths are shown in Table 3. Correlations between state variables within time points are shown in Table 4. Since two of the three random-intercepts were dropped from the model, no correlations between trait variables were estimated, and therefore, not reported. The autoregressive effects for Y-BOCS-SR and CA were significant. State Y-BOCS-SR at admission positively predicted state Y-BOCS-SR after month 1 of treatment ($\beta = .43$, $p < .001$). Subsequently, state Y-BOCS-SR at month 1 of treatment positively predicted state Y-BOCS-SR at discharge ($\beta = .68$, $p < .001$). State CA at admission positively predicted state CA after month 1 of treatment ($\beta = .46$, $p < .001$) and state CA at month 1 of treatment positively predicted state CA at discharge ($\beta = .55$, $p < .001$). The autoregressive effects for RTC were not significant, suggesting that state-like effects of RTC did not endure across time.

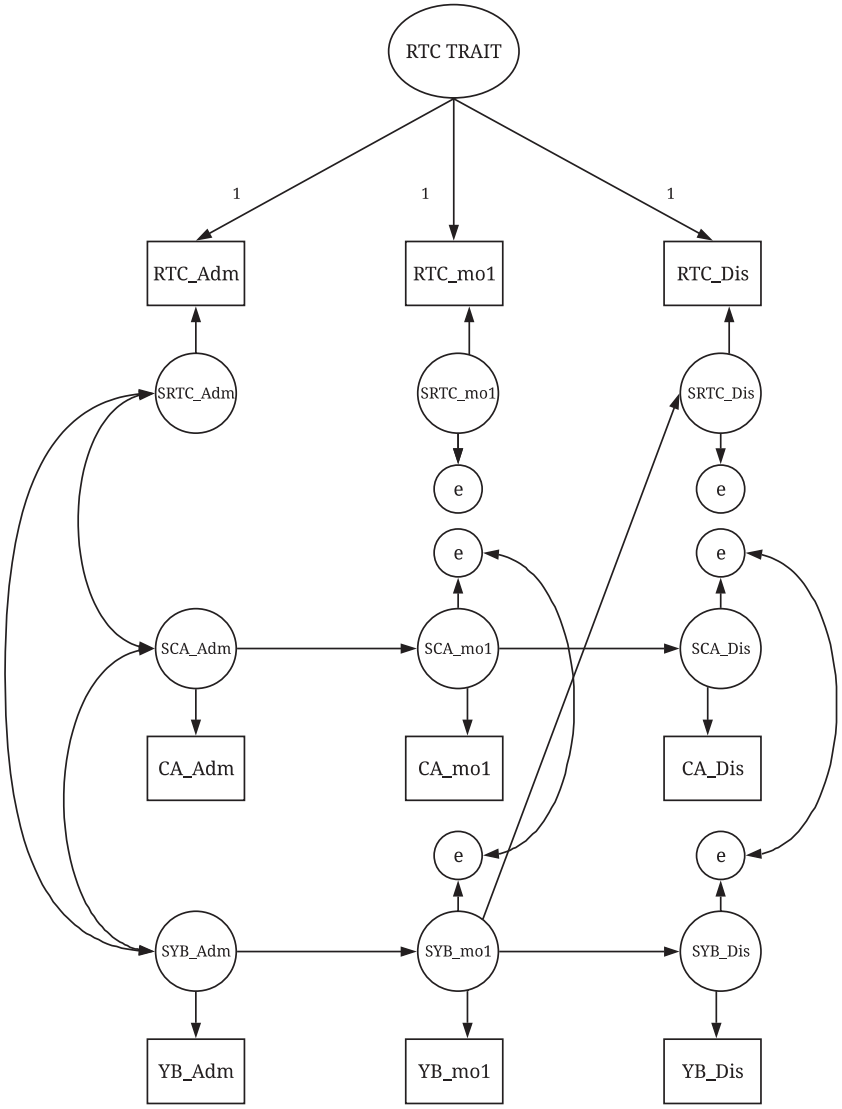

FIGURE 3 Final RI-CLPM showing all three measured variables: readiness to change (RTC), committed action (CA), and self-reported Yale-Brown Obsessive Compulsive Scale symptom severity (YB) at admission (Adm), month 1 of treatment (mo1), and discharge (Dis). RTC Trait = trait readiness for change, SRTC = state readiness for change, SCA = state committed action, SYB = state self-reported Yale-Brown Obsessive Compulsive Scale symptom severity.

