Running Head: COGNITIVE AND METACOGNITIVE PREDICTORS OF O-C SYMPTOMS

How Well Do Cognitive and Metacognitive Models

Predict Obsessive-Compulsive Symptoms?

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Abstract

The research reported here was designed to expand upon the understanding that cognitive and metacognitive theories each offer explanations for the development of obsessive compulsive disorder (OCD) by contrasting predictions derived from these models. Undergraduate students at the University of North Carolina at Chapel Hill (n=110) completed online surveys to facilitate this study. The Obsessive Beliefs Questionnaire (OBQ-44) was used to measure beliefs and appraisals which are considered to be critical to the etiology of OCD from the cognitive perspective, whereas the Metacognitive Beliefs Questionnaire (MCQ-30) was used to measure beliefs related to monitoring and evaluating thoughts, from the metacognitive perspective. Each of these models has support in that both cognitive and metacognitive beliefs are linked to OC symptoms, but the extent to which the OBQ and MCQ account for various obsessive-compulsive (OC) symptoms had not been compared previously. Partial correlations and hierarchical regression analyses provided a framework through which to compare the utility of these tools in predicting OC symptoms, while holding general distress constant. In final regression models the OBQ significantly predicted OC symptoms related to *responsibility for harm* whereas the MCQ significantly predicted OC symptoms related to *unacceptable thoughts* and *symmetry*. Neither the OBQ nor the MCQ significantly predicted OC *contamination concerns* in this study, however, across regression models the MCQ and OBQ differed in the amount of variance in OC symptoms that they could each explain. These findings demonstrate a lack of overlap between the OBQ (specifically the importance and control of thoughts domain) and the MCQ, as previously suggested. This study offers additional insight into how cognitive and metacognitive models align with various OC symptom domains, and indicates that each model has specific strengths in predicting certain kinds of OC symptoms.

How Well Do Cognitive and Metacognitive Models

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Obsessive Compulsive Disorder

Recognizing that mental disorders can have very salient and severe effects on the lives of the people who experience them is especially important for a disorder like Obsessive Compulsive Disorder (OCD), which is known as one of the most debilitating. Compared to those without the disorder, individuals with OCD report higher rates of functional impairment and impaired quality of life, as well as a greater use of health care services and disability (Huppert, Simpson, Nissenson, Liebowitz, & Foa, 2009). As the name suggests OCD involves unwanted, intrusive thoughts (obsessions) as well as ritualized behaviors (compulsions), each of which influence the other to perpetuate a cycle which can dominate an individual's life as they spend an excessive amount of their time obsessing over and neutralizing their anxiety (Abramowitz, 1997). Four common dimensions of obsessive-compulsive symptoms have been identified: (a) contamination obsessions and decontamination rituals, (b) obsessions about responsibility for causing harm or making mistakes and checking rituals, (c) obsessions about order, completeness or symmetry and ordering/arranging rituals, and (d) obsessional thoughts about sex, religion or violence which an individual finds unacceptable and mental neutralizing rituals (Abramowitz et al., 2010). While particular sorts of obsessions and compulsions tend to co-occur (eg., contamination fears and washing rituals) the presentations that OCD symptoms can take on are heterogeneous and idiosyncratic to an individual's concerns and beliefs (Abramowitz et al., 2010).

A nationally representative survey of US adults found the lifetime prevalence of OCD to be 2.3%, certainly enough to warrant investigation into understanding this condition, but moreover an additional 28.2% of people surveyed reported experiencing obsessions or compulsions in their lives (Ruscio, Stein, Chiu, & Kessler, 2010). The mean age of onset for OCD has been reported as 19.5 years, and the mean number of years reported for the duration of the disorder was 8.9 years within a sample of individuals of whom approximately half were receiving treatment (Rusico et al., 2010). Even when receiving treatment, progress towards eliminating symptoms can be quite slow, as the symptoms of OCD are notoriously resistant to treatment. Considering the level of impairment that a diagnosis of OCD necessitates, the average individual with the disorder is losing a highly valuable portion of lifetime and it should additionally be noted that OCD has also been known to last a lifetime. One reason suggested for the bleakness of this prognosis is an undue delay between onset of symptoms and search for treatment because of fears people may have related to speaking openly about their obsessions and compulsions (Abramowitz, 1997). People with OCD have a high chance of having a comorbid anxiety disorder of another type, or a mood disorder, and in many cases receive treatment that is not specific to OCD (Rusico et al., 2010). These features highlight a need for a better focus on the specific complications of Obsessive Compulsive Disorder in order to develop better, more targeted treatments for this disorder.

