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Emotion intolerance and obsessive-compulsive symptoms

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ABSTRACT

EMOTION INTOLERANCE AND OBSESSIVE-COMPULSIVE SYMPTOMS

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Cognitive theories of OCD emphasize the role of dysfunctional interpretations of one's thoughts in the etiology and maintenance of OC symptoms. However, high levels of dysfunctional obsessive beliefs are not found to be characteristic of all individuals with OCD. The current study sought to investigate the possibility that an alternative process for symptom development may need to be considered. Specifically, it was hypothesized that low tolerance to various emotional experiences may be an important factor contributing to OC symptoms. Due to the heterogeneity of OCD, the "intolerable" emotional experience was thought to vary among individuals based on their specific symptoms. The study also predicted that low emotion tolerance would moderate the association between dysfunctional obsessive beliefs and OC symptoms. In other words, individuals with low emotion tolerance were thought to be at an increased likelihood to develop OCD symptoms in response to their dysfunctional beliefs.

Valid completers of the study ($n = 336$) were recruited through Amazon Mechanical Turk and completed a battery of questionnaires online. A series of regression analyses was conducted to examine whether emotion intolerance contributes to symptoms of OCD while controlling for relevant variables. A regression analysis also was conducted to test whether the relationship between dysfunctional beliefs and OCD symptoms is moderated by emotion intolerance.

In general, results suggested that one's ability to tolerate emotional experiences might be important in OCD, specifically experiences of disgust, anxiety/apprehension, and

sadness/depression. However, the effect sizes found in this study were small, and some findings did not remain significant after controlling for other relevant variables. Explanations and future directions are explored.

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EMOTION INTOLERANCE AND OBSESSIVE-COMPULSIVE SYMPTOMS

BY

STEPHANIE RENEE ORBON
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DEDICATION

For my loving and supportive parents, for making me the person I am today

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CHAPTER 1

INTRODUCTION

Obsessive-compulsive disorder (OCD) is a psychological disorder characterized by the presence of obsessions and/or compulsions. Obsessions are repetitive and persistent thoughts, images, or urges that are intrusive, unwanted, and cause marked distress or anxiety in individuals (American Psychiatric Association [APA], 2013). Compulsions are repetitive behaviors or mental acts that are typically performed in response to obsessions. Compulsive behaviors aim to reduce associated distress and/or to prevent feared events from occurring; however, compulsions are either not connected realistically to the feared event or are performed excessively (APA, 2013).

Obsessive-compulsive (OC) symptoms vary in their frequency and severity across individuals and have been thought to exist on a continuum (Purdon & Clark, 1994). However, to warrant a clinical diagnosis of OCD, symptoms must be time consuming (e.g., more than 1 hour a day) and/or “cause clinically significant distress or impairment” (APA, 2013, p. 237). This criterion is important to distinguish the clinical disorder from commonly occurring obsessive and compulsive tendencies in the general population. In fact, a considerable amount of empirical research has shown that between 80-90% of nonclinical individuals report experiencing intrusive thoughts, images, or impulses that often appear similar in content to those reported by individuals with OCD (Morillo, Belloch, & Garcia-Soriano, 2007). Intrusive thoughts also are experienced by individuals with a range of other clinical disorders, such as those marked by

anxiety and depression (Morillo et al., 2007). Because intrusive thoughts are so common, it is important to identify key differences between commonly experienced intrusive thoughts and clinical obsessions experienced in OCD. A better understanding of what distinguishes intrusive thoughts in OCD from commonly experienced intrusive thoughts, or those experienced in other clinical disorders, may be informative for prevention and/or treatment efforts.

It has been noted that nonclinical intrusive thoughts tend to be less frequent, shorter in duration, and cause less distress than those found in clinical levels of OCD (e.g., Rachman, 1997; Rachman & de Silva, 1978). In this sense, clinical obsessions can be thought of as extreme forms of commonly experienced intrusive thoughts. Furthermore, the content of intrusive thoughts appears to differ across clinical disorders. For example, individuals suffering from anxiety often experience intrusive thoughts reflecting worry-like concerns about commonplace problems, and individuals with depression tend to experience automatic intrusive thoughts centered on negative views of the self, world, or future (Morillo et al., 2007). Thus, both quantitative and qualitative differences may need to be considered. Other theories have suggested that emotional experiences and/or dysfunctional appraisals of intrusive thoughts are important in the transition to OCD pathology (e.g., Morillo et al., 2007; Smith, Wetterneck, Hart, Short, & Björgvinsson, 2011). Due to the heterogeneity of OCD, mechanisms underlying differing symptom dimensions also have been considered. These issues have been examined in several studies and will be further explored below.

Clinical Obsessions vs. Intrusive Thoughts

Morillo and colleagues (2007) sought to compare features of clinical obsessions in individuals with OCD to intrusive thoughts experienced by individuals with alternative clinical

diagnoses (i.e., depression, non-OCD anxiety disorders) and nonclinical community members. The Revised Obsessional Intrusions Inventory (ROII; Purdon & Clark, 1994), a measure of obsession-relevant intrusive thoughts, was utilized to assess characteristics of unwanted intrusive thoughts. The frequency and content of thoughts were examined, as well as differences among participants' most disturbing intrusive thoughts, emotional consequences of the thoughts, cognitive appraisals of the thoughts, and thought control strategies.

Results of the study revealed that the OCD group reported a higher recurrence of intrusive thoughts than the other three groups ($F_{(3,107)} = 20.74, p < 0.001$) but did not report a *higher variety* of intrusive thoughts ($F_{(3,107)} = 1.87$). Differences between participants' most disturbing clinical obsessions (OCD group) and intrusive thoughts (other three groups) were also examined. Results showed that clinical obsessions in individuals with OCD were more recurrent, more unpleasant, more difficult to control or dismiss, and induce a greater desire to avoid than nonclinical intrusive thoughts. It was concluded that the main differences between clinical obsessions and nonclinical intrusive thoughts are quantitative in nature.

However, Rassin, Coughle, and Muris (2007) emphasized that similarities between clinical and nonclinical obsessions should not be overstated. They sought to further investigate similarities and differences between clinical and nonclinical obsessions to determine whether important content differences exist. In their study, a sample of undergraduate students was presented with a list of 70 different thought intrusions, some of which were originally reported by individuals who were diagnosed with OCD and some of which were reported by nonclinical participants. The students were asked to indicate whether they had ever experienced the intrusion by circling "yes" or "no" for each intrusion on the list. Results showed that the students were less likely to endorse the presence of intrusive thoughts that had been reported by individuals with

OCD compared to those reported by nonclinical participants (12.2% of clinical vs. 29.1% of nonclinical intrusive thoughts; $t_{(132)} = 19.6, p < .001$). Despite these differences, well-known themes were demonstrated in both clinical and nonclinical intrusive thoughts (e.g., aggression, harm, sex, illness, death, religion), but the authors did not provide insight into what might have led to this difference. Although describing the finding as “mystical,” they suggest that fundamental differences *may* exist between clinical obsessions and nonclinical intrusive thoughts. Because it is unclear whether this is the case, further exploration of this issue may be warranted.

OCD Subtypes

As noted, certain themes have been found to commonly surface in OCD. For example, OCD symptoms have frequently involved themes related to cleaning and contamination, symmetry (e.g., repeating, ordering, and counting), forbidden or taboo thoughts (e.g., aggressive, sexual, religious content), or harm to self or others (APA, 2013). However, although certain themes are common, it is important to note that specific content of obsessions and compulsions can vary substantially between individuals. In fact, it is possible that two individuals with OCD could present with completely different and non-overlapping symptom content. Furthermore, a range of affective responses have been reported by individuals with OCD, including anxiety, panic, disgust, distress, and uneasiness (APA, 2013). It is likely that individuals’ specific emotional responses vary with the content of their unique symptom patterns. It could be that emotions occur in response to the specific content of the symptoms experienced (e.g., thoughts about germs may cause disgust; thoughts about harm may cause anxiety). However, it could also be the case that symptoms arise in response to an individual’s vulnerability to experience

particular emotions (e.g., an individual who tends to feel disgusted may spend more time thinking about germs). This is an area that requires further exploration. Ultimately, it is important to recognize that although individuals with OCD share certain core symptoms (i.e., obsessions, compulsions), OCD is an extremely heterogeneous disorder regarding its content and manifestations.

Mataix-Cols, do Rosario-Campos, and Leckman (2005) suggested that most models of OCD do not emphasize this heterogeneity enough, noting concerns about utilizing global severity scores of OCD symptoms. To further investigate the utility of OCD dimensions, they reviewed 12 factor-analytic studies involving more than 2,000 individuals with OCD that evaluated the structure of OCD symptoms. Only studies that used “comprehensive and nonbiased instruments” (p. 229) to measure OCD symptoms, such as the Yale-Brown Obsessive Compulsive Scale (Y-BOCS) and Obsessive Compulsive Inventory (OCI), were included in the search. The identified studies also examined validity of the symptom dimensions, considering issues of comorbidity, genetics, life-span development, neuroimaging, neuropsychology, and predictors of treatment outcome. Although these studies utilized different methods and instruments, it was pointed out that the factor content suggested “more similarities than differences” (p. 229) across the identified symptom dimensions. In particular, at least four symptom dimensions were consistently extracted—symmetry/ordering, contamination/cleaning, obsessions/checking, and hoarding.¹ Of note, symptom dimensions were associated with distinct patterns of comorbidity, genetic transmission, neural substrates, and treatment response. Due to

¹Although hoarding has been commonly associated with OCD, there is a large body of evidence suggesting that hoarding is not a symptom or manifestation of OCD (e.g., Wheaton, Abramowitz, Fabricant, Berman, & Franklin, 2011). In addition, as of 2013, hoarding disorder is now classified as a separate disorder in the DSM.

the complexity and heterogeneity of OCD, studying symptom dimensions of OCD may be particularly important in increasing our understanding of the disorder.

Nonetheless, concerns and limitations of symptom-based subtyping of OCD have also been raised. Specifically, individuals with similar symptom behaviors may have different motivations underlying these compulsions. For example, one individual with washing compulsions may seek to reduce contamination of germs and illness, whereas another individual with washing compulsions may be attempting to remove “evil” or prevent harm to others (Calamari et al., 2006). As such, increased attention has been given to understanding the motivations and processes thought to underlie symptom dimensions of OCD. In particular, a significant amount of research has been conducted on cognitive processes, which involve the *form* and *context* of obsessive thoughts, rather than merely the abnormal *content* (Polman, O’Connor, & Huisman, 2011).