Table 3
Summary of Autoregressive and Cross-Lagged Pathways

	β	*SE*	*p*
Autoregressive			
RTC_Adm – RTC_mo1	.13	.19	.49
RTC_mo1 – RTC_Dis	.15	.19	.45
CA_Adm – CA_mo1	.46	.06	<.001**
CA_mo1 – CA_Dis	.55	.07	<.001**
YB_Adm – YB_mo1	.43	.06	<.001**
YB_mo1 – YB_Dis	.68	.06	<.001**
Cross-lagged			
RTC_Adm – CA_mo1	.15	.08	.08
RTC_Adm – YB_mo1	-.01	.09	.90
CA_Adm – RTC_mo1	.16	.13	.20
CA_Adm – YB_mo1	-.02	.07	.79
YB_Adm – RTC_mo1	.21	.12	.08
YB_Adm – CA_mo1	-.02	.07	.79
RTC_mo1 – CA_Dis	-.17	.12	.15
RTC_mo1 – YB_Dis	.00	.11	.99
CA_mo1 – RTC_Dis	.05	.10	.61
CA_mo1 – YB_Dis	-.05	.07	.45
YB_mo1 – RTC_Dis	.34	.12	<.01*
YB_mo1 – CA_Dis	-.05	.09	.60

Note. All pathways were freely estimated. *SE* refers to standard errors. Abbreviations are as follows: readiness to change (RTC), committed action (CA), self-reported OCD symptom severity (YB) at admission (Adm), month 1 of treatment (mo1), and discharge (Dis).

Instead, the stability of these variables was explained by their trait-like components.

When evaluating cross-lagged paths within the model, only the path between state Y-BOCS-SR at month 1 of treatment significantly predicted state RTC at discharge (β = .34, p < .01). Within-time correlations between state Y-BOCS-SR and state CA were negative at admission (r = -.14, p < .01), month 1 of treatment (r = -.23, p < .01), and discharge (r = -.39, p < .001). State RTC and state CA were positively correlated at admission (r = .30, p < .001). Figure 3 illustrates the significant paths of the RI-CLPM with all three variables. Estimates and correlations are detailed in Tables 3 and 4.

Table 4
Summary of Correlations for State Variables

	r	*p*
State Variable		
RTC_Adm – CA_Adm	.30	<.001**
RTC_Adm – YB_Adm	.09	.17
CA_Adm – YB_Adm	- .14	<.01*
RTC_mo1 – CA_mo1	.05	.70
RTC_mo1 – YB_mo1	.16	.20
CA_mo1 – YB_mo1	- .23	<.01*
RTC_Dis – CA_Dis	- .02	.80
RTC_Dis – YB_Dis	- .06	.55
CA_Dis – YB_Dis	- .39	<.001**

Note. All pathways were freely estimated. Pearson's correlation is defined by *r*. Abbreviations are as follows: readiness to change (RTC), committed action (CA), self-reported OCD symptom severity (YB) at admission (Adm), month 1 of treatment (mo1), and discharge (Dis).

Discussion

The present study aimed to explore the reciprocal and longitudinal relations between two motivational constructs and OCD symptom severity using an advanced methodology that partitions trait-like (between-person) and state-like (within-person) processes. Results showed the stability of readiness to change was fully represented by trait-like effects, whereas the stability of committed action and OCD symptom severity were fully represented by state-like effects. Negative correlations were found between within-person commitment to behavioral change and OCD symptom severity within all measured time points. Further, a positive within-time association between within-person readiness to change and commitment to action was found at baseline. Results showed a positive cross-lagged effect between within-person OCD symptom severity at month 1 of treatment and within-person readiness to change at discharge.

Significant autoregressive effects (i.e., the stability of state-like variables) and nonsignificant random intercepts (i.e., no variables represent trait-like effects) indicate that state-like effects fully accounted for the consistency in an individual's commitment to behavioral change and OCD symptom severity across treatment. Alternatively, the nonsignificant autoregressive effect and significant random intercept for readiness to change indicate that the stability of readiness can be fully attributed to stable, trait-like factors and *not* state-like effects. Further consideration of this finding may be useful for clinicians who aim to improve readiness to change without the integration of formal interventions to enhance treatment engagement. For example, clinicians often report that patients who are reluctant to engage in ERP need to "hit rock bottom" before they are "ready" to change, or environmental adjustments will reduce patient accommodation enough to increase readiness. However, over the course of an intensive/residential treatment, which focused on exposure-based practices and not on specific, formalized, motivational interventions, readiness to change was shown to have a trait-like, time-invariant effect. Clinicians who provide similar exposure-focused treatments may find a ceiling effect to improving patient readiness to engage in ERP. Additionally, if informal attempts to improve readiness were unsuccessful, it may lead clinicians to

delay actual engagement in treatment-related activities. Thus, for clinicians not utilizing specific motivational interventions to improve readiness, attempts to improve commitment to behavioral change and immediate engagement in treatment relevant behaviors (even if they are not at the level of difficulty the clinician desires) may be more impactful for enhancing patient motivation.