Cognitive Perspective

Perhaps the most well studied approach to understanding and treating OCD is the cognitive (or cognitive-behavioral) approach. According to cognitive theory, it is the appraisal of thoughts as threatening which drives normally occurring intrusive thoughts to develop into obsessions (Tolin, Woods, Abramowitz, 2003). Appraisals are interpretations which draw

information both from situational factors as well as enduring, general beliefs one holds that give meaning to thoughts by determining their importance, probability, or relationship to the individual in terms of responsibility (Obsessive Compulsive Cognitions Working Group, 1997). An appraisal of threat, rather than the content of the intrusive thoughts themselves, determines an individual's response. The appraisal of an intrusive thought as threatening produces negative affect, which does not yet present a serious issue on its own; however, an individual with OCD would attempt to get rid of negative affect with compulsive rituals intended to neutralize or prevent the perceived potential for harm.

To illustrate the cognitive model with an example, a person may experience the intrusive thought that they have forgotten to lock the door to their home while they are away, at work. For most individuals, this thought would be regarded as unimportant mental noise and their mind would quickly return to thoughts relevant to the tasks at hand for their job. In cases of OCD, however, the person misperceives that thought as a meaningful indicator for their responsibility to prevent burglary (eg., *"This thought is an omen. Someone is going to break in and it will be my own fault!"*) This individual might attempt to eliminate their concern, and compelling anxiety, by returning home to check that their home is secure. In the short term, this checking behavior will reduce their anxiety but the fact that this individual will associate safety with this checking behavior is counterproductive because they will likely feel the need to address returning anxiety in the same way. Constant checking is neither a realistic option nor a reasonable response. Rituals, such as checking, prevent the individual from learning that the thought itself did not present a threat, and that if experienced again, the thought is unlikely to result in negative outcomes (Tolin, Woods, Abramowitz, 2003).

Researchers have identified particular types of beliefs (i.e., obsessive beliefs) that provide a foundation for negative appraisals of otherwise normal intrusive thoughts (Obsessive Compulsive Cognitions Working Group, 1997). These beliefs have been grouped into three factors: (1) inflated responsibility and the overestimation of the probability/severity of threat, (2) perfectionism and intolerance of uncertainty, and (3) a concern about the importance and need to control one's thoughts (Obsessive Compulsive Cognitions Working Group, 1997). Some cognitive theorists additionally argue that cognitive-affective internal working models, or underlying structures, that stem from early experiences and childhood temperament may present a vulnerability for certain individuals to develop OCD because of maladaptive ways of thinking about the concepts of self, others, and the world (Doron & Kyrios, 2005). These theorists would contend that the cognitive components of OCD are the most important contributors to the etiology of the disorder.

The cognitive model also has implications for the treatment of OCD using cognitive-behavioral therapy by exposure with response prevention (ERP) and cognitive restructuring (i.e., cognitive therapy). ERP aims to reduce OCD symptoms through systematic confrontation with feared stimuli (exposure; e.g., practicing touching the floor) without allowing those experiences to be paired with the rituals that an individual has learned to associate with safety (response prevention; e.g., resisting the urge to wash one's hands) (Abramowitz, 1997). ERP is hypothesized to work by extinguishing anxiety and addressing cognitive distortions that individuals with OCD possess (as described previously) and creating more realistic alternative beliefs (Abramowitz, 1997). In the case of cognitive therapy, change occurs through the means of verbal challenges rather than the actual testing of feared situations through exposure.

