Mechanisms of Change in Cognitive Therapy for Obsessive Compulsive Disorder: Role of Maladaptive Beliefs and Schemas

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Abstract

Objective—To identify mechanisms of change in individuals with moderately severe obsessive-compulsive disorder (OCD) receiving cognitive therapy (CT).

Method—Thirty-six adults with OCD received CT over 24 weeks. At weeks 0, 4/6, 12, 16/18, and 24, independent evaluators assessed OCD severity, along with obsessive beliefs and maladaptive schemas. To examine mechanisms of change, we utilized a time-varying lagged regression model with a random intercept and slope.

Results—Perfectionism and certainty obsessive beliefs and maladaptive schemas related to dependency and incompetence significantly mediated (improved) treatment response.

Conclusions—Cognitive changes in perfectionism/certainty beliefs and maladaptive schemas related to dependency/incompetence precede behavioral symptom reduction for OCD patients. Targeting these mechanisms in future OCD treatment trials will emphasize the most relevant processes and facilitate maximum improvement.

Keywords

obsessive beliefs; cognitive therapy; mechanism of change; early maladaptive schema; OCD

Exposure with response prevention (ERP) has consistently been demonstrated to be an efficacious psychosocial treatment for Obsessive Compulsive Disorder (OCD; Franklin Abramowitz, Kozak, Levitt, & Foa, 2000). However, approximately 25% of patients refuse to engage in ERP (Franklin & Foa, 1998) and of those who enter treatment, nearly 20% of patients do not respond and another 20% relapse following the intervention (Riggs & Foa,

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1993). To meet the needs of these patients, a flexible, modularized cognitive therapy (CT) based upon the cognitive model of OCD (Rachman, 1997) was developed (Wilhelm & Steketee, 2006). This treatment involves limited exposure, which likely contributes to its greater acceptability to patients and lower drop-out rates (e.g., 10-15%; Wilhelm, Steketee, Reilly-Harrington, Deckersbach, Buhlmann, & Baer, 2005).

In the CT framework, unwanted intrusive thoughts (e.g., harming a loved one) are considered normal and common occurrences. However, the misinterpretation of innocuous intrusions as overly significant leads to increased anxiety and an urge to engage in compulsions to reduce emotional arousal. CT targets the belief systems (e.g., inflated responsibility) and misinterpretations that contribute to the maintenance of OCD. Throughout treatment, patients are educated about their most relevant belief domains and taught to modify maladaptive thinking patterns. Additionally, patients are asked to engage in brief behavioral experiments that test the validity of their obsessive beliefs; however, no systematic prolonged exposures are conducted (Wilhelm & Steketee, 2006). Wilhelm and Steketee's 24-week CT for OCD significantly reduced obsessive beliefs as well as OCD and depression severity in an open trial (Wilhelm et al., 2005), and when compared to a waitlist control group (Wilhelm, Steketee, Fama, Buhlmann, Teachman, & Golan, 2009).

While Wilhelm and Steketee's (2005; 2009) trials demonstrated that CT yields a short-and long-term effect on obsessive beliefs and OCD severity, the processes that led to symptomatic reduction are unknown. Investigating the mechanisms of change can highlight *why* the treatment worked and inform how interventions can be tailored to emphasize the relevant processes (Johannsen & Høglend, 2007). Indeed, much research in the depressive (for a review, see Garratt, Ingram, Rand, & Sawalani, 2007) and anxiety disorders (e.g., Hofmann et al., 2007; Teachman, Marker, & Smith-Janik, 2008) has found that changes in cognitions and appraisals precede reductions in measures of symptom severity.