Cognitive Models of OCD

Cognitive theories of OCD have sought to further explain how commonly experienced intrusive thoughts escalate to clinical obsessions. It is important to recall that individuals experience their intrusive thoughts as both unwanted and involuntary. It has been argued that individuals at risk for OCD react to these unwanted intrusive thoughts by making “catastrophic misinterpretations” about their presence, which lead to increased perceptions of threat and potential danger (Belloch, Morillo, & García-Soriano, 2009; Rachman, 1997). For example, some individuals may interpret an intrusive thought as reflective of their character (e.g., “Because I’m thinking about harmful things, I must be dangerous”). Due to these increases in perceived threat, individuals may attempt to control or eliminate their intrusive thoughts as a way

to alleviate their distress and prevent potential harm. Accordingly, individuals who believe they are dangerous may begin avoiding situations or items that trigger these thoughts.

Nonetheless, efforts to control unwanted intrusive thoughts are not specific to OCD. Studies have shown that individuals with other clinical disorders and nonclinical individuals display a variety of strategies intended to deal with their intrusive thoughts (Morillo et al., 2007). As such, it is important to differentiate thought control strategies, as not all are assumed to be counterproductive. For example, social control (i.e., talking to other people about the thought) involves communicating one's concerns to others, which may help individuals to obtain non-threatening explanations for their thoughts (Belloch et al., 2009).

However, several strategies to control thoughts have been found to be maladaptive. For example, a great deal of research has been conducted on the paradoxical effects of *intentional thought suppression*. Najmi, Riemann, and Wegner (2009) suggest several explanations as to why thought suppression may be ineffective. For example, it is possible that thought suppression works temporarily as a neutralization strategy, thus preventing habituation to one's intrusive thoughts. In addition, research has suggested the presence of a rebound effect from thought suppression (e.g., Purdon & Clark, 2000). Specifically, suppression of an unwanted thought often leads to an increase in the frequency of the thought post-suppression. Furthermore, because suppression is generally ineffective, failure to adequately suppress a thought may increase its salience and lead to worsened mood, faulty appraisals of the failed attempt to eliminate the thought, and an increased perceived need to control thoughts.

Studies have been conducted to examine specific thought control strategies that are utilized by individuals with OCD. For example, Belloch and colleagues (2009) used the Thought Control Questionnaire (TCQ; Wells & Davies, 1994) to assess the use of five different thought

control strategies (i.e., distraction, punishment, reappraisal, social control, worry) among individuals with OCD, individuals with other anxiety disorders, individuals with depression, and community members. Results revealed that individuals with OCD scored higher on punishment (i.e., getting angry with oneself) than all of the other groups, $F_{(3,133)} = 15.21$, partial $\eta^2 = .44$. The other thought control strategies were used equally by both clinical and nonclinical participants.

Another study used the ROII to assess the extent to which individuals used ten different thought control strategies (Morillo et al., 2007). In this study, overt neutralizing ($F_{(3,107)} = 20.64$, partial $\eta^2 = .37$), reassurance seeking ($F_{(3,107)} = 6.17$, partial $\eta^2 = .15$), reassuring oneself ($F_{(3,107)} = 3.44$, partial $\eta^2 = .09$), and thought suppression ($F_{(3,107)} = 5.83$, partial $\eta^2 = .14$) were found to be used significantly more by individuals with OCD compared to community members, individuals with depression, and individuals with other anxiety disorders. Overt neutralizing was the strategy most frequently utilized by the OCD group and the strategy that best differentiated the groups. In sum, it seems especially important for individuals with OCD to control their experiences of having intrusive thoughts by utilizing techniques to either avoid or neutralize their thoughts (instead of strategies more likely to be helpful, such as reappraisal or social control).

Many people believe that the strong need to eliminate one's intrusive thoughts results from misinterpretation of the thoughts themselves. Specifically, it is assumed that individuals find their thoughts threatening in some regard, which leads them to begin avoiding particular objects, situations, behaviors, or sensations that could trigger these thoughts. They may also begin engaging in avoidance or neutralizing strategies that aim to counter or prevent the perceived threat. Because these avoidance behaviors provide temporary relief from the perceived threat, these individuals are susceptible to continue utilizing these strategies over time. However, the intrusive thoughts will continue to emerge in the presence of other triggering stimuli or when

they are not actively being suppressed. Because these beliefs remain unchallenged, the significance of the intrusive thought remains unchanged as well (Rachman, 1997). Thus, OCD symptoms remain or even increase over time.

Belief Domains Important in OCD

Seeking to advance the study of cognition in OCD, the Obsessive Compulsive Cognitions Working Group (OCCWG) formed in 1995 to begin conducting extensive and coordinated research in this area. Research on OCD-relevant cognitive phenomena was examined, and the following levels of cognition were identified: intrusions (unwanted thoughts, images, impulses), appraisals (ways in which meaning is given to a specific event, including expectations, interpretations, and judgments), and assumptions (enduring dysfunctional attitudes or beliefs). Specific appraisals of thoughts are thought to be influenced by one's general assumptions. It was noted that some assumptions might be specific and highly related to OCD, and others might be more general and found in other clinical disorders.

An important goal of the group was to develop a measure of beliefs (i.e., assumptions) that distinguished OCD from other disorders. After reviewing the relevant literature, 19 belief domains relevant to OCD were identified and assessed. The domains were then ranked by members of the OCCWG to the degree they characterized OCD-related beliefs. Six major domains were targeted on the basis of theory, available evidence based on literature reviews, and clinical experiences: (1) inflated responsibility, (2) overimportance of thoughts, (3) importance of controlling thoughts, (4) overestimation of threat, (5) intolerance for uncertainty, and (6) perfectionism (OCCWG, 1997). These six domains were further studied and assessed by six subgroups of the OCCWG.

Inflated Responsibility (R)

Inflated responsibility beliefs are beliefs that one is responsible for one's thought intrusions and has the power to bring about or prevent certain negative outcomes. These outcomes may be thought to have consequences in the real world or at a moral level and are perceived by the individual as essential to prevent. It is suggested that people who believe they are responsible for their thoughts and potential consequences will experience increased distress in response to their thought intrusions and respond by engaging in compulsions to prevent potential harm (OCCWG, 1997).

Overimportance of Thoughts (I)

Overimportance of thoughts implies that the mere presence of a thought makes it significant (OCCWG, 1997). Thought-action fusion (TAF; Salkovskis, 1985) is included in this domain, which reflects the belief that thoughts are morally equivalent to actions (i.e., Moral TAF) or that having a thought increases its likelihood of occurrence (i.e., Likelihood TAF). For example, having a bad thought might be interpreted as being a bad person.

Importance of Controlling Thoughts (C)

Individuals with OCD also tend to overvalue the importance of their ability to control their intrusive thoughts (OCCWG, 1997). These individuals typically find it important to track mental events (i.e., monitor their thoughts) and believe there may be moral, psychological, and behavioral consequences of not controlling their thoughts. In addition, it is believed that efforts at thought control can and should be successful (OCCWG, 1997).

Overestimation of Threat (T)

Individuals with OCD are also thought to overestimate the probability and severity of aversive events. Situations are often perceived as dangerous until proven safe. However, it has been suggested that personal threat (i.e., not threat in general) may be of primary importance to individuals with OCD (OCCWG, 1997). In other words, individuals seem to feel excessive *personal* vulnerability to danger and harm. It has also been pointed out that beliefs about one's coping abilities, low tolerance for ambiguity, and low tolerance for anxiety and discomfort are related to this idea (OCCWG, 1997)

Intolerance of Uncertainty (U)

Individuals with OCD tend to have increased difficulties making decisions, appear to be more cautious, and display greater doubt about their decisions than individuals without OCD (OCCWG, 1997). These difficulties are thought to emerge from the individual's perceived need for certainty. This domain includes beliefs about the necessity of being certain, beliefs about having a poor capacity to cope with unpredictable change, and beliefs about the difficulty of adequate functioning in ambiguous situations (OCCWG, 1997).

Perfectionism (P)

Perfectionism has been described as the tendency to believe a perfect solution exists to every problem, the belief that doing something perfectly is possible and necessary, and the belief that minor mistakes will have serious consequences (OCCWG, 1997).

The Obsessive Beliefs Questionnaire (OBQ-87) was subsequently developed (OCCWG, 2001) to measure these six cognitive domains. Following structural analysis, the OCCWG (2005) revised the OBQ-87 into the OBQ-44, reducing the six scales to three: (1) Responsibility/Threat Estimation (R/T), (2) Perfectionism/Uncertainty (P/U), and (3) Importance/Control of Thoughts (I/C). The OCCWG noted little advantage in using the full measure over the 44-item measure because of multicollinearity and similarities among the six domains.

“Low Beliefs” OCD

Various studies have sought to examine associations among dysfunctional beliefs and specific OC symptoms. In particular, Taylor and colleagues (2010) noted six studies that used regression analyses to predict OC symptoms using the OBQ obsessive belief scales. All of the studies except one controlled for depression, anxiety, or both. These studies revealed some important trends in associations. Specifically, ordering symptoms were predicted by P or P/U in five out of six studies; obsessing was predicted by C or I/C in four out of four studies; neutralizing was predicted by T or R/T in three out of four studies; and washing was predicted by T or R/T in four out of six studies. Nonetheless, not all studies found the same significant associations. For example, although four studies found washing symptoms to be predicted by T or the R/T, one study additionally found P/U to be a predictor, and two studies failed to find any significant predictors. Taylor and colleagues suggest that inconsistencies may have emerged due to differences in statistics, sample sizes, and/or OCD measures.

To further explore associations between obsessive beliefs and OC symptoms, Taylor and colleagues (2010) conducted a study to improve on some of the methodological concerns of previous studies. Specifically, they utilized a large sample ($n = 5,015$) to increase statistical

power, used structural equation modeling (SEM) to provide a more accurate estimation of associations, and did not control for general distress to avoid potential confounds. They found R/T to be associated with all OC symptom domains (path coefficients ranging from .24 for ordering to .49 for checking), P/U to be associated with ordering symptoms (.28), and I/C to be associated with obsessing (.30). As OBQ dysfunctional beliefs were only found to account for 23% of the variance of OC symptoms, it was suggested that other factors (e.g., cognitive factors, life stressors, genetics, learning experiences) should be considered to develop a powerful model of the etiology of OCD (Taylor et al., 2010).