Meta-cognitive Perspective

Although the cognitive-behavioral model explains the symptoms of OCD quite well, research shows that there is room for improvement in terms of explanatory models of this condition. Thus, it is worth examining alternative approaches to understanding OCD. The metacognitive model of OCD, for example, focuses on self-awareness and self-management of processes which regulate mental states, skills, memories, and behaviors (Akturk & Sahin, 2011). Metacognitive processes have been conceptualized as occurring before, during, and after the completion of tasks with the purpose of planning, monitoring, and evaluating an individual's performance (Akturk & Sahin, 2011). Cognition, on the other hand, is composed of the processes necessary for the fulfillment of those tasks. Myers, Fisher and Wells (2009) have proposed that metacognitions about the meaning and power of thoughts, as well as metacognitive beliefs about rituals are specifically related to the etiology of OCD. An important type of metacognition theorized to be related to obsessive-compulsive symptoms has been described as fusion beliefs, which can be of three varieties depending upon what is being fused: thoughts and actions, thoughts and events, or thoughts and objects (Myers, Fisher & Wells, 2009).

In each of the three cases of fusion beliefs, an individual equates an intrusive thought that they have had with an action, event or object. For instance, one could hold the belief that if they think about harming their spouse, they are going to go through with that action in the future. According to Myers et al., (2009) fusion beliefs are activated by intrusive thoughts and lead to appraisals of those thoughts as threatening, a condition which is central to the etiology and maintenance of OCD. In a causal chain proposed by Myers et al., (2009), negative appraisals of thoughts activate subsequent metacognitive beliefs about rituals. These beliefs guide the actions of individuals who seek an experience that matches their beliefs about when they can end a ritual, sometimes called a stop signal. So, in the case of an individual who fears hurting their

spouse, the appraisal of that thought as threatening would lead them to carry out rituals meant to protect their spouse from harm until they reach their personal and subjective mark of assured safety.

The metacognitive model provides an alternative to cognitive therapies, with a specialized approach to treatment that involves a specific focus on higher order thinking processes. Metacognitive therapy (MCT) depends wholly on modifying metacognitive mental processes such as beliefs one holds about the power of thoughts; MCT makes no attempt to make changes in other belief domains (i.e., inflated responsibility, intolerance of uncertainty) (Fisher &Wells, 2008). MCT occurs by increasing awareness of metacognitive beliefs in order to replace rituals and internal criteria that guide rituals with more adaptive coping methods through detached mindfulness and verbal reattribution (Fisher & Wells, 2008). Detached mindfulness is a mental practice in which an individual carries out very little conceptual processing or redirection/control of their thoughts but maintains high awareness of their thoughts, allowing them to process their thoughts without engaging in worrying (Wells, 2005). Due to the approach that metacognitive therapy takes on OCD, treatment does not involve exposure in the way that ERP does and instead aims to create an adaptive plan to process obsessive and compulsive thoughts, regardless of their contents.

Prior Research

Assessment tools based on each of the theoretical perspectives mentioned above have been developed to measure the beliefs, strategies, and behaviors thought to be associated with OCD from their respective model. From the cognitive perspective, the Obsessive Beliefs Questionnaire (OBQ) has been developed and revised by the Obsessive Compulsive Cognitions Working Group (1997) to measure three domains of obsessive beliefs: (1)

responsibility/overestimation of threat, (2) perfectionism/intolerance of uncertainty, and (3)

concern over controlling/importance of one's thoughts. Similarly, the metacognitions

questionnaire (MCQ) was constructed by Cartwright-Hatton & Wells (1997) to measure

metacognitive beliefs, judgements and monitoring tendencies consistent with the metacognitive

model. The MCQ has also undergone a revision process, but retains a five factor structure

measuring: (1) positive beliefs about worry, (2) negative beliefs about uncontrollability of

thoughts, (3) cognitive confidence, (4) negative beliefs about the consequences of not controlling

thoughts, and (5) cognitive self-consciousness (Wells & Cartwright-Hatton, 2004).