Recent research into the mechanisms of change in CT for OCD has examined the role of maladaptive beliefs, but has yielded inconclusive results. Woody, Whittal, and McLean (2011) found that changes in maladaptive beliefs accounted for a significant reduction in OCD symptom severity, but their proposed mediator (Obsessive Belief Questionnaire, OBQ; Obsessive Compulsive Cognitions Working Group [OCCWG], 2003) and outcome measure (Yale-Brown Obsessive Compulsive Scale, Y-BOCS; Goodman et al., 1989) were administered concurrently and only at baseline and post-treatment. As such, the researchers indicated that they were unable to establish temporal precedence. Consequently, in addition to the primary outcome measures listed above, Woody and colleagues analyzed the Personal Significance Scale (Rachman, 2001; most similar to the Importance/Control subscale of the OBQ) and the Obsessional Activity Questionnaire (Woody et al., 2011; measure of OC severity), which were administered prior to every session. Contradicting their findings with their primary measures, bivariate dual change score (BDCS) analyses indicated that the severity of obsessional symptoms accounted for changes in appraisals of personal significance. Thus, this study raised the question of whether changes in appraisals mediate symptom severity or vice versa.

Most recently, Olatunji and colleagues (2013) examined how an inflated sense of responsibility mediated treatment response in CT for OCD. They administered their primary mediator, the Salkovskis Responsibility Scale (SRS; Bouvard et al., 2001), and outcome measure (Y-BOCS) at baseline and at weeks 4, 16 (post-treatment), 26, and 52. While the researchers did not conduct session-by-session assessments, their use of a time lag permitted a test for temporal precedence. Results indicated that a reduction in beliefs related to exaggerated responsibility did not significantly mediate changes in OCD symptom severity.

Given the findings from these two investigations, future research is needed to clarify the role of responsibility in CT for OCD, as well as more thoroughly assess whether other types of obsessive beliefs (e.g., perfectionism), when measured frequently throughout treatment, mediate response. Therefore, the primary aim of the present study was to comprehensively examine whether three empirically supported types of obsessive beliefs (perfectionism/ certainty, importance/control of thoughts, responsibility/threat estimation; OCCWG, 2005) operate as mechanisms of change in CT for OCD, by analyzing changes in these constructs throughout treatment. Given that cognitive mediation of symptom improvement has been demonstrated in both depression and anxiety disorders, we hypothesize that changes in obsessional beliefs will lead to a reduction in OCD symptom severity.

We also examined whether other cognitive structures, such as early maladaptive schemas (EMS), mediate treatment outcome. These pervasive core beliefs organize information about oneself, others, and the environment (Beck & Freeman, 1990; Young et al., 2003). EMS's are constructed during childhood and adolescence as a result of unmet emotional needs (e.g., impaired autonomy) and function as a template for the processing of relevant information. These deeper-level beliefs (e.g., unrelenting standards) give rise to higher-level assumptions and appraisals (e.g., If I don't do something perfectly, then I am a complete failure; Young et al., 2003). Consistent with schema therapy (Young, Klosko, & Weishaar, 2003), modification of EMS's through CT can lead to changes in higher-level appraisals and potentiate one's response to treatment (Haaland et al., 2011).

While no research has examined how one's EMS profile mediates treatment outcome for OCD, other studies have examined the schema activation pattern of patients with OCD and how EMS's predict outcome in ERP. Results demonstrated that OCD patients show significantly elevated EMS profiles compared to those with other comorbid conditions (e.g., trichotillomania; Lochner et al., 2005) or a control sample (Atalay, Atalay, Karahan, & Çaliskan, 2008). Moreover, Haaland and colleagues (2011) found that during ERP, the only EMS which predicted symptom improvement at post-treatment was improvement in the failure schema. Integrating research on schema activation patterns in OCD patients, we hypothesize that EMS's will operate as a distinct mechanism of change in CT for OCD, such that reductions in underlying schemas will predict a reduction in OCD symptom severity later in treatment.

The present study aims to clarify the role of obsessive beliefs as a mechanism of change in CT for OCD and investigate how underlying maladaptive schemas influence treatment response. Specifically, we examined whether ratings of obsessive beliefs and maladaptive schemas predict the rate of change in Y-BOCS during and post-treatment. Our study

represents the first to not only examine the mediating role of maladaptive schemas, but to also administer a comprehensive measure of obsessive beliefs more frequently, facilitating examination of the potential mediator's temporal precedence.