Our results also show that deviations from an individual's expected commitment to behavioral change score were negatively associated with deviations from their expected OCD symptom severity scores within each time point. Greater commitment to behavioral change was associated with less severe OCD symptoms across all measured time points. These longitudinal findings build on previous cross-sectional research from the substance use literature, which demonstrated negative baseline correlations between commitment to action and symptom severity (Field et al., 2007; Pantalon et al., 2002).

The interconnectedness and presumed malleability of these state-like constructs seem promising when considering the potential for motivation-focused interventions. It is plausible that for individuals who undergo traditional ERP in intensive/residential treatment centers, the state-like nature of commitment to action and symptom severity makes these variables more amenable to change via short-term, directive interventions. Alternatively, the trait-like nature of readiness to change may be more stagnant and remain stable in the face of environmental pressures/short-term motivational interventions. Clinically, shifting the focus from enhancing an individual's readiness for change to helping them structure their environmental supports and develop more effective strategies for committing to and following through with their behavior change may positively impact OCD symptom reduction in time-limited treatment settings. Further, the longitudinal relationship of these constructs provides support for ongoing integration of motivational-enhancement strategies. Supposing future research finds state-like commitment to behavioral change impacts OCD symptom severity across time, clinicians working in these settings may supplement ERP with CA-specific motivational-enhancement techniques *throughout treatment* to enhance treatment effectiveness.

Motivational-enhancement techniques, such as motivational interviewing (MI), are often used *pretreatment* to reduce ambivalence and to evoke and reinforce a patient's intrinsic capabilities to be successful in treatment (Miller & Rollnick, 2002). An important open-trial study by Simpson, Zuckoff, Page, Franklin, and Foa (2008) integrated MI at pretreatment *and* during ERP for OCD patients. Building on their successful approach, our data may provide insights to further enhance the effectiveness of ERP with integrated MI, especially for patients in time-limited, intensive treatment settings. There may be an additional benefit to increasing the number of pretreatment sessions focused on enhancing a patient's commitment to behavioral change. Continued implementation of MI throughout treatment as a standard procedure (compared to implementing MI strategies *after* encountering treatment resistance) may also improve outcomes for this population. For example, discussions on how a patient plans to move forward with the next steps (e.g., actionable goals) in their treatment *prior to* engaging in challenging exposures may positively impact their willingness and continued engagement with exposure practice. Nonetheless, challenges remain for integrating MI with ERP, including the need for additional research on the best method of MI integration and the effectiveness of MI in OCD populations (see Simpson et al., 2010b).

Our results also suggested a modest positive correlation between state-like readiness to change and committed action at baseline, indicating patients entered treatment both ready for and committed to behavioral change. This finding replicates previous research in the substance use literature (Field et al., 2007; Pantalon et al., 2002) and provides additional evidence that these constructs measure related, but ultimately distinct aspects of motivation. Though the RTC and CA relationship at baseline is encouraging, it did not endure across treatment. While our patients may have entered treatment with high readiness for change and were initially committed to engaging the necessary behaviors, the inherent difficulty in exposure therapy (e.g., confronting greater fears) may make it difficult for some patients to remain committed to engaging in treatment following admission, regardless of their level of readiness for change. As exposures become more challenging, readiness, or the *desire* for change, may not translate into behavioral actions associated with committed action. This may have been especially true for individuals who did not feel *capable* of managing or tolerating the associated distress and/or feared outcome associated with more difficult exposures (even if they report *feeling ready* to seek a change in their life). Another possibility is that the intensive/residential treatment setting, which includes a structured environment and around-the-clock staff support, positively impacted patients' ability to engage in ERP, despite their readiness level. Thus, patients may have been willing to engage in exposures even if they did not feel ready. Nonetheless, future research is needed to

disentangle the relations between these variables in OCD populations.