      Research using the measures described above demonstrates that both the cognitive and

the metacognitive theories can account for OCD symptoms (e.g., Gwilliam, Wells, and

Cartwright-Hatton, 2004; OCCWG, 1997). Nevertheless, a debate has arisen over which model

accounts for greater variability in OCD symptoms. Gwilliam, Wells, and Cartwright-Hatton

(2004) suggested that obsessive beliefs (e.g., inflated responsibility) are merely byproducts of

metacognitive beliefs. In a study investigating this issue, Hansmeier, Exner, Rief, and

Glombiewski (2016) conducted regression analyses using the MCQ and OBQ to predict OCD

symptoms. Indeed, they found that metacognitions explained incremental variance in obsessive-

compulsive symptoms while controlling for obsessive beliefs. However, in their original

analyses these authors did not include the importance/control of thoughts subscale of the OBQ in

their analyses. Specifically, they argued that this factor overlapped with the MCQ (Hansmeier,

Exner, Rief, & Glombiewski, 2016). The two factors analyzed from the OBQ did not fully

represent how the cognitive model explains OCD and this systematically reduces the explanatory

value of the cognitive model. Because of this omission one cannot draw the conclusion that the

meta-cognitive model is the stronger predictor of OCD symptoms and the question remains to be properly addressed.

The Present Study

In order to best understand, assess and treat OCD it would be very helpful to know the extent to which the metacognitive model accounts for the various OC symptom dimensions above and beyond what is accounted for by the traditional cognitive model. Accordingly, we conducted a set of four regression analyses in which the dependent variable is a different obsessive-compulsive symptom domain (i.e., contamination, symmetry, unacceptable thoughts, responsibility for harm), and the following independent variables were entered hierarchically: in step 1, we included a measure of general distress. In step 2, we added a measure of the three domains of obsessive beliefs (i.e., the OBQ). In step 3, we added a measure of metacognitive beliefs (i.e., the MCQ). On the basis of previous research strongly supporting the cognitive model (Abramowitz, Taylor, & McKay, 2009), we hypothesized that obsessive beliefs would significantly predict OC symptoms above and beyond general distress, and remain as significant individual predictors even after accounting for metacognitive beliefs in step 3. On the basis of a previously demonstrated association between metacognitive beliefs and OC symptoms, (Hansmeier, Exner, Rief, & Glombiewski, 2016; Gwilliam, Wells, and Cartwright-Hatton, 2004), it was also hypothesized that the inclusion of metacognitive beliefs (i.e., the MCQ) in step 3 would add some additional explanation of OC symptom variability.

Method

Participants

Participants in this study were recruited from a voluntary participant pool of students currently enrolled in an introductory psychology course at the University of North Carolina-

Chapel Hill. Students chose to complete an online survey in exchange for one hour of credit towards a research requirement in the course. In total, 176 students accessed the surveys in the experiment. Not all students chose to respond to the survey and those who did not view one hundred percent of the survey items were removed from our analysis. Additionally, several attentional checks were included in the survey to ensure credibility of responses (eg. "Please select applied to me very much") and failure to respond appropriately to these items led us to remove participants' data from our analysis. Failure to respond appropriately or to view the surveys in their entirety led to the removal of 66 participants, leaving 110 remaining participants whose data were used for analyses. Of these 110 participants, 68 were female (61.8%) and 42 were male (38.2%). Participants were ages 17-25 with a mean age of 18.72 (SD = 1.08). Demographic information about race was also collected; 77 individuals indicated themselves as White (70%), 12 individuals as African American or Black (10.9%), 11 individuals as Asian (10%), 8 individuals as Multiracial (7.3%) and 2 individuals chose the response option for other racial group and provided the responses of "Hispanic" and "Latinx" (1.8%).

Measures

Participants completed an online battery containing the following four self-report assessment tools.

The **Depression, Anxiety and Stress Scale** (DASS-21; S.H. Lovibond & P.F. Lovibond, 1995) was chosen to measure general distress. It contains 21 items that are rated on a scale from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time). One question from this measure, for instance, asked participants to rate the statement "I felt scared without any good reason" on the aforementioned scale. This measure is composed of three sub-scales—for depression, anxiety, and stress each of which has been psychometrically validated in both

clinical and community samples (Antony, Bieling, Cox., Enns, & Swinson, 1998). In the present

sample, the DASS had a Cronbach's Alpha of .94.