Methods

Participants

We analyzed data from adults who participated in either an open (n=10) or waitlist controlled trial (WCT; n=29) for CT for OCD (see Wilhelm et al., 2005; 2009). The study protocols were approved by institutional review committees at participating institutions, and all participants provided written informed consent. Eligible participants were 18 years of age or older, met diagnostic criteria for OCD, and had a Y-BOCS score greater than 16 (indicating clinically significant OCD symptoms). Exclusion criteria for both studies included: a diagnosis of Tourette's syndrome, severe cognitive dysfunction, mental retardation, dementia, brain damage, or symptoms requiring psychiatric hospitalization. Additionally, participants were excluded if they concurrently participated in psychotherapy, had received CT for OCD, or had received at least 10 sessions of behavior therapy for OCD. Patients in the WCT were permitted to be on a stable dosage of psychiatric medications (i.e., remain at the same dose for 2 months before and throughout the study), but the open trial excluded patients who received pharmacotherapy.

As had been done previously with this population (Steketee, Siev, Fama, Keshaviah, Chosak, & Wilhelm, 2011), we combined the two samples to increase power. Adults in the two trials were similar in most respects, differing only in that participants in the WCT had less co-morbidity and greater use of psychiatric medications at baseline compared to those in the open trial. Three patients in the WCT who dropped out immediately after baseline before receiving any treatment were excluded. Thirty-six patients comprised the final analysis population, all of whom completed at least one assessment visit. Thirty-two (89%) completed at least two assessments, 29 (81%) completed at least three assessments, and 26 patients (72%) completed all four scheduled on-treatment assessments.

In addition to OCD, a little less than 50% ($n = 16$) of the sample met diagnostic criteria for a current Axis I disorder. Comorbid conditions included major depressive disorder ($n = 10$), social phobia ($n = 4$), generalized anxiety disorder ($n = 4$), specific phobia ($n = 4$), body dysmorphic disorder ($n = 2$), dysthymia ($n = 2$), binge eating disorder ($n = 2$), and panic disorder ($n = 1$). Regarding OC symptomology, patients reported the following at baseline: contamination, aggressive, somatic, religious, sexual, and superstitious obsessions and washing/cleaning, checking, hoarding, ordering, superstitious, and miscellaneous compulsions (e.g., list making).

Measures

Participants enrolled in the open trial were administered the following measures, excluding the Structured Clinical Interview for DSM-IV, at weeks 0 (baseline), 4, 12 (mid-treatment), 16, and 24 (post-treatment), whereas participants in the WCT were administered study measures at weeks 0, 6, 12, 18, and 24.

Structured Clinical Interview for DSM-IV— Patient Version (SCID; First, Spitzer, Gibbon, & Williams, 1995)—The SCID is a semi-structured diagnostic clinical interview conducted at the screening visit that evaluates Axis I psychiatric diagnoses; doctoral-level clinicians completed the SCID prior to treatment initiation. Inter-rater reliability in the present study for OCD diagnosis was extremely high (kappa = 1.00; Wilhelm et al., 2009).

Yale-Brown Obsessive Compulsive Scale **(Y-BOCS; Goodman et al., 1989)**— The Y-BOCS is a 10-item clinician-administered measure of OCD symptom severity with good psychometric properties. Inter-rater reliability on the Y-BOCS in the present study was high ($r = .97$; Wilhelm et al., 2009).

Obsessive Beliefs Questionnaire **(OBQ; OCCWG, 2005)**—The OBQ is a 44-item self-report measure with three factor analytically derived subscales measuring beliefs about the importance and control of thoughts (ICT), inflated responsibility and threat estimation (RT), and perfectionism and intolerance of uncertainty (PC). Participants in this investigation completed the earlier 87-item version of the OBQ (OCCWG, 2003), which includes all of the 44 items of the shortened version that was analyzed for this study. The OBQ has demonstrated good reliability and validity. In our sample, internal consistency was $\alpha = .91$, .90, and .91 for the ICT, RT, and PC subscales, respectively. The inter-correlations among the subscales were as follows: $r = .29$ between ICT and RT, $r = .31$ between ICT and PC, and $r = .60$ between RT and PC.