Last, our findings revealed a significant predictive cross-lagged effect, such that higher state-like OCD symptom severity at month 1 of treatment predicted higher state-like readiness for change at discharge. Patients in our program may have recognized that their treatment was nearing its end (following the 1-month time-point) and felt the opportunity to challenge remaining OCD symptoms was decreasing. Patients who were still struggling with more severe OCD symptoms following month 1 of treatment may have felt a greater readiness (or perceived need) to change their behavior in the context of their impending discharge. Though it is promising that our findings indicate a desire for continued progress posttreatment, it is important to consider that their OCD symptom severity at month 1 had no impact on their actual *commitment* to behavioral change at discharge. This interpretation is likely specific to intensive/residential treatment centers given the time-limited nature of this type of program.

A major strength of this study is using the RI-CLPM approach to data analysis. The ability to partition stable, trait-like differences from time-variant, state-like differences has allowed us to draw preliminary conclusions about motivational variables and their unique impact on OCD symptom severity in an intensive/residential treatment sample. Elucidating state-like, within-person reciprocal processes is important, given the likelihood of enduring trait-like individual differences in psychological constructs (Hamaker et al., 2015). To our knowledge, this is the first study utilizing the RI-CLPM in an OCD-specific population. We hope this study illustrates the utility of the RI-CLPM and encourages future OCD and motivation researchers to employ this approach. Additionally, this study represents an important addition to the literature by assessing both readiness for behavioral change *and* commitment to behavioral change in an OCD sample. These constructs meaningfully differ from one another and in their relationships with symptom severity, and future work would benefit from their continued assessment.

Though the present study utilized unique methodological and analytic approaches in a robust treatment-seeking sample, specific limitations must be noted. The naturalistic intensive/residential treatment setting, and the severity of our sample, is unique, as patients are often referred to this level of care due to unsuccessful outpatient treatment attempts. Previous research has shown intensive/residential treatment responders to exhibit more severe OCD symptoms at baseline (Brennan et al., 2014), which is a stark contrast to findings regarding treatment responders in outpatient settings (Keeley, Storch, Merlo, & Geffken, 2008; Knopp, Knowles, Bee, Lovell, & Bower, 2013). As such, these individuals may be meaningfully different in numerous ways (including levels of motivation at treatment outset) than outpatient or non-treatment-seeking samples. Further, our sample was homogeneous regarding racial diversity, which limits the generalizability of these findings to a more diverse patient population. We hope this study will set the stage for future replication with more diverse patient populations and in variable treatment settings.

Additionally, the present study utilized 1 month of treatment as a time point to acquire longitudinal data without interrupting the patients' clinical care. More frequent data collection was not feasible given the number of available staff members during data collection. As such, the present study was limited by the reduced number of participants who remained in the treatment program at month 1 of treatment. The inability to measure the constructs at more frequent intervals may limit conclusions that can be drawn from the study. For example, given the dynamic nature of motivation and the intensity of daily treatment, it is possible that our measured timepoints were too far apart to capture meaningful, predictive cross-lagged relationships of motivation on symptom severity. Encouragingly, Steketee and collegues (2011) found effects of motivation on OCD symptom severity with weekly assessments, which may indicate a need for more frequent measurements to enhance our understanding of the relations between these constructs. Finally, the present study only utilized self-report measurements of motivation. Future research would benefit from utilizing behavioral proxies; specific examples include measurements of in-session CBT engagement as determined by coding ERP session tapes (CBT Compliance Measure; Tolin et al., 2017), and between-session CBT homework compliance (e.g., PEAS; Simpson et al., 2010a). It is important to recognize that this study was exploratory. Replications of these preliminary results are necessary to determine if our model and findings are robust and generalizable to other treatment contexts. We encourage future researchers to test this model in other anxiety and obsessive-compulsive spectrum disorders that utilize CBT-derived treatments.

Conclusions

To our knowledge, this was the first study to assess the RI-CLPM model in a sample of patients with OCD. Given the benefits of elucidating the state- and trait-like nuances of variables, utilizing this methodological approach represents an important

contribution to the literature by enhancing our understanding of the relations between different facets of motivation and OCD symptom severity. Additionally, this study adds to the literature on the longitudinal relationships between OCD symptoms and motivational constructs during treatment; our assessment of both RTC *and* CA allows for a comprehensive understanding of motivational progressions throughout intensive/residential treatment. As such, our findings may provide points of consideration for future studies aiming to better understand the relations between different motivational constructs and OCD symptoms. Future work may better evaluate how the driving mechanisms of commitment to behavioral change can be targeted through the integration of focused motivational enhancement techniques.

Conflict of Interest Statement

The authors declare that there are no conflicts of interest.

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