The **Dimensional Obsessive-Compulsive Scale** (DOCS; Abramowitz, et al., 2010)

measured four different domains of OCD. The complete scale is composed of 20 items with four

subscales covering themes of: contamination, symmetry, unacceptable thoughts, and

responsibility for harm. Each of the four scales of the DOCS served as a dependent variable in

this study, allowing us to measure obsessive-compulsive symptoms in diagnostically specific

manner. For example, the section corresponding to contamination included "About how much

time have you spent each day thinking about contamination and engaging in washing or cleaning

behaviors because of contamination?" with instructions that this should be answered in relation

to the past month and with response options that varied from 0 (none at all) to 4 (8 hours or more

each day). Other items were also scored from 0-4, and asked about avoidance, distress,

disruption, and difficulty disregarding thoughts. In the present sample, the DOCS had a

Cronbach's Alpha of .88.

The **Obsessive Beliefs Questionnaire** (OBQ-44; Obsessive Compulsive Cognitions

Working Group, 1997) is an assessment tool that came out of the cognitive perspective and

measures beliefs and appraisals considered to be critical to the development of obsessive-

compulsive symptoms (Obsessive Compulsive Cognitions Working Group, 2005). The 44 items

on this scale asked the extent to which participants agreed with statements containing beliefs,

such as "I often think things around me are unsafe." Responses to the items on the OBQ-44 are

scored on a scale ranging from 1 (disagree very much) to 7 (agree very much). Statements are

organized into three belief domains: responsibility and threat estimation, perfectionism and

certainty, and the importance of and control of thoughts. The group that created the OBQ-44

found that it showed good internal consistency and criterion-related validity in clinical and non-clinical samples (Obsessive Compulsive Cognitions Working Group, 2005). In the present sample, the OBQ had a Cronbach's Alpha of .94.

The **Metacognitive Beliefs Questionnaire** (MCQ-30; Wells, & Cartwright-Hatton, 2004) followed a similar format to the OBQ-44 but differs in that it is designed to measure beliefs related to monitoring and evaluating thoughts which are considered important in the metacognitive model. The MCQ-30 is composed of 30 items organized into five domains: positive beliefs about worry, negative beliefs about uncontrollability and danger of worry, cognitive confidence, need for control, and cognitive self-consciousness. As an example, one item from the need for control domain reads, "If I could not control my thoughts, I would not be able to function". Items received ratings on a scale from 1 (do not agree) to 4 (agree very much). The authors of this measure have found good internal consistency and convergent validity (Wells, & Cartwright-Hatton, 2004). In the present sample, the MCQ had a Cronbach's Alpha of .90.

Procedure

Participants chose to complete this survey through the University of North Carolina at Chapel Hill undergraduate psychology research portal (SONA). Each student created a private account in order to participate in research studies as a part of their PSYC101 course. After selecting this study on SONA the student participants were redirected to a survey administered through Qualtrics, which was used for all data collection in this study. A consent form was displayed first, and if an individual did not provide consent at the bottom of the first page they were redirected to another webpage, ending the survey. The self-report measures were presented in random order to participants for completion. Several attentional check items were added to

these measures in order to check for accuracy and ensure that participants fully read items. One of these was the statement "I have suffered from a fatal heart attack" embedded within a section that asked participants to rate their agreement with different items. Demographic questions came at the end of the survey for all participants, to prevent these items from influencing responses to other parts of the survey. This section asked participants to report their age, gender, race, and ethnicity. Participants were then presented with a debriefing page containing further details about the purpose of the study, and lastly, credit was awarded on their SONA accounts for their PSYC 101 course. Statistical analyses were carried out using SPSS version 24.

Results

Descriptive Statistics

Mean scores were calculated from participants' responses on each of the study measures; these are shown in Table 1. As can be seen, the mean scores were well within the expected range for a non-treatment-seeking sample of students.

Partial correlations were calculated between measures of cognitive beliefs (OBQ), metacognitive beliefs (MCQ) and obsessive-compulsive symptoms (DOCS), controlling for general distress (DASS) in order to better assess the relationship between these beliefs and obsessive-compulsive concerns. Table 2 shows these partial correlations; as can be seen, all variables were positively correlated with one another and correlations ranged from weak to moderately strong. Only some subscales of the DOCS were significantly correlated with one another or with the OBQ or with the MCQ.