Young Schema Questionnaire - Short Form **(YSQ-SF; Young, 2003)**—The YSQ-SF is a 75-item self-report measure that assesses 15 EMS's (e.g., emotional deprivation). For each item, respondents are provided a character concern (e.g., "Almost nothing I do is quite good enough") and asked to rate it on a scale from 1 (does not fit) to 6 (fits perfectly). Higher scores indicate greater severity of the maladaptive schema. The YSQ-SF has demonstrated adequate psychometric properties (Welburn, Coristine, Dagg, Pontefract, & Jordan, 2002).

Data Analytic Plan

All analyses were conducted using the full intent-to-treat (ITT) sample (*N*=36). The primary outcome modeled was the Y-BOCS total score. Candidate covariates included all three subscales of the OBQ and YSQ subscale mean scores. A priori hypotheses, based upon theoretical and empirical findings (Atalay et al., 2008; Haaland et al., 2011; Lochner et al., 2005), guided our selection of the most relevant YSQ subscales to be included in analyses (dependence/incompetence, defectiveness/shame, emotional inhibition, failure to achieve, insufficient self-control, social isolation, unrelenting standards, and vulnerability to harm). YSQ mean scores were used instead of count scores because of minimal variation in count scores for most schemas.

We sought to examine how changes in the covariates over time predicted overall reduction in the Y-BOCS. We conducted a separate set of analyses for the OBQ and YSQ subscales to conserve power. Without an adequate comparison group (since the waitlist lasted only 12

weeks due to ethical reasons), we were unable to conduct traditional mediation analyses. Instead, we utilized a random effects regression model with a random intercept, random slope for time, and a time-varying change in the covariate from one visit to another. To strengthen the case for causality, we lagged the time-varying covariate, examining changes that occurred between the assessment period prior to when the outcome was measured. Specifically, the change in the covariate between week 0 and 4/6 predicted week 12 Y-BOCS, the change between week 4/6 and 12 predicted the week 16/18 Y-BOCS, and the change between week 12 and 16/18 predicted week 24 Y-BOCS. The length of the lag was chosen based on the expected latency for the covariates to affect symptom severity. In other words, we did not expect that improvement in the covariate would translate to immediate reduction in symptom severity, but would be observable at the next assessment (4-6 weeks later).

Missing Data and Tests of Assumptions

Though the potential for missing data was high, the longitudinal mixed effects models utilized are robust to data that are *missing at random* (i.e., depend on prior observed assessments; Little, 1995). Moreover, to reduce missing data for total scores, we applied mean imputation to individual scale items when fewer than 10% of items were unanswered. The assumption of linearity of the relationship between the Y-BOCS and each covariate was tested, but was not defensible for most covariates. We therefore chose to dichotomize using a median split (above vs. at/below the median), rather than include terms for quadratic effects or tertiles, mainly to conserve power in this small sample (i.e., by estimating a single parameter rather than two parameters simultaneously). Conditional residuals were examined to ensure adequate model fit. No structure was imposed on the covariance matrix to specify how values over time were correlated (i.e., an unstructured covariance matrix was fit). To ensure that important covariates were not overlooked in this exploratory analysis, and because a universal hypothesis was not present, no adjustments were made for multiple comparisons; Rothman, 1990).

Results

Demographic characteristics of the total sample (*N*=36) are summarized in Table 1, and Table 2 summarizes the outcome and covariates analyzed. A total of 28 of the 36 patients analyzed were considered to be treatment completers (i.e., received at least 18 of the 22 CT sessions). Among the 8 patients who terminated treatment early, the mean number of sessions received was 10.6 and ranged from 6 to 17. Patients reported moderate to severe OCD symptoms at baseline, as measured by the Y-BOCS total. Baseline scores on the OBQ were clinically elevated and consistent with moderately severe OCD samples (OCCWG; 2003; 2005). Additionally, many of the YSQ schemas were elevated, and the unrelenting standards schema was endorsed to a greater degree than any other EMS.