Moreover, some research has revealed that dysfunctional beliefs are not always identified in cases of OCD. For example, Taylor and colleagues (2006) sought to identify subgroups of OCD based on differences in dysfunctional beliefs as measured by the OBQ-44. Using cluster analysis on 244 individuals with OCD, they found support for a two-cluster solution. Specifically, Ward's method, a hierarchical clustering method, and squared Euclidean distance were used for the clustering approach. Cluster analysis was then repeated using the *K*-means method, which requires the number of clusters to be specified in advance. The cluster analysis was set to two clusters, the number of clusters identified by the Ward solution. Results showed that 85% of participants were classified into the same clusters with both methods, revealing stability between approaches. In addition, the total sample was randomly split in two, and Ward clustering was conducted on each subsample. The same pattern of results was found on each subsample, suggesting that the two-cluster solution was a robust finding (Taylor et al., 2006).

One of the clusters (high beliefs) was associated with significantly higher scores on all measures of dysfunctional beliefs than those obtained by control groups (i.e., individuals with other anxiety disorders, student controls, community members). The other cluster (low beliefs)

reflected scores that were similar to the control groups and significantly lower than scores of the high beliefs cluster. Both clusters were similar in terms of demographic variables, and both clusters had higher scores on measures of OCD symptoms compared to all of the control groups. The exception to this was for harming impulses (high beliefs > low beliefs and all control groups) and harming thoughts (high beliefs > low beliefs and anxious controls > community members and student controls). Notably, the low beliefs group was 49.2% of the OCD sample.

Using a sample of 366 individuals with OCD, Calamari and colleagues (2006) also utilized cluster analysis to identify subgroups based on dysfunctional beliefs via the OBQ-44. Similar to Taylor et al. (2006), they conducted a cluster analysis using Ward's method and squared Euclidean distance. Multiple methods were utilized to determine the number of clusters, including examination of dendrograms, consideration of the change in agglomeration coefficients, Mojena's stopping rule, and the bootstrap validation procedure. Using information from these analyses and comparison with other findings (i.e., Taylor et al., 2006), it was decided to examine a two-cluster model. Support was also found for a more complex model, and a five-cluster model was additionally interpreted. *K*-means analyses were then conducted for each model, specifying the two- and five-cluster models that were suggested from the Ward's analysis. Similar profiles of OBQ scores were found across the Ward's and *K*-means analyses for both the two-cluster and five-cluster model, suggesting stability of the models. Both the two- and five-cluster models included a subgroup of individuals with low scores on the OBQ measures (low beliefs group), with scores comparable to control samples (individuals with non-OCD anxiety disorders and student controls). The groups did not differ on any demographic measures, including age, sex, and education.

The reliability of the identified clusters was also tested by dividing the sample into two subsamples and repeating the *K*-means analyses. Evaluations of both the two- and five-cluster models on each subsample revealed groups that were similar to those found using the full sample. Specifically, the two-cluster analyses classified 93% of participants in one subsample and 99% of participants in the other into the same group; the five-cluster analyses classified 82% and 87% of each subsample into the same group. This replication on random subsamples of participants was noted as evidence for stability of the identified clusters.

Further examination of the full two-cluster model revealed that mean scores on the OBQ measures differed significantly between the high- and low-beliefs groups (R/T = 81.9 vs. 44.7; P/U = 86.9 vs. 56.4; I/C = 53.2 vs. 27.8). The group with higher OBQ scores (high-beliefs group) also reported more severe levels of OCD symptoms as measured by the Y-BOCS (Total = 25.9 vs. 23.6, Obsessions = 13.0 vs. 11.6; Compulsions = 24.3 vs. 15.3), as well as higher levels of depression and anxiety (Beck Anxiety Inventory [BAI] = 24.3 vs. 15.3; Beck Depression Inventory [BDI] = 28.4 vs. 19.2). However, it was noted that although the high-beliefs group was found to have more severe OCD symptoms, the effect size was small to medium ($d = .37$), whereas the effect sizes for belief measures were large ($ds = 1.66$ - 2.28). In other words, the two groups differed more on the strength of their obsessional beliefs than on the severity of their OCD symptoms. It is also notable that the low-beliefs group made up 55.7% of the total OCD sample.

The five-cluster model included a high-beliefs group, low-beliefs group, and groups with relative elevations on the R/T, I/C, and P/U subscales of the OBQ. Mean comparisons on measures between the most extreme groups (low beliefs and high beliefs) revealed large differences on OBQ scores (R/T = 93.6 vs. 40.3, $d = 3.92$; P/U = 96.6 vs. 41.4, $d = 4.58$; I/C =

62.7 vs. 21.3, $d = 4.81$), OCD severity (Total: 27.7 vs. 22.1, $d = .88$; Obsessions: 13.9 vs. 11.1; Compulsions = 13.9 vs. 11.1), and anxiety and depression scores (BAI: 28.2 vs. 13.3; BDI: 33.7 vs. 16.8). Although the groups differed in OCD severity scores, the categorization does not seem likely to be merely due to symptom severity. Specifically, the low-beliefs group (both in the two- and the five-cluster models) still met criteria for OCD, although their OBQ belief scores were similar to non-OCD control groups. Effect sizes also showed greater differences between groups on OBQ belief measures than on OCD symptom severity scores.

Chik, Calamari, Rector, and Riemann (2010) sought to further examine qualities of individuals with OCD who do not endorse high levels of dysfunctional obsessive beliefs. They classified 82 OCD patients into a high- or low-beliefs group based on their scores on OBQ scales. Specifically, they conducted a discriminant function analysis (DFA) on Calamari and colleagues' (2006) data to determine whether group membership (i.e., high- and low-beliefs groups) could be reliably predicted using OBQ scores. The classification functions that were generated were found to accurately classify 97.6% of the 370 participants in Calamari et al.'s study. The classification functions were subsequently used to classify the OCD sample in the current study into high- and low-beliefs subgroups. Probability analyses were conducted on the cases, and six cases were found to have less than .75 likelihood of belonging to their assigned group and were therefore dropped from further analyses. Final groups included 34 individuals with OCD belonging to the high-beliefs group (44.7%), and 42 individuals with OCD belonging to the low-beliefs group (55.3%).

Between-group comparisons revealed that the low-beliefs group and the student control group scored similarly on measures of OBQ beliefs (R/T = 40.19 vs. 47.83; P/U = 54.88 vs. 54.37; I/C = 27.24 vs. 29.37, respectively), and both groups scored significantly lower than the

high-beliefs group ($R/T = 80.15$; $P/U = 80.44$; $I/C = 50.47$). The high-beliefs group reported higher levels of OCD symptoms on the Obsessive Compulsive Inventory-Revised (OCI-R) than the low-beliefs group; however, the two groups did not differ on OCD symptom severity scores on the Y-BOCS.

As mentioned, Chik and colleagues (2010) also sought to examine alternative processes that might contribute to OCD symptoms in the low-beliefs group. The finding that over half of the OCD sample endorsed levels of dysfunctional beliefs that were similar to individuals without OCD suggests that other processes (beyond what is currently measured on the OBQ) seem to be contributing to the development of OCD symptoms. One possibility is that the assessment of dysfunctional thought processes needs to be expanded. In other words, the OBQ may need to include additional domains of dysfunctional beliefs that currently are not captured by the measure.

To explore this idea, Chik and colleagues expanded their assessment of dysfunctional thinking by including a measure of metacognition (i.e., the Metacognitions Questionnaire [MCQ]; Wells & Cartwright-Hatton, 2004) that has been previously found to be related to anxiety disorders. Specifically, metacognition refers to psychological structures, knowledge, events, and processes that are involved in the control, modification, and interpretation of thinking (Wells & Cartwright-Hatton, 2004). Importantly, it involves beliefs about thinking that can influence one's appraisals about thoughts. The MCQ measures five domains of metacognition: positive beliefs about worry, perception of uncontrollability and danger of thoughts, cognitive confidence, need to control thoughts, and cognitive self-consciousness. These metacognitions have been found to be positively associated with OC symptoms on the PI (23 of 30 correlations were found to be significant: $r_s = .16-.49$, $p_s < .05$; Wells & Cartwright-Hatton, 2004). Chik and

colleagues were interested in whether individuals with low OBQ scores could be characterized by scores on the MCQ. They pointed out that this finding would be congruent with cognitive theories of OCD and would support the idea of expanding cognitive assessments. Of note, they replaced the cognitive self-consciousness subscale on the MCQ with the Cognitive Self-Consciousness Scale - Expanded (CSC-E; Janeck, Calamari, Riemann, & Heffelfinger, 2003), an extended measure that includes the original MCQ cognitive self-consciousness subscale.

The results of the study indicated that the high-beliefs group endorsed more total metacognitive beliefs than the low-beliefs group and the student control group, although it did not differ from an anxious control group. Examination of subscale means showed that the high-beliefs group also scored higher than the low-beliefs group on three subscales (uncontrollability/danger, need to control thoughts, cognitive self-consciousness as measured by the CSC-E), although the high- and low-beliefs groups had comparable scores on the two other subscales (positive beliefs about worry, cognitive confidence). Of note, the high-beliefs group and the anxious control group did not differ on any of the subscales.

In addition, a direct DFA was conducted with MCQ-30 measures to predict OCD subgroup membership based on metacognitive beliefs. Scores on the MCQ-30 were found to differentiate groups, and OCD subgroup membership was accurately predicted for 79.7% of the sample. Further analyses showed that the MCQ-30 Need to Control Thoughts subscale score was largely responsible for the differentiation of OCD subgroups and accurately predicted 78.3% of the subgroups. Because the subgroups also differed on OCD symptoms on the OCI-R, Chik and colleagues (2010) examined whether group differentiation could be attributed to symptom severity. An ANCOVA was conducted to examine subgroup differences on the Need to Control Thoughts subscale while controlling for OCI-R scores. A significant difference between groups

remained, $F(1, 66) = 15.72, p < .001, \eta^2 = .19$. This indicates that the Need to Control Thoughts subscale could differentiate groups even after taking the severity of OCD symptoms into account.

Chik et al. (2010) also evaluated the associations between the metacognitive processes that were found to differentiate OCD subgroups (i.e., discriminant function scores) and OCD symptoms. A significant association between metacognitive beliefs and OCD symptoms would provide support for the importance of metacognitive processes in symptom development. Results revealed that the discriminant function scores significantly correlated with OCI-R total, checking, obsessing, and neutralizing scores in the total OCD group ($r_s = .33$ to $.57$) and the high-beliefs group ($r_s = .37$ to $.57$). However, in the low-beliefs group, only one significant correlation was found (Need to Control Thoughts with Obsessing, $r = .35$).