Regression Analyses

Four hierarchical regressions testing our hypotheses were run in order to examine the relative contributions of the DASS, OBQ, and MCQ in predicting each of the four OC symptom

dimensions (the DOCS subscales). For each of these regressions, the first step involved entering the DASS as a measure of general distress. In the second step, the OBQ was added to account for the contributions of obsessive beliefs. In the third and final step, the MCQ was added to measure the contributions of metacognitive beliefs. Table 3 shows the summary statistics for each of the four regressions.

Contamination Subscale. When a hierarchical regression with the predictor variables mentioned above was conducted the DASS accounted for 2% of variance in DOCS contamination scores in step 1, which was not significant ($p < .05$). Addition of the OBQ in the second step accounted for 2% of additional variance, again not significant. In the third step, adding the MCQ explained only 1% more variability, which was not significant. Overall, the model accounted for 5.3% of variance in contamination symptoms, $F(3, 103) = 1.93$, $p = .13$. None of the variables in the model emerged as statistically significant independent predictors.

Responsibility Subscale. Within the first step of this regression, the DASS accounted for 11% of variance in DOCS symptoms within this domain, which was significant ($p < .01$). Addition of the OBQ in step 2 explained additional significant variance (9.6%). When the MCQ was added in step 3, it explained less than 1% of additional variance. Overall, the regression model accounted for 20.9% of variance in symptoms related to responsibility for harm, $F(3, 102) = 8.96$, $p < .001$. In the final model, only the OBQ emerged as a significant individual predictor of DOCS responsibility scores.

Unacceptable Thoughts Subscale. The DASS, in step 1, explained 17% of variance in symptoms, which was significant ($p < .01$). Addition of the OBQ accounted for 4% of additional variance. The contributions of the OBQ were significant in step 2, ($p < .05$). The MCQ explained an additional 13% of variance in symptoms regarding unacceptable thoughts, which was

significant ($p < .01$). The complete regression model accounted for 34.7% of variance in symptoms in this domain of the DOCS, $F(3, 102) = 18.05$, $p <.001$, with only the MCQ emerging as significant individual predictor.

Symmetry Subscale. In step 1, the DASS explained 4% of symptom variance, which was statistically significant ($p < .05$). Addition of the OBQ accounted for no additional variance in symptoms. The MCQ's addition provided an explanation for 9% of additional symptom variance, which was of statistical significance. Overall, this model accounted for 13.2% of variance in symptoms, $F(3, 102) = 5.18$, $p <.01$, and only the MCQ remained as a significant individual predictor.

Discussion

The research reported here was designed to expand upon the understanding that cognitive and metacognitive theories each offer explanations for the development of OCD by contrasting predictions derived from these models. While both perspectives have been individually linked to some extent with OCD, recent debate has arisen in an attempt to better understand how these two perspectives might operate in relation to one another. A more complete understanding of OCD may come from increasing research through the lens of these perspectives; however, given the similarity between certain aspects of each perspective's explanation of OCD, it would be useful to first address the ways in which each perspective uniquely accounts for OC symptoms.

It is the cognitive (or cognitive-behavioral) view that certain beliefs give meaning to thoughts through a process known as appraisal. During the appraisal of thoughts, obsessive beliefs lead an individual to understand and respond to a particular stimuli in a way characteristic of OCD (Obsessive Compulsive Cognitions Working Group, 1997). Responses take the form of compulsive rituals, meant to diminish the experience of anxiety, though more often producing

greater distress and functional impairment over time. Alternatively, the metacognitive perspective states that beliefs about the power or meaning of an individual's thoughts can produce maladaptive appraisals or lead an individual to maintain faulty beliefs relevant to OCD. Although the metacognitive perspective provides a connection to the cognitive process by suggesting that meta-beliefs might influence the use of cognitive beliefs, it has also been suggested that metacognitive beliefs bear a great deal of similarity to the importance/control of thoughts subscale of the OBQ. A lack of understanding of the degree to which these two domains might overlap in regard to symptom explanation has limited discussions of their theoretical similarity and relationship.