Across all patients, the Y-BOCS total score decreased by an average of 13.9 points (*p*<0.0001) from baseline to the last treatment assessment, and by an average of 5.6 points (*p*<0.0001) from week 12 onwards; the assumption of a linear decrease over time was reasonable. Table 3 summarizes the results for the change in lagged time-varying covariates

examined as mechanisms of change in Y-BOCS total score during treatment. Over time, patients with a reduction in OBQ-PC from the immediately preceding assessment that was above the median reduction of 6 points had a 2.1-point greater decrease in Y-BOCS total score (95% CI = [0.02, 4.2] point decrease) between weeks 12 and 24, on average, than patients with a reduction below the median (between weeks 12 and 24, the mean decrease in Y-BOCS total score was 8.0 points vs. 5.9 points for patients with an OBQ PC change >6 vs. 6 points, respectively). The corresponding effect size for the effect of the OBQ PC on the magnitude of Y-BOCS reduction was $d = 0.77$ (Thalheimer & Cook, 2002). Neither the OBQ ICT nor RT subscales emerged as significant mediators of treatment response.

For the YSQ, patients with a decremented or stable YSQ Dependence/Incompetence (DI) mean score from the immediately preceding assessment had a 2.1-point greater reduction in Y-BOCS total score (95% CI = [0.14, 4.0] point decrease) between weeks 12 and 24, on average, than patients with an increased YSQ DI mean score (between weeks 12 and 24, the mean decrease in Y-BOCS total score was 7.1 points vs. 5.0 points for patients with a YSQ DI mean change > vs. 0 points, respectively). The corresponding effect size for the effect of the YSQ DI on Y-BOCS reduction was $d = 0.82$ (Thalheimer & Cook, 2002). No other YSQ subscale mean scores emerged as significant mediators of treatment response.

Discussion

The present study examined whether obsessive beliefs operated as a mechanism of change in a 24-week CT for OCD treatment trial and explored how underlying maladaptive schemas influenced treatment response. Results indicated that a reduction in certain beliefs and schemas over the course of treatment – specifically perfectionism/certainty and dependency/ incompetence – was associated with greater improvement in OCD symptoms over time. While the amount of change predicted by these cognitive variables was modest, the observed 2-point change on the Y-BOCS represented 16% of the overall change in OCD symptom severity.

Longitudinal results for the time-lagged prediction of change with treatment indicated that a reduction in perfectionism and certainty beliefs, but not inflated responsibility or importance of/need to control thoughts, significantly mediated (improved) treatment response. Individuals with perfectionism and certainty beliefs tend to maintain rigid and unrealistic standards related to success and have significant difficulty tolerating uncertainty (Frost, Marten, Lahart, & Rosenblate, 1990). To our knowledge, the present study is the first to demonstrate the mediating role of this belief system in symptom reduction.

Past research suggests that the beneficial effect on treatment response of reducing beliefs about perfectionism and certainty may be explained by the complex interplay with other obsessive beliefs (OCCWG, 2005; Taylor et al., 2010). Experimental manipulations have demonstrated that perfectionism beliefs predispose individuals to other types of cognitive distortions (e.g., overestimated responsibility; Bouchard, Rhéaume, & Ladouceur, 1999). Given that obsessive beliefs do not occur in isolation, a reduction in perfectionism and certainty beliefs might consequently reduce other beliefs and subsequently weaken the urge

to engage in rituals; in essence, via a cascade of interrelated cognitive changes, behavioral modification occurs.

EMS's related to dependency and incompetence were also found to significantly mediate response. More specifically, a decrease in dependency on others, and an increase in autonomy, confidence, and self-reliance, accounted for reductions in OCD severity. Although we were surprised that other strongly present maladaptive schemas in our sample (especially unrelenting standards) did not emerge as significant mediators, the influence of the dependency/incompetence schema on treatment response can be understood through the lens of self-efficacy (i.e., belief that one can complete goal-related behaviors that lead to a desired outcome; Bandura, 1977). Bandura (1986) argued that strengthening self-efficacy could mitigate fear and improve treatment response, and numerous studies have demonstrated that self-efficacy influences mechanisms of change in CBT (Bouchard et al., 2007) and predicts behavioral change following therapy (e.g., Casey, Oei, & Newcombe, 2005; Zoellner, Echiverri, & Craske, 2000). In line with this theory, increased self-efficacy may directly reduce the urge to engage in compulsive rituals. Perceiving oneself as more autonomous would diminish the need to rely upon others for a sense of certainty (e.g., reassurance seeking) or for completing tasks of daily living that are impaired by OCD (e.g., driving). The modification of this EMS may then improve one's ability to independently tackle anxiety-provoking situations and reduce the need for accommodation by loved ones, thereby reducing OCD severity.