Taking all of this into consideration, it was concluded that (1) metacognitive processes were more associated with thinking processes of the high-beliefs group than the low-beliefs group, and (2) metacognitive beliefs of the high-beliefs group were similar to those of individuals with non-OCD anxiety disorders. In other words, metacognitive beliefs were not found to motivate OCD symptoms in individuals with low dysfunctional beliefs on the OBQ.

These findings have implications for cognitive models of OCD. The identification of “low-beliefs” subgroups of OCD patients suggests that in some cases cognitive and metacognitive processes may not play a role in the etiology or maintenance of the disorder. Although the OBQ has been the primary measure utilized, the inclusion of an additional measure of metacognitive beliefs (i.e., the MCQ) also was not shown to characterize the low-beliefs group. However, these beliefs did characterize individuals with other kinds of anxiety disorders. As a result, it is unclear why some individuals with high levels of dysfunctional beliefs develop

OCD but other individuals with similar levels of dysfunctional beliefs develop other types of clinical disorders. It is therefore important to consider alternative processes that may be leading to OC symptoms.

Sensory and Affective Experiences

Other studies have sought to examine the role of various sensory and emotional experiences in OCD. An example of a sensory experience often associated with OCD is the uncomfortable sensation of things being “not just right.” These “not just right experiences” (NJREs) have been described as a form of “sensory perfectionism” or a dysregulation of sensory-affective systems. These experiences can lead to tension and a desire to perform tasks in very specific ways until the NJRE is reduced (Chik et al., 2010; Coles, Frost, Heimberg, & Rhéaume, 2003).

“Not just right experiences” have been measured by the NJRE-Questionnaire (NJRE-Q) and the NJRE-Questionnaire Revised (NJRE-QR; Coles et al., 2003), which defines NJREs as “times when you have the subjective sense that something isn’t just as it should be” (p. 684). The NJRE-Q lists several examples of NJREs and asks participants to identify whether they have had the experience in the past week or ever. Respondents are also asked to identify the most frequent NJRE and rate its frequency, intensity, importance, and associated anxiety. The NJRE-QR asks participants whether they have experienced particular NJREs within the past month and also asks them to rate their most recent NJRE on its frequency, intensity, immediate distress, delayed distress, rumination, urge to respond, and sense of responsibility.

Seeking to examine the association of NJREs to OCD features, Coles and colleagues (2003) conducted two studies in undergraduate samples. The first study found that the

occurrence of NJREs over the past week was associated with all dimensions of OCD symptoms as measured by the PI. However, the correlation with contamination symptoms ($r = .29, p < .001$) was smaller in magnitude than with all other OCD subscales ($r = .41$ to $.46$). This general pattern held true for all properties of NJREs, including frequency, intensity, importance, and associated anxiety.

The second study found that the total occurrence of NJREs in the past month was associated with the frequency ($r_s = .46$ to $.60$) and severity ($r_s = .44$ to $.55$) of all symptom types of OCD as measured by the OCI. After combining frequency and severity scores using Fisher Z transformations, these composite scores were correlated with total NJREs and compared in magnitude. Results revealed that NJREs were more strongly related to both checking and ordering than to washing, obsessing, hoarding, and neutralizing (all $p_s < .05$). Additionally, analyses were conducted to compare associations between NJREs and OCD symptoms with associations between NJREs and other symptoms of psychopathology (i.e., trait anxiety, worry, social anxiety, depression). Results showed that NJRE correlations with OCD frequency ($r = .63$) and OCD distress ($r = .57$) were significantly stronger than with other measures of psychopathology ($r_s = .21$ to $.45$). In addition, total NJREs remained correlated to frequency and severity of OCD symptoms when controlling for all other symptom measures ($r_s = .43$ to $.60$).

Chik and colleagues (2010) investigated whether NJREs would explain OCD symptoms in individuals with low levels of dysfunctional beliefs. It was thought that if NJREs were characteristic of the low-beliefs OCD group, they would be frequently endorsed in this group, they would be correlated with OC symptoms in this group, and they would be able to differentiate between the low- and high-beliefs groups. Examination of mean differences on NJRE-QR measures revealed that the high-beliefs group scored higher than the low-beliefs group

on NJRE measures of Intensity, Immediate Distress, Delayed Distress, Rumination, and Responsibility ($p < .05$ in post hoc Bonferroni-corrected comparisons). However, the subgroups did not differ on measures of Frequency, Urge to Respond, or the total score.

A direct DFA was conducted with NJRE-QR measures to determine if NJREs could differentiate the OCD subgroups. Scores on the NJRE-QR were found to accurately categorize 70.7% of the sample. Further analyses showed that scores on the NJRE-QR Delayed Distress subscale were able to differentiate the groups almost as well as using the full measure, also predicting 70.7% of the sample. An ANCOVA was conducted to test between group differences on the Delayed Distress scale after controlling for OCI-R total score to determine whether OCD symptom severity group could account for the group differences. However, the subgroup difference on Delayed Distress remained ($F(1, 70) = 4.18, p < .05, \eta^2 = .06$), indicating that Delayed Distress was able to differentiate the groups beyond severity of OCD symptoms.

Associations between the NJRE measures that differentiated OCD subgroups (i.e., discriminant function scores) and OCD symptom measures were also evaluated. Of note, no significant associations were found between discriminant scores and OCD symptoms in the high-beliefs group. However, significant associations were found between discriminant scores and the OCI-R total, washing, checking, neutralizing, and obsessing scales with the low-beliefs groups ($r_s = .33$ to $.47$) and the OCD total group ($r_s = .33$ to $.51$). Because reliable associations between NJREs and OCD symptoms were found only with the low-beliefs group, it was concluded that NJREs seem to be particularly important for individuals with low levels of dysfunctional beliefs.

Although NJREs have been found to be associated to OCD symptoms, a recent study (Fergus, 2014) suggested that the observed specificity to OC symptoms might result from the way NJREs have been measured. In particular, the NJREs identified on Coles et al.'s (2003)

measure seem to have been developed specifically to relate to OCD. Although it was stated that efforts were made to include NJREs that were not from typical domains of OCD, the NJREs on Coles et al.'s measure were developed "based on clinical experience, input from clients with OCD, suggestions from individuals with OCD via the internet, and pilot work" (p. 684). To examine whether the specificity between NJREs and OCD symptoms could reflect a measurement artifact, Fergus (2014) used a modified version of Coles et al.'s NJRE measure (i.e., NJRE-QR-M) with a different set of NJREs. These new NJREs had served as examples in the original measure but had not been rated by participants. These items were used (a) to maintain consistency in the operational definition of NJREs and (b) because this set of NJREs appeared relevant to a broad range of symptoms.

Participants ($n = 480$) were recruited through the internet to complete a series of questionnaires, including the NJRE-QR-M and several symptom measures. Zero-order correlations between NJREs and OCD symptoms were compared to zero-order correlations between NJREs and symptoms of other disorders (i.e., depression, GAD, social anxiety). NJREs were found to significantly correlate with each symptom measure ($r_s = .37$ to $.57$), although stronger with GAD symptoms than with the other symptoms. In addition, a hierarchical multiple linear regression analysis was conducted, controlling for participant sex, general distress, and perfectionism/uncertainty. These variables were found to account for a large amount of variance in NJRE scores ($R^2 = .41, p < .01$). All of the symptom measures were entered into the second step, which revealed that these symptoms of psychopathology accounted for additional variance in NJRE scores ($\Delta R^2 = .07, p < .01$). Further examination showed that symptoms of OCD and GAD were found to share unique relations with NJREs (partial $r_s = .17$ and $.21$, respectively, $p <$

.01), whereas symptoms of depression and social anxiety did not. This study concluded that NJREs may not be specific to OCD and may rather be relevant to a broader range of pathology.

Additional studies have examined other issues associated with sensory and affective experiences, such as distress tolerance (DT) and anxiety sensitivity (AS). DT has been defined as the “capacity to experience and withstand negative psychological states” and involves perceptions of aversiveness, appraisal and acceptability of distress, tendency for distress to absorb one’s attention, and emotion regulation (Simons & Gaher, 2005, p. 83-84). AS has been defined as a “tendency to fear body sensations associated with anxious arousal because of their perceived physical, psychological, or social consequences” (Wheaton, Mahaffey, Timpano, Berman, & Abramowitz, 2012, p. 891). More specifically, AS involves fear of physical anxiety symptoms, fear of cognitive dyscontrol (e.g., unable to keep mind focused), and concerns that one’s anxiety might be observable to others. Both DT and AS have been shown to be related to a range of psychopathology symptoms and disorders; for example, DT has been found to be related to substance use, anxiety disorders, and personality disorders (Keough, Riccardi, Timpano, Mitchell, & Schmidt, 2010; Mitchell, Riccardi, Keough, Timpano, & Schmidt, 2013; Zvolensky, Vujanovic, Bernstein, & Leyro, 2010), and AS has been shown to be associated with panic, social anxiety, and GAD (Wheaton et al., 2012).

Wheaton and colleagues (2012) examined associations between AS and OC symptoms using dimensional measures of both constructs. Results from this study showed that AS was predictive of all OCD dimensions, even after controlling for general distress and obsessive beliefs. Regression analyses also revealed patterns of associations between particular AS dimensions and particular OC symptom dimensions. For example, contamination symptoms were predicted by a fear of physical arousal. It was suggested that some individuals with

contamination fears worry about contracting diseases and may interpret physical anxiety symptoms as indicative of illness. Unacceptable thoughts were predicted by fears of cognitive dyscontrol and fears of social concerns. It was thought that individuals who perceive their thoughts as unacceptable may fear they have lost control over their cognitive abilities or appraise their inability to control their thoughts as a mental weakness. In addition, individuals with unacceptable thoughts may fear being embarrassed or judged as immoral or dangerous if their thoughts are discovered by others. Responsibility for harm was predicted by a fear of cognitive dyscontrol and a fear of physical concerns. It was noted that individuals with high responsibility beliefs often try to control their thoughts and may be particularly distressed when their thought control efforts fail. They also tend to distrust their memory and worry about having unintentionally caused harm, which may contribute to a fear of a cognitive disturbance. In addition, physical symptoms may cause these individuals to feel “out of control” or at risk of harming another person. Symmetry-related OC symptoms were also predicted by fears of cognitive dyscontrol and physical symptoms. It was suggested that these individuals tend to feel distressed when things are “not just right,” which may be associated with fears of cognitive dyscontrol or “going crazy.”