Administering reliable assessment tools (i.e., the OBQ-44 and the MCQ-30) from each of the two perspectives alongside one another allows for the possibility of potential overlap between these two models to be calculated. Additionally, evaluating the contributions of each of these assessment tools within the same sample of participants can reveal their relative predictive capacities. Inclusion of the DASS-21 in analyses provided an important means of controlling for more general experiences of anxiety and distress, which otherwise may have detracted from the specificity of the regression models for OCD. The DOCS was also chosen in order to enhance the specificity of our models, as the DOCS measures OCD symptoms along four diagnostically relevant subscales which makes it possible to distinguish the contributions of the predictors for different types of OC symptoms.

Although the cognitive model has previously been regarded as one of the best explanations for OCD and has influenced the gold-standard for treating OCD, mixed support was provided by the regression analyses for obsessive beliefs (i.e., the OBQ) as significant predictors of OC symptoms above and beyond general distress and metacognitive beliefs. Only for the

responsibility for harm subscale of the DOCS was the OBQ a significant individual predictor in the complete regression model, consistent with our hypothesis. This finding may be due to a very close, potentially cyclic, relationship between beliefs about perceived responsibility and the presence of concerns over responsibility for harm as a symptom of OC psychopathology. The correlation between the OBQ (measuring inflated responsibility) and the DOCS subscale for responsibility for harm was among the highest correlations found in this study. For the regression model for the DOCS unacceptable thoughts subscale, the OBQ significantly predicted scores within this domain until the MCQ was added in the third step. This finding may indicate that the previously understood predictive power of the OBQ for OC symptoms related to unacceptable thoughts may have actually relied on the detection of certain metacognitive beliefs, most likely through the importance/control of thoughts domain of the OBQ.

Greater support emerged for metacognitive beliefs (i.e., the MCQ) as predictors of OC symptom variability. For three subscales of the DOCS— contamination, unacceptable thoughts and symmetry— additional explanations of variance were added when the MCQ was entered in each final step. For both the unacceptable thoughts subscale and the symmetry subscale of the DOCS these additional contributions were significant after accounting for general distress and cognitive beliefs. These findings indicate that metacognitive beliefs may have more relevance than cognitive beliefs for predicting OC symptoms related to unacceptable thoughts and symmetry. It should be noted that the DOCS domain referred to in this paper as "symmetry" also measures behaviors such as senseless counting and ordering, repeating routine actions until satisfied with exactness and searching for a "just right" feeling. It would seem that the MCQ is especially well suited for predicting OC symptoms which are dependent upon particularly subjective criteria, in that the motivations for and rationale behind avoiding bad thoughts or

feeling "just right" might involve more idiosyncratic judgements/internal information for appraisal than does avoiding harm or contamination.

With regard to the relative contributions of the OBQ and MCQ and the potential for overlap between belief domains, the differences in explanations of variance that appeared in the hierarchical regression models conducted in this study provide evidence against a complete overlap. It has been proposed that the importance and control of thoughts domain of the OBQ measures similar beliefs as does the MCQ; however, these two models differed in their ability to predict OC symptoms within regression models where both factors were included which suggests they contribute to explaining variance in symptoms separately (Hansmeier, Exner, Rief, & Glombiewski, 2016). Although in the case of the unacceptable thoughts subscale of the DOCS some overlap between the OBQ and MCQ seems possible (discussed above), for other domains of the DOCS the contributions of these models are quite different. In fact, the metacognitive model added significant additional explanations of variance for the symmetry subscale of the DOCS when the OBQ did not. Together, these findings indicate that the MCQ may be quite useful for measuring beliefs that can trigger the misperception of threat from the occurrence of intrusive thoughts; however, this model is most useful for predicting OC symptoms related to unacceptable thoughts and symmetry whereas the cognitive model best predicts OC symptoms related to responsibility for harm.