A number of caveats should be mentioned in the present study. First, the analyses were conducted on a relatively small, homogeneous sample. Consequently, our findings may not be fully generalizable, and should be considered exploratory and used as guidance for future trials. Likewise, characteristics identified as significant predictors should be further studied in larger trials to confirm that significance was not spurious (e.g., due to multiple comparisons in a small sample). A larger sample size would also (a) provide increased power to examine the precise shape of the relationship between the predictors and treatment response by analyzing tertiles or quartiles, or incorporating quadratic terms, rather than the simple median split employed because linearity was not upheld and (b) permit an examination of the relationship between patients' targeted belief domain(s) (e.g., exaggerated responsibility), presenting OCD symptom (e.g., contamination), and subsequent changes in their Y-BOCS severity score.

Additionally, given the lack of a control group throughout the duration of CT (for ethical reasons, the WCT utilized a 12-week waitlist only), we cannot conclude that improvements observed during treatment were attributable to CT and not due to a placebo effect, the passage of time, increased attention during the trial, or other unobserved confounding factors. Also, changes in depression during CT may have mediated response (e.g., Olatunji et al., 2013). Given our relatively small sample size and that we were unable to conduct a typical mediation analysis because there was no control group, we recommend future researchers evaluate this possible mechanism by including depression symptom severity throughout treatment as a time-varying covariate.

Moreover, 84% of variance in Y-BOCS scores was unexplained by the mechanisms of action, highlighting the importance of studying other factors that predict symptom improvement in CT for OCD. Future research should include empirically-supported mediators from both the OCD (comorbidity; Olatunji et al., 2013) and CT (dysfunctional attitudes; Garratt et al., 2007) literature. Lastly, in order to establish temporal precedence and strengthen the case for causality, our analysis examined mechanisms of change occurring only in the middle and later phases of therapy. Accordingly our study does not elucidate potential mechanisms of response in the early phase of treatment. A future study examining mechanisms of response in a larger sample with more frequent measurements would permit examination of early phase improvement in CT for OCD.

Taken together, our results suggest that cognitive changes precede behavioral symptom reduction in CT for OCD; however, the cognitive features that accounted for symptomatic change in this study were specific, rather than broad. Identifying the specific cognitive processes that lead to behavioral change aligns with the scope of NIMH's experimental therapeutics program. This research program aims to identify the clinical dimensions associated with psychopathology, and subsequently develop and evaluate the efficacy of individualized interventions that target these dimensions. To this end, detecting the mechanisms of action in CT for OCD directly informs the targets that should facilitate maximum improvement and be addressed in future OCD treatments (e.g., interventions targeting schemas related to dependency and incompetence).

Acknowledgments

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- We sought to identify mediators of improvement in cognitive therapy (CT) for OCD.

- Participants included 36 adults with OCD who received CT over 24 weeks.

- Perfectionism and certainty obsessive beliefs improved treatment response.

- Schemas related to dependency significantly mediated improvement in CT.

- Specific cognitive changes precede behavioral symptom reduction in CT for OCD.