The contribution of DT to various anxiety disorders, including OCD, was examined by Keough and colleagues (2010). They conducted a series of hierarchical linear regressions to predict OC symptoms. Depression symptoms, anxiety symptoms, and AS were entered into the first step of the equations to control for these variables, and DT was entered into the second step. Results revealed that even after controlling for depression, anxiety, and AS, DT remained significantly associated to OC symptoms ($\beta = -.11, p < .05$). In other words, individuals with

lower tolerance to distress were found to have higher OC symptoms. However, this finding also held true for symptoms of other anxiety disorders (i.e., panic, worry, social anxiety).

Cogle, Timpano, Fitch, and Hawkins (2011) conducted a series of studies to further examine the association between DT and OC symptoms. To examine the incremental specificity of DT as a predictor of OC symptoms (specifically of obsessions), they conducted hierarchical regressions controlling for anxiety, depression, AS, and obsessive beliefs. Analyses were done separately to predict each of the six subscales of the OCI-R (i.e., obsessing, neutralizing, ordering, washing, checking, hoarding). The regression analyses revealed that low DT was predictive of obsessions, $F(6,265) = 32.75$, Bonferroni-corrected $p < .008$, but was not found to predict any other OC symptom. Another study (Cogle, Timpano, Sarawgi, Smith, & Fitch, 2013) found evidence of associations between obsessions and poor distress tolerance, particularly poor tolerance for sadness. It was suggested that obsessions and poor tolerance for sadness might involve difficulties in removing disturbing thoughts or may be associated with a general tendency toward rumination.

Cogle and colleagues (2011) also examined DT's association with participant responses to an in vivo neutralization task. Specifically, participants were instructed to copy the sentence "_____ will be in a car accident" onto a piece of paper, filling in the blank with the name of a loved one. Participants were asked to think about the situation for 30 seconds, and then the experimenter left the room for one minute. During the one-minute period (i.e., the neutralization period), participants were told they did not have to do anything but could do something if they chose. When experimenters returned, they asked participants whether they utilized any coping behaviors during that time. Behaviors coded as neutralizing included destroying or altering the sentence, visualizing the accident with a less serious/positive outcome, carrying out superstitious

acts, turning over or concealing the paper, and using religious strategies such as prayer.

Participants were asked to report anxiety levels before the neutralization task, post-writing, and post-neutralization period.

Results from this study showed that poor DT was not associated with initial anxiety to the task. However, individuals who engaged in neutralization behaviors reported significantly lower DT on total scores as well as all subscales than those who did not ($F_{(1,62)} = 4.67 - 8.02$). In addition, poor DT (total score, appraisal, and regulation) was associated with more anxiety after the neutralization period ($r = .31 - .32, p < .05$). It was concluded that poor tolerance of negative emotions may lead individuals to use maladaptive strategies (e.g., neutralization) to cope with distress and may also contribute to more prolonged distress over time.

Several other studies have found support for the role of emotion appraisal in OCD. For example, youth (7-12 years old) diagnosed with OCD were found to exhibit lower levels of emotion regulation than youth with other anxiety disorders (i.e., GAD, social phobia, separation anxiety disorder; Jacob, Morelen, Suveg, Brown Jacobsen, & Whiteside, 2012). Another study showed that feeling threat from anxiety and embarrassment predicted OCD symptoms in undergraduate students (Smith, Norton, & Wetterneck, 2014). It has also been found that experiential avoidance (defined as “unwillingness to remain in contact or experience unpleasant private events through attempts to avoid or escape from these experiences”) relates to OCD severity, specifically for responsibility for harm, unacceptable thoughts, and symmetry (Wetterneck, Steinberg, & Hart, 2014).

The results from these studies provide support for the importance of sensory and emotional constructs in OCD. However, these experiences have also been associated with individuals with non-OCD pathology and do not associate with all subtypes of OCD. Because

symptom presentations often differ substantially across individuals with OCD, it is difficult to determine factors that contribute to the development of OC symptoms while being relevant to each individual's idiographic symptom pattern.

Despite differences in symptom content and expression, individuals with OCD appear similar in their desire to eliminate or prevent recurring unwanted internal experiences and discomfort. Consistent with this, constructs of NJREs, DT, and AS all suggest a discomfort with various internal sensory or affective experiences (i.e., sensations that things are “not just right,” intolerance to feelings of distress, fears of anxious arousal). Although these constructs describe different experiences, the extreme heterogeneity of OCD symptoms makes it likely that the specific experience causing distress for an individual would vary as well. In other words, it is plausible that individuals with OCD feel intolerant to certain sensory or affective experiences that differ as a function of their specific symptom presentation.

Related to this idea, other issues concerning specific emotional experiences have been explored in the OCD literature, including experiences of guilt, shame, and disgust. For example, to examine the association between guilt and OCD, Shapiro and Stewart (2011) conducted a literature review of 15 studies. They noted three main themes that appeared to emerge from these studies: (1) guilt has been found to contribute to OC symptoms (e.g., increased threat perception, NJREs, overresponsibility, intrusive thoughts/impulses) in nonclinical samples, (2) state-guilt leads to brain activation in regions proximal to OCD-affected regions in nonclinical samples, and (3) common guilt themes are present in OCD samples. They also reported that trait-guilt has predicted obsessive complaints in individuals without OCD, increased guilt has been associated with increased severity of OC symptoms, and guilt-related life events have been found to increase obsessiveness. Increased levels of guilt have also been found to specifically contribute

to washing behaviors and NJREs in nonclinical individuals (Cogle, Goetz, Hawkins, & Fitch, 2012; Mancini, Gangemi, Perdighe, & Marini, 2008).

However, Fergus, Valentiner, McGrath, and Jencius (2010) found shame to be more relevant than guilt to anxiety disorders (including OCD). In this study, participants with anxiety disorders completed an intensive outpatient program for 2-3 weeks (treatment depending on primary diagnoses) and completed pre- and post-treatment measures of shame proneness and guilt proneness. Residual change scores of shame and guilt proneness after completion of treatment were calculated, along with residual change scores of anxiety symptoms. Correlations among these scores were then calculated. Results indicated that changes in OCD symptoms were associated with greater changes in shame proneness ($r = .51$, Bonferroni-corrected $p < .0012$) but unrelated to changes in guilt proneness ($r = .05$). This pattern also held true for social anxiety disorder (SAD; $r = .45$) and generalized anxiety disorder (GAD; $r = .46$). Although zero-order correlations failed to show significant associations between OCD and shame proneness or guilt proneness, it is unclear whether examination of specific OC dimensions (rather than a total score) would provide additional information.

Individuals with OCD have been shown to endorse higher levels of disgust propensity than nonclinical controls and individuals with generalized anxiety disorder (Olatunji et al., 2011). In addition, general tendencies to respond with disgust have been shown to decrease with exposure-based treatment for OCD (Olatunji et al., 2011). Interestingly, one study found that individuals with OCD expressed lower distress tolerance and higher levels of shame and guilt than a healthy control group but were found to endure physical pain for longer periods (Hezel, Riemann, & McNally, 2012). It was suggested that individuals who have difficulty tolerating

emotional distress (e.g., individuals with OCD) might experience physical pain as a distraction from emotional pain and thus have higher thresholds for physical pain.

Another study (Adams, Cisler, Brady, Lohr, & Olatunji, 2013) found that affective and cognitive mechanisms differentially relate to direct and indirect contamination aversions. In other words, affective mechanisms, specifically disgust, were found to correlate with direct contamination aversion (i.e., aversion towards objects directly or closely linked to the source contaminant, such as bedpans or soiled tissues). Alternatively, cognitive mechanisms (e.g., emotion regulation, obsessive beliefs) were found to correlate with indirect contamination aversion (i.e., aversion towards objects that might be contaminated only through contact with other contaminated objects, such as money, doorknobs, or elevator buttons). It was suggested that cognition and emotion likely interact in response to both direct and indirect contamination. Other studies have demonstrated support for this idea. For example, it has been found that obsessive beliefs (particularly overestimation of threat) interact with disgust to predict contamination fear (Cisler, Brady, Olatunji, & Lohr, 2010).

These studies all support the idea that individuals with OCD experience emotional distress in various forms (e.g., anxiety, guilt, disgust) that may differ across symptom presentations. Because of the heterogeneity of OCD symptoms, it is not surprising that individuals with OCD would experience different types of distress. The similarity seems to be the individual's *perceived intolerance* of their experience. Perceiving their emotional distress (in whatever form) as intolerable may lead individuals to engage in maladaptive compulsive behaviors as a way to seek immediate relief from their experiences. These compulsive behaviors may be directly related to the type of emotional distress that is perceived as intolerable. For example, someone who cannot tolerate feeling disgusted may engage in compulsive washing

behaviors; someone who cannot tolerate feeling shameful may engage in neutralizing behaviors in response to inappropriate thoughts; someone who cannot tolerate feeling guilty or fearful may engage in constant checking behaviors, and so on.

It is also worth considering how dysfunctional beliefs might play a role in this process. Specifically, individuals with high levels of dysfunctional beliefs may be at risk for experiencing increased emotional distress in general. For example, someone who frequently experiences one's thoughts as dangerous may consequently experience greater levels of fear. Frequent or intense experiences of fear may lead to compulsive behaviors that are aimed to decrease distress and perceived danger. However, individuals can also experience emotional distress without first engaging in dysfunctional thought patterns. These individuals may also be unwilling to experience their uncomfortable emotions and may accordingly engage in compulsions to eliminate or decrease their distress. Thus, dysfunctional thought patterns may create vulnerability for OCD by leading to increased emotional distress; however, *intolerance to emotional distress* might be the main process underlying symptom development.

In addition, because a variety of emotional experiences may be relevant in OCD, it seems important to be able to measure these specific nuances. However, measurement of distress tolerance in the literature has typically involved only a broad definition of distress and has not distinguished among various emotional states that could create distress in an individual. This could be problematic by failing to capture particular types of distress experienced in OCD. For example, individuals may not respond to questions about *distress* in the same way they would respond to questions about *disgust* or *anger*.

Tolerance of Negatively Valenced Affective States

Related to this concern, Bernstein and Brantz (2013) acknowledge that “a major gap in extant DT research is the absence of a measure of individual differences in perceived tolerance of specific negatively valenced emotions or facets of emotional distress” (p. 421). In response to this dilemma, they developed a measure, the Tolerance of Negative Affective States Scale (TNASS), to assess perceived tolerance to 25 negatively valenced affective/emotional states. The TNASS was grounded in a conceptual model reflecting emotional states that had been identified in the broader literature and incorporating research on anxiety and distress. Each affective state was measured using three linguistically and empirically based synonyms, some synonyms reflecting varying levels of intensity of the emotion. This approach was thought to facilitate comprehensive content of the construct and strong face validity. Feedback was then elicited from multiple scholars on distress tolerance, and the measure was revised iteratively based on expert feedback.

This version of the TNASS was completed by 200 adult participants, and an exploratory factor analysis (EFA) and parallel analysis were conducted on the items. A six-factor solution was identified, accounting for 61% of variance in item scores. Three items were ultimately omitted, as they did not demonstrate a primary or interpretable factor loading. In addition, their exclusion did not result in the removal of any clinically or theoretically important variance. The six factors were labeled (1) Fear/Distress, (2) Sadness/Depression, (3) Anger, (4) Disgust, (5) Anxious-Apprehension, and (6) Negative Social Emotions (e.g., shame, guilt). A confirmatory factor analysis was then conducted in an independent sample of 158 adult participants to test the six-factor model derived from the EFA. Fit indices were found to be within the cutoff range for

acceptable to good fit. One additional item was omitted due to an insufficient item-factor loading, resulting in a final 21-item measure.

To demonstrate utility of the measure, Bernstein and Brantz (2013) measured convergent and discriminant validity of the TNASS with respect to theoretically relevant constructs. Specifically, they examined relations with the Distress Tolerance Scale (DTS; Simons & Gaher 2005), a subscale of the Difficulties in Emotion Regulation Scale that measures non-acceptance of emotion (DERS-Non-Acceptance; Gratz & Roemer 2004), and the Acceptance and Action Questionnaire (AAQ; Hayes et al., 2004). The DTS is a commonly used measure of distress tolerance in the extant literature and measures four factors of distress tolerance, including a perceived ability to tolerate emotional distress (Tolerance), subjective appraisal of distress (Appraisal), attention absorbed by negative emotions (Absorption), and regulation efforts to alleviate distress (Regulation). The AAQ is a measure of experiential avoidance or psychological flexibility.

As expected, the TNASS was found to be related to, yet unique from, these associated constructs. In addition, specific TNASS factors showed different magnitudes of correlations with the measures. Specifically, Fear/Distress was associated with the AAQ ($r = .30, p < .01$) and all DTS scales except Non-Acceptance ($r_s = .20 - .36, p < .01$); Sadness/Depression was associated with the AAQ ($r = .24, p < .01$) and all DTS scales except Absorption and Non-Acceptance ($r_s = .21 - .37, p < .01$); Anger was associated with the AAQ ($r = .27, p < .01$) and all DTS scales except Absorption ($r_s = .25 - .28, p < .01$); Disgust was associated with the AAQ ($r = .19, p < .01$) and DTS total scale, Tolerance, and Regulation ($r_s = .18 - .23, p < .01$); Anxious/Apprehension was associated with the DTS total score, Tolerance, and Regulation ($r_s = .20 - .26, p < .01$); and Negative Social Emotions was associated with the AAQ ($r = .23, p < .01$).

and DTS total, Tolerance, and Regulation ($r_s = .20 - .24, p < .01$). The TNASS aims to assess narrow emotional states, so the differences among correlations is expected.

Of note, the authors also measured the frequency at which participants believe they have experienced these affective states to assess discriminant validity between *tolerance of* and *frequency of* the same negative affective states. It was important to determine that scores on the TNASS were not explained simply by the degree to which an individual experiences each affective state. As anticipated, analyses revealed that frequency and tolerance of parallel affective states were orthogonal, as all correlations were found to be nonsignificant (fear/distress: $r = .03$; sadness/depression: $r = .17$; anger: $r = .02$; disgust: $r = -.03$; anxiety/apprehension: $r = .17$; negative social emotions: $r = .14$, all $p_s < .01$).

Bernstein and Brantz (2013) specifically say they do not intend for the TNASS to serve as an alternative to the DTS but suggest it may be used as a complementary tool. Specifically, the DTS and the TNASS were found to be conceptually and operationally unique, as their shared variance was small to moderate in magnitude. It also was noted that the DTS reflects a broader set of emotion regulatory processes through the use of subscales (i.e., subjective appraisal, absorption of attention, regulation efforts, ability to tolerate). Alternatively, the TNASS assesses perceived tolerance to various emotional states in a more conceptually narrow sense as well as provides explicit behavioral definitions of tolerance and intolerance. Another obvious difference is that the DTS uses a broad conceptual definition of distress, whereas the TNASS measures perceived tolerance to multiple specific and distinct affective states.

Regarding the present study, it is thought that examining specific types of distress and discomfort (as opposed to a broad measure of distress) would be most useful when assessing associations with OCD. This is particularly important due to the heterogeneity of OCD, as

individual symptom patterns may appear different from each other. Specifically, measuring multiple affective states should increase the likelihood that the specific type of “distress” experienced by an individual will be captured. In addition, using a narrow and explicit definition of “tolerance” will increase the consistency of individual interpretations, ensuring that participants are responding to the same construct(s).

CHAPTER 2

CURRENT STUDY

Cognitive theories of OCD have been important in showing how cognitive structures, processes, and content contribute to the etiology and persistence of OC symptoms (OCCWG, 2003). Specifically, one's dysfunctional interpretations of his or her own thoughts have been shown to be relevant in the development of OCD. However, high levels of dysfunctional obsessive beliefs are not found to be characteristic of all individuals with OCD (Calamari et al., 2006; Chik et al., 2010; Taylor et al., 2006). This suggests that OCD symptoms, at least for some individuals, develop through an alternative process. It is certainly possible that current measurement of dysfunctional beliefs is not exhaustive and that other belief domains need to be identified and included in OCD assessment. However, additional research has suggested that certain sensory and emotional states might also be relevant to the development of OCD symptoms. For example, various studies have suggested the importance of factors such as guilt, disgust, distress tolerance, anxiety sensitivity, and feelings of incompleteness or "not just right" experiences.

An important feature of OCD involves an individual's attempts to reduce distressing experiences (e.g., to decrease anxiety, to prevent feared outcomes); thus, one's ability to tolerate the associated distress seems to be an important process in OCD symptomatology. Accordingly, the primary goal of this project was to investigate how tolerance of negatively valenced emotional states relates to OCD symptoms. Broadly, it was hypothesized that lower tolerance to

negatively valenced emotional states would be associated with higher levels of OCD symptoms. Furthermore, due to the extreme heterogeneity of OCD, it was thought that measuring specific emotions would explain more variance than utilizing a broad measure of distress tolerance. It also was predicted that the relationship between dysfunctional obsessive beliefs and OCD symptoms would be stronger for individuals with low tolerance to negative affect. In other words, individuals with low emotion tolerance were thought to be at an increased likelihood to develop OCD symptoms in response to their dysfunctional beliefs.

Such findings would have the potential to advance current conceptualizations of OCD in a few ways. First of all, if intolerance of emotion is found to be an important predictor of OCD symptoms, it would be important to know if different emotions are predictive of different OCD symptom domains. In this case, OCD treatment outcomes could potentially be improved if emotion tolerance and/or acceptance—particularly emotions that are specific to the individual's unique presentation and concerns—are targeted.

In addition, more attention may need to be given to associations between cognitive and emotional factors in models of OCD. Specifically, it might be the case that individuals with high levels of dysfunctional beliefs and low tolerance to negative emotional states are at a particularly high risk of developing OCD. For example, if someone is extremely averse to feeling fear and also tends to overestimate the probability of danger, this person might be more likely to engage in compulsive checking behaviors in response to intrusive thoughts.

Hypotheses

Specific hypotheses were as follows:

- (1a) Intolerance to negatively valenced emotional states will be associated with OC symptoms, even after accounting for depressive symptoms.
- (1b) Intolerance to specific emotional states will predict additional variance in OC symptoms after accounting for a broad measure of distress tolerance.
- (1c) Different emotional states will be associated with different OC symptom domains (e.g., contamination symptoms may be associated with intolerance to disgust and intolerance to fear/distress; unacceptable thoughts may be associated with intolerance to negative social emotions).
- (2a) Consistent with trends found in previous studies (e.g., Taylor et al., 2010; Wheaton et al., 2010), specific obsessive beliefs will be associated with specific OC symptom dimensions, even after accounting for depressive symptoms.
 - Contamination symptoms will be most strongly related to Responsibility/Threat beliefs.
 - Responsibility for Harm symptoms will be most strongly related to Responsibility/Threat beliefs.
 - Symmetry symptoms will be most strongly related to Perfectionism/Uncertainty beliefs.
 - Unacceptable Thoughts will be most strongly related to Importance/Control of Thoughts.
- (2b) Intolerance to negative emotional states will account for a significant portion of variance in OC symptoms, beyond that accounted for by obsessive beliefs.

- (2c) Intolerance to negative emotional states will moderate the association between obsessive beliefs and OC symptoms.

Method

Participants

Participants ($n = 495$) were recruited using Amazon Mechanical Turk (MTurk), a website designed to recruit individuals to complete short tasks for payment. MTurk was released in 2005 and has since been used for research studies in psychology, political science, and economics (Bates & Lanza, 2013). MTurk samples tend to be more diverse than college samples with respect to certain demographic variables, such as age, location, and racial background. In addition, low cost facilitates the ability to obtain large samples and high power (Buhrmester, Kwang, & Gosling, 2011; Paolacci & Chandler, 2014). MTurk also allows researchers to screen participants for eligibility. In the current study, participants were excluded if they indicated they were not at least age 18, did not read English fluently, or did not reside within the United States. Participants were compensated \$1 for completion of the study.

Two validity items were embedded within the questionnaires to assess the attentiveness of participants as an estimate of gross invalidity of responses (e.g., “Please choose 'agree' if you are paying attention right now”). Participants were listwise deleted from analyses if they missed either of the two validity items; 138 cases were removed for this reason. Three participants indicated that they had been diagnosed with either schizophrenia or dissociative identity disorder and were excluded from further analysis. Three participants completed the study twice; only their

first sets of responses were retained. Six individuals omitted entire sets of questionnaires and were removed from the analyses.

After removing these 149 cases from the total sample, the completion times of the remaining participants were examined. First, completion times were listed in ascending order to visually examine the length of time it took individuals to complete the study. A distinct break in the data was found in which five participants had completion times that were 77 minutes longer than the next highest time. It is thought that these participants may have taken a break partway through the study or waited to close out of their web browser, resulting in significantly longer completion times. The mean completion time was then calculated for the remaining sample (excluding the five outliers²) and was found to be 22 minutes and 19 seconds. Seven participants, whose completion times were greater than one standard deviation below this mean, were thought to have completed the study unreasonably quickly and were excluded from the remaining analyses (leaving 339 cases).

Two additional participants were removed from the dataset due to excessive missing data. One participant did not answer 68% of items from a specific measure, and the other participant did not answer 15-30% of the items from three different measures. The remaining 336 participants were retained as the final sample.

Of these 336 participants, 179 self-reported as female (53.3%), 154 self-reported as male (45.8%), and 3 self-reported as transgender (0.9%). Age of participants ranged from 18 to 69 years, with the average age at 35.9 years (SD = 11.5). Demographic data for the sample are reported in Table 1.

²Although the five outliers were not considered when calculating the mean completion time, they were retained in the overall sample.

Table 1

Participant demographics

Characteristic

Sex		
Male	154	(45.8%)
Female	179	(53.3%)
Transgender	3	(0.9%)
Race/Ethnicity		
African/African American	12	(3.6%)
Asian/Asian American	20	(6.0%)
Hispanic/Latino(a)	20	(6.0%)
Native American	3	(0.9%)
White/Caucasian	276	(82.1%)
Other	5	(1.5%)
Highest level of education		
6 th grade or less	0	(0.0%)
7 th -11 th grade	3	(0.9%)
12 th grade (or equivalent)	36	(10.7%)
Some college	115	(34.2%)
4-year college degree	123	(36.6%)
Some graduate school	5	(1.5%)
Graduate degree	54	(16.1%)
Age		
<i>M</i>	35.9	
<i>SD</i>	11.5	
Range	18-69	

Note. *N* = 336.

Measures

Dimensional Obsessive-Compulsive Scale (DOCS)

The Dimensional Obsessive-Compulsive Scale (DOCS; Abramowitz et al., 2010) was developed to reflect the most recent empirical findings on the nature of OCD symptoms and address limitations of existing OC symptom measures. The DOCS was also constructed to reflect the assumption that obsessions and compulsions are universal experiences that occur on a continuum. Efforts were made not to pathologize the items, assuming familiarity with the experiences, which allows the measure to be used in both clinical and nonclinical populations.

The DOCS assesses the severity of the four best empirically supported OC symptom dimensions (Contamination, Responsibility for Harm and Mistakes, Symmetry/Incompleteness, and Unacceptable Thoughts). Scores for each symptom dimension range from 0 to 20, higher scores indicating greater severity. The severity of symptoms is measured by the following factors: (1) time occupied, (2) avoidance, (3) associated distress, (4) functional interference, and (5) difficulty disregarding the obsessions and refraining from compulsions.

This is important because research suggests that severity of OC symptoms is multi-dimensional, consisting of parameters such as distress, functional interference, frequency, and duration, whereas most other OC symptom measures only contain a one-dimensional assessment of severity (Abramowitz et al., 2010). As a result, symptom severity is often confounded with the number of different symptoms being endorsed. For example, an individual who experiences multiple types of obsessions would endorse more items on a scale, appearing to have more severe OCD. However, it is possible to experience multiple types of obsessions with little associated distress, avoidance, or impairment. Alternatively, individuals who report fewer types

of symptoms would appear less impaired, even if they are experiencing a great deal of distress and impairment. In addition, since measures are unable to provide an exhaustive list of specific symptoms, individuals whose specific symptoms are not listed on a measure will appear less impaired. To address these limitations, the DOCS contains broad descriptions with various examples of symptoms within each domain, rather than containing items for specific obsessions and compulsions. By assessing dimensions broadly, the measure does not have to include enough items to ensure that all participants' symptoms are equally represented.

The DOCS assesses each OC symptom dimension with five questions measuring severity of symptoms. Items are rated on a scale of 0 (“no symptom”) to 4 (“extreme symptoms”). Internal consistency for the DOCS total score was supported in OCD, anxiety disorder, and student samples (alphas = .90, .92, and .93, respectively). Internal consistency was also supported for each of the symptom domains in OCD samples (alphas = .94-.96), anxiety disorder (i.e., panic disorder, social phobia, generalized anxiety disorder, specific phobia, PTSD) samples (alphas = .84-.94), and student samples (alphas = .83-.89).

The DOCS was also found to be more strongly correlated with other measures of OCD than with other forms of psychopathology, supporting its construct validity. Regarding convergent validity, its correlations with the OCI-R ranged from .65 - .71, and its correlation with the Yale-Brown Obsessive Compulsive Scale (Y-BOCS) was .54. Correlations between the DOCS and discriminant measures (i.e., depression, general anxiety and stress, and social anxiety) ranged from .08 to .52.

The mean DOCS score was found to be 30.06 ($SD = 15.49$) in OCD patients, 16.75 ($SD = 13.14$) in anxiety disorder patients, and 11.93 ($SD = 9.87$) in a student control group. In addition, ROC analyses revealed that scores on the DOCS were found to be significantly better than the

OCI-R at identifying individuals with OCD relative to non-patients (AUC = .86 vs .80; $Z = 4.68$, $p = .000$) and individuals with other anxiety disorders (AUC = .77 vs .70; $Z = 3.57$, $p = .000$).

A cutoff score of 18 was found to provide the best balance between sensitivity and specificity in classifying OCD patients from nonclinical adults, whereas the best balance between specificity and sensitivity in classifying OCD patients from those with other anxiety disorders was obtained with a cutoff score of 21 (Abramowitz et al., 2010).

Obsessive Beliefs Questionnaire-44 (OBQ-44)

The Obsessive Beliefs Questionnaire (OBQ; OCCWG, 2005) is a 44-item questionnaire that assesses dysfunctional beliefs thought to be characteristic of obsessional thinking. The scale is comprised of three subscales: (1) Responsibility/Threat Estimation (R/T), (2) Importance/Control of Thoughts (I/C), and (3) Perfectionism/Uncertainty (P/U). Items are rated on a 7-point scale ranging from “disagree very much” to “agree very much.” Internal consistency coefficients were found to be high for each scale (alphas = .93 for R/T; .93 for P/U; .89 for I/C; and .95 for total score). The mean total OBQ score was found to be 174.3 (SD=50.2) in OCD patients, 159.3 (SD=53.0) in anxiety disorder patients, 131.3 (SD=44.3) in student controls, and 96.0 (SD=35.1) in community controls.

Correlations between the OBQ total and OCD symptoms on the PI-R were found to be significant ($r_s = .27$ to $.59$). Significant correlations were also found between OCD symptoms and R/T ($r_s = .19$ to $.62$) and between OCD symptoms and P/U ($r_s = .19$ to $.45$). The I/C subscale was found to correlate with harm impulses and harm thoughts ($r_s = .27$ and $.42$), but not with grooming, checking, or contamination. Of note, the OCCWG (2005) stated that “there is probably little advantage in using the 6 OBQ-87 subscales. . . particularly given their

multicollinearity which will make interpretation of findings unreliable” (p. 1538). Thus, the OBQ-44 was selected for the current study rather than the OBQ-87.

Tolerance of Negative Affective States Scale (TNASS)

The Tolerance of Negative Affective States Scale (TNASS; Bernstein & Brantz, 2013) is a 25-item scale that assesses the extent to which individuals are tolerant of the following negatively valenced affective states: sadness, anger, fear, disgust, embarrassment, guilt, shame, anxiety, and distress. The items are rated on 5-point scale from “very intolerant” to “very tolerant.” The measure also provides definitions of tolerance and intolerance of emotion. The TNASS was developed to address a gap in distress tolerance research, specifically the absence of a measure of specific negatively valenced emotions. Tolerance of distressing affective states has been measured in extant research by assessing a broad conceptual definition of “distress” without delineating among specific emotions. The TNASS consists of six factors: 1. Fear-Distress (TolFear), 2. Sadness-Depression (TolSad), 3. Anger (TolAnger), 4. Disgust (TolDisgust), 5. Anxious-Apprehension (TolAnx), and 6. Negative Social Emotions (TolSocial). Internal consistency was supported for the TNASS total score ($\alpha = .92$) and each subscale (alphas = .76-.86). Significant correlations have been found between the TNASS factors and associated constructs. Specifically, TolFear was found to correlate with the AAQ ($r = .30, p < .01$) and all DTS scales except Non-Acceptance ($r_s = .20 - .36, p < .01$); TolSad was found to correlate with the AAQ ($r = .24, p < .01$) and all DTS scales except Absorption and Non-Acceptance ($r_s = .21 - .37, p < .01$); TolAnger was found to correlate with the AAQ ($r = .27, p < .01$) and all DTS scales except Absorption ($r_s = .25 - .28, p < .01$); TolDisgust was found to correlate with the AAQ ($r = .19, p < .01$) and DTS total scale, Tolerance, and Regulation ($r_s = .18 - .23, p < .01$);

TolAnx was found to correlate with the DTS total score, Tolerance, and Regulation ($r_s = .20 - .26, p < .01$); and TolSocial correlated with the AAQ ($r = .23, p < .01$) and DTS total, Tolerance, and Regulation ($r_s = .20 - .24, p < .01$).

Distress Tolerance Scale (DTS)

The Distress Tolerance Scale (DTS; Simons & Gaher, 2005) is a 15-item scale in which individuals indicate the extent to which they can withstand distressing psychological states. The DTS comprises four subscales that reflect facets of distress tolerance: (1) perceived ability to tolerate emotional distress, (2) subjective appraisal of distress, (3) attention absorbed by negative emotions, and (4) regulation efforts to alleviate distress. Items are rated on a 5-point scale from “strongly disagree” to “strongly agree,” and high scores are representative of high distress tolerance. Subscale scores are the mean of the items, and the total DTS score is formed from the mean of the four subscales.

Internal consistency has been found to be adequate for the total scale ($\alpha = .89$; Simons & Gaher, 2005) and all four subscales (α s = .82 - .86; Bardeen, Fergus, & Orcutt, 2013). Means in a student population were found to be 3.43 ($SD=0.76$) for the total score, 3.22 ($SD=1.00$) for Tolerance, 3.79 ($SD=0.82$) for Appraisal, 3.43 ($SD=1.00$) for Absorption, and 3.26 ($SD=0.92$) for Regulation. Additionally, the DTS was found to be negatively associated with measures of negative affectivity ($r = -.59$) and dysregulation ($r = -.51$) and positively correlated with positive affectivity ($r = .26$) and mood regulation expectancies ($r = .54$).

Center for Epidemiologic Studies Depression Scale (CES-D)

The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) is a 20-item self-report scale designed to measure depressive symptoms in the general population. Major components of depressive symptomatology were identified (i.e., depressed mood, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, psychomotor retardation, loss of appetite and sleep disturbance), and items were selected from previously validated depression scales to represent each component. Responses indicate how often over the past week participants experienced each symptom, and items are rated on a 4-point scale ranging from *rarely or none of the time* to *most of or all the time*.

The CES-D has been shown to be reliable in both general and clinical populations (coefficient alphas = .85 and .90, respectively). The mean CES-D score was found to range from 7.9-9.2 (SD=7.5-8.6) in general population samples and was found to be 24.4 (SD=13.5) in a psychiatric inpatient sample. It was shown to have a negative correlation with positive affect ($r = -.21$) and correlate higher with measures of depressed mood ($r_s = .57$ to $.61$) and general psychopathology ($r = .54$) than other variables (social functioning: $r = .19$; aggression: $r = .26$), providing evidence of discriminant validity (Radloff, 1977). It also has been shown to have good convergent validity ($r = .75$) with the BDI (Skorikov & VanderVoort, 2003). A cutoff score of 16 has been used to identify individuals at risk for clinical depression (Radloff, 1977).

Procedure

The study was administered using the MTurk online platform. Before beginning the task, respondents were informed about the nature of the study and their rights as participants. They

were asked to provide their informed consent to complete the study and to confirm that they were at least age 18, could read English fluently, and resided within the United States. For the remaining study items, participants were required to provide an answer for each item, although were permitted to select “I prefer not to answer” for any items they did not feel comfortable answering. Participants were provided with a debriefing page upon completion of the study, informing them of the more specific purpose of the study than was provided within the consent document. This debriefing page also provided contact information of the researchers and the phone number of the national crisis call center.

CHAPTER 3

RESULTS

Missing Data

The data were first analyzed for missing data: 5.95% of cases were found to have missing data, 14.47% of variables were found to have missing data, and only 0.05% of the total values were found to be missing. Notably, none of the items with missing data was missing more than two values.

Because the overall percentage of missing data was so small (0.05%), it is unlikely that missing values in this study have a significant impact on the dataset. In fact, researchers have suggested that small percentages³ of missing values may be corrected with relatively simple data imputation methods (e.g., mean substitution) that would produce biased results in datasets with larger amounts of missing values (Saunders et al., 2006). However, for the current study, expectation-maximization (EM), an iterative procedure that produces maximum likelihood estimates (Graham, 2009), was used to impute the missing values. In this procedure, if a value is missing, the “best guess” is computed. The “best guess” is a regression-based single imputation with all other study variables used as predictors. Although the EM algorithm does not provide standard errors as an automatic part of the process, because of the small amount

³There has not been a consistent definition of “small” percentages of missing data in the literature, but researchers have suggested percentages ranging from 5% to 20% (Saunders et al., 2006).

of missing data in this study, any potential biases and/or loss of power would likely be inconsequential (Graham, 2009).

Normality

Scales were examined for relative normality of the distribution of the data. Skew and kurtosis values were calculated for variables. According to Field (2013), in large samples, absolute values greater or less than 2.58 are sufficient to establish normality of the data. They also indicate that in “very large samples” (specific number was not specified) no criterion should be applied, and ultimately significance tests of skewness and kurtosis should not be used. In the current sample ($n = 336$), values of skew were found to range from -0.5 to 1.7. Values of kurtosis were found to be between -1.1 and 2.9. Only three values of kurtosis were above the suggested cutoff of 2.58 for normality (2.6, 2.6, and 2.9).

In addition, according to Field (2013), tests of normality in large samples are likely to be significant, even for small and unimportant effects, and may lead to unnecessary corrections in data. Specifically, the central limit theorem (CLT) indicates that in large samples, the sampling distribution will be normal regardless of the shape of the population (Field, 2013). Field also points out that a better approximation of normal is found with samples of 100, and in heavy-tailed distributions, samples of 160 might even be necessary. Following Field’s recommendation for large samples, the shapes of the distributions were also examined visually and were shown to approximate normality.

Outliers

Values that were found to be 2.2 times the interquartile range above Q3 or below Q1 were identified as outliers (Hoaglin & Iglewicz, 1987). Using this approach, the DOCS was the only measure that was found to have any outliers. Six values were found to be greater than the upper bound of the identified range. Nonetheless, closer examination of these values shows that they were only incrementally larger than the rest of the data, and all were well below the possible upper bound of the measure. Given that the current sample is not a clinical sample of OCD patients, it makes sense that the distribution of values on the DOCS would be somewhat positively skewed, as most participants likely would not endorse high levels of OCD symptoms. Thus, these identified outliers do not appear to be invalid or overly influential and were retained in the dataset.

Descriptive Statistics

Descriptive statistics were computed for all scales and subscales and are presented in Table 2. Means and standard deviations of scales were found to be similar to those obtained from previous studies (see Table 3), suggesting that these measures performed as intended within the current sample.

Coefficient alphas and average inter-item correlations (AIC) were calculated to assess internal consistency reliability. Total scale scores demonstrated coefficient alphas of at least .91, and all subscales of all measures demonstrated coefficient alphas of at least .81.⁴ Average inter-item correlations for total scale scores demonstrated reasonable internal consistency with values

⁴Coefficient alpha was not calculated for one subscale (TolAnx) that consists only of two items.

Table 2

Descriptive statistics and internal consistency reliability for all study variables

Scale	#items	<i>M</i>	<i>SD</i>	α^a	AIC	skew	kurt	Possible Range	Actual Range
DOCS	20	10.2	9.6	.92	.37	1.5	2.6	0-80	0-49
Contamination	5	2.4	3.0	.87	.59	1.7	2.9	0-20	0-17
Responsibility	5	2.7	3.2	.91	.67	1.4	1.9	0-20	0-16
Symmetry	5	2.4	3.2	.92	.69	1.4	1.6	0-20	0-17
Thoughts	5	2.8	3.5	.92	.69	1.6	2.6	0-20	0-19
OBQ	44	149.0	47.6	.96	.34	0.2	-0.5	44-308	44-275
R/T	16	57.6	19.5	.91	.38	0.0	-0.5	16-112	16-102
I/C	12	30.2	13.8	.90	.44	0.8	0.0	12-84	12-72
P/U	16	61.2	20.7	.93	.43	0.2	-0.6	16-112	16-110
TNASS	21	65.7	12.6	.93	.39	0.2	-0.1	21-105	21-105
Fear/Distress	4	12.2	3.9	.82	.53	0.0	-0.5	4-20	4-20
Sad/Depression	3	9.7	3.0	.81	.59	-0.2	-0.6	3-15	3-15
Anger	3	9.3	3.3	.87	.69	0.0	-0.9	3-15	3-15
Disgust	3	10.1	3.2	.86	.66	-0.3	-0.7	3-15	3-15
Anxious/Appr	2	6.4	2.1	---	---	-0.1	-0.8	2-10	2-10
Negative Social	6	18.0	5.7	.87	.52	0.3	-0.5	6-30	6-30
DTS	15	3.4	1.0	.94	.52	-0.4	-0.8	1-5	1-5
Tolerate	3	3.4	1.1	.82	.60	-0.3	-1.0	1-5	1-5
Appraisal	6	3.6	1.1	.89	.58	-0.5	-0.7	1-5	1-5
Absorption	3	3.3	1.2	.87	.69	-0.2	-1.1	1-5	1-5
Regulation	3	3.3	1.1	.82	.60	-0.1	-1.0	1-5	1-5
CES-D	20	15.1	13.6	.95	.47	1.0	-0.1	0-60	0-53

Note. $N = 336$. DOCS = Dimensional Obsessive-Compulsive Scale; OBQ = Obsessive Beliefs Questionnaire; R/T = Responsibility/Threat Estimation; I/C = Importance and Control of Thoughts; P/U = Perfectionism/Intolerance of Uncertainty; TNASS = Tolerance of Negative Affective States Scales; Appr = Apprehension; DTS = Distress Tolerance Scale; CES-D = Center for Epidemiologic Studies Depression Scale. α = Cronbach's coefficient alpha; AIC = Average inter-item correlation; kurt = kurtosis.

^aAlthough alpha values are rather high, the item intercorrelations are within the acceptable range, which suggests that the measure items are both interrelated and multidimensional (see Cortina, 1993, for discussion).

Table 3

Comparison of means and standard deviations to previous samples

Scale	Current (<i>N</i> = 336)		Previous	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
DOCS	10.2	9.6	10.7	9.8
Contamination	2.4	3.0	2.5	2.9
Responsibility	2.7	3.2	2.4	2.8
Symmetry	2.4	3.2	2.6	3.1
Thoughts	2.8	3.5	2.8	3.2
OBQ	149.0	47.6	131.3	44.3
Responsibility/Threat	57.6	19.5	48.4	18.7
Importance/Control	30.2	13.8	27.1	11.6
Perfectionism/Uncertainty	61.2	20.7	55.5	20.1
TNASS	65.7	12.6	72.5	18.4
DTS	3.4	1.0	3.4	0.8
Tolerance	3.4	1.1	3.3	1.0
Appraisal	3.6	1.1	3.8	0.8
Absorption	3.3	1.2	3.4	1.0
Regulation	3.3	1.1	3.3	0.9
CES-D	15.1	13.6	16.0	12.0

Note. Previous studies used for comparison include: Abramowitz et al., 2010; Obsessive Compulsive Cognitions Working Group, 2005; Kiselica et al., 2014; Simons & Gaher, 2005; Santor et al., 1995. DOCS = Dimensional Obsessive-Compulsive Scale; OBQ = Obsessive Beliefs Questionnaire; TNASS = Tolerance of Negative Affective States Scales; Appr = Apprehension; DTS = Distress Tolerance Scale; CES-D = Center for Epidemiologic Studies Depression Scale.

ranging from .34 to .52 (the recommended range is between .15 and .50; Clark & Watson, 1995).

Subscales were shown to have higher AIC values (.52 to .69), which is expected due to the narrower content area being assessed. Overall, these internal consistency estimates suggest that the current measures performed as expected in this sample and offer reasonable reliability. Zero-order correlations between variables are presented in Table 4.

Sample Characteristics

Sixty-one individuals (18.2% of the sample) were found to have scores on the DOCS greater than or equal to the recommended cutoff score (18) that provided