Finally, the fact that none of the predictors included in our regression models significantly predicted OC symptoms related to contamination concerns in this study should be addressed. Despite the fact that contamination concerns were reported equally as often as symptoms within other domains of the DOCS, neither meta/cognitive beliefs nor general distress explained their occurrence. As such, these findings add to previous research highlighting the

need for continued research into the factors which may contribute to this presentation of disorder because of the shortcomings of existing models in explaining contamination (Wheaton et al. 2010). Consistent with previous research, it appears that factors not measured through the OBQ or measures of general distress might influence OC contamination concerns, such as disgust sensitivity or other cognitions such as magical beliefs which give individuals an irrational understanding of the process of contamination (Wheaton et al., 2010; Tolin, Worhunsky, & Maltby, 2004). Moreover, this study adds that metacognitive beliefs do not provide a better explanation of OC contamination concerns than those previously proposed.

It is a limitation of this study that it did not include measures of cognitions beyond the cognitive beliefs in the OBQ and the metacognitive beliefs in the MCQ, given the findings with regard to contamination concerns and the moderate abilities of these models in predicting OC symptoms. Reliance on a student sample limited our selection of assessment tools to those that have evidence supporting their relevance for non-clinical samples and additionally limits the generalizability of the findings reported here. There are additional disorder-specific measures of beliefs which could be utilized to further explore the relationship between the cognitive and metacognitive models' abilities to predict OCD symptoms. Finally, the findings reported here are cross-sectional and correlational in design which excludes the possibility of determining causality.

To conclude, the findings reported here support that the metacognitive model offers a useful framework for understanding certain symptoms of OCD, even beyond the traditional cognitive model and general distress. These findings also highlight the heterogeneity of OCD and the importance of examining contributing factors in this way as well. Modifying metacognitive beliefs, however, might be a useful therapeutic intervention to address the

maladaptive appraisals characteristic of OCD. As such, extending studies of MCT for OCD

beyond the pilot phase (i.e., Fisher & Wells, 2008) to more closely examine the efficacy of this

treatment would be clinically useful.

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Table 1

Means Scores on Study Measures

Measure	*M*	*SD*	*Min.*	*Max.*
DASS-21	17.06	13.43	0.00	59.00
OBQ-44	143.50	40.70	64.00	285.00
MCQ-30	57.24	13.67	32.00	91.00
DOCS	10.90	7.63	0.00	31.00

Note. DASS-21= Depression Anxiety and Stress Scale, OBQ-44 = Obsessive Beliefs Questionnaire, MCQ-30 = Metacognitive Beliefs Questionnaire, DOCS = Dimensional Obsessive-Compulsive Scale

Table 2

Partial Correlations between 4 OCD Symptom Domains, Obsessive Beliefs, and Meta-cognitive

Beliefs; Controlling for General Distress

Variable	2	3	4	5	6
1. DOCS- Contamination	.31*	.04	.33*	.14	.17
2. DOCS- Responsibility	-	.16	.24*	.33*	.13
3. DOCS- Unacceptable Thoughts	-	-	.21*	.22*	.46**
4. DOCS- Symmetry	-	-	-	.00	.30**
5. OBQ-44	-	-	-	-	.33**
6. MCQ-30	-	-	-	-	-

* *p* < .05

** *p* < .01

Table 3

Summary of Hierarchical Regressions- Total Models

Variable	R^2	B	β	t	p
Predicting DOCS- Contamination					
Final model	.05				.13
DASS		.00	-.02	-.13	.90
OBQ		.01	.12	.99	.33
MCQ		.03	.16	1.30	.20
Predicting DOCS - Responsibility for Harm					
Final model	.21				. <.001
DASS		.03	.15	1.33	.19
OBQ		.02	.35	3.22	<.01
MCQ		.01	.03	.28	.78
Predicting DOCS- Unacceptable Thoughts					
Final model	.35				<.001
DASS		.03	.11	1.13	.26
OBQ		.01	.08	.81	.42
MCQ		.10	.47	4.62	<.001
Predicting DOCS- Symmetry					
Final model	.13				<.01
DASS		.01	.04	.34	.74
OBQ		-.01	-.12	-1.09	.28
MCQ		.09	.39	3.32	<.01