Table 1

Demographic Characteristics of 36 Cognitive Therapy Participants with OCD

Characteristic		OCD patients (*N*=36)	
		N	**%**
Sex	Male	19	53%
Race/Ethnicity	Caucasian	34	94%
	Asian	1	3%
	Hispanic	1	3%
Number of Co-morbid Axis I diagnoses	0	20	56%
		5	14%
	2	9	25%
	3	2	6%
Treatment Completion Status	Terminated early	8	22%
	Completed treatment	28	78%

	N	**Mean**	**(SD)**
Age	36	32.7	(10.5)
Treatment Sessions Attended (out of 22 total)	36	18.8	(5.3)

Table 2

Outcome and Covariate Summaries for the Analysis Population

Sample Characteristics	N	Mean	(SD)
Baseline Y-BOCS Total (range: 0-40)	36	26.1	(4.0)
Week 12 (mid-treatment) Y-BOCS Total (range: 0-40)	31	17.6	(7.5)
Week 24 (post-treatment) Y-BOCS Total (range: 0-40)	29	11.6	(8.6)
Baseline OBQ Total (range: 44-308)	36	175.3	(47.8)
Importance/Control of Thoughts (ICT) Subtotal (range: 12-84)	36	44.8	(18.9)
Perfectionism/Certainty (PC) Subtotal (range: 16-112)	36	63.3	(20.1)
Responsibility/Threat Estimation (RT) Subtotal (range: 16-112)	36	67.3	(22.1)
Baseline YSQ Overall Total (range: 75-450)	34	171.8	(43.8)
YSQ Dependence/Incompetence Mean (range: 1-6)	34	1.7	(0.8)
YSQ Defectiveness/Shame Mean (range: 1-6)	32	2.1	(1.2)
YSQ Emotional Inhibition Mean (range: 1-6)	34	1.7	(0.7)
YSQ Failure to Achieve Mean (range: 1-6)	34	2.0	(1.2)
YSQ Insufficient Self-Control/Self-Discipline Mean (range: 1-6)	32	2.3	(1.2)
YSQ Social Isolation Mean (range: 1-6)	33	2.4	(1.2)
YSQ Unrelenting Standards Mean (range: 1-6)	33	4.0	(1.3)
YSQ Vulnerability to Harm & Illness Mean (range: 1-6)	33	2.3	(1.1)

Table 3

Time-varying predictors of Y-BOCS Reduction from Mid- to Post-Treatment

Time-Varying Predictor (Median Split)	Difference in magnitude of change in Y-BOCS total by covariate (> vs. median)		
	β Estimate (Std. Error)[1]	t-Value	*p*-value
Change in Obsessive Beliefs Questionnaire (OBQ)			
Total (> 18 vs. 18)	−1.5 (1.04)	−1.42	0.17
ICT Subtotal (> 5 vs. 5)	0.07 (1.13)	0.06	0.95
PC Subtotal (> 6 vs. 6)	−2.1 (0.98)	−2.13	0.048[*]
RT Subtotal (> 3 vs. 3)	−1.2 (0.90)	−1.36	0.19
Change in Young Schema Questionnaire (YSQ)			
Total (>7 vs. 7)	−1.5 (0.94)	−1.54	0.14
DI Mean (>0 vs. 0)	−2.1 (0.93)	−2.23	0.037[*]
DS Mean (>0 vs. 0)	0.3 (0.93)	0.27	0.79
EI Mean (>0 vs. 0)	0.4 (0.93)	0.39	0.70
FA Mean (>0 vs. 0)	−1.2 (1.06)	−1.14	0.27
IS Mean (>0 vs. 0)	0.3 (0.88)	0.33	0.75
SI Mean (>0 vs. 0)	−1.1 (0.88)	−1.24	0.23
US Mean (>0.4 vs. 0.4)	0.6 (0.99)	0.63	0.54
VH Mean (>0 vs. 0)	−1.0 (0.86)	−1.17	0.26

Std. = Standard; Y-BOCS = Yale-Brown Obsessive Compulsive Scale;

ICT = Importance/Control of Thoughts; PC = Perfectionism/Certainty;

RT = Responsibility/Threat Estimation; DI = Dependence/Incompetence;

DS = Defectiveness/Shame; EI = Emotional Inhibition; FA = Failure to Achieve;

IS = Insufficient Self-Control/Self-Discipline; SI = Social Isolation;

US = Unrelenting Standards; VH = Vulnerability to Harm & Illness

[1] Corresponds to the change in the lagged time-varying covariate

[*] Significant at two-sided alpha=0.05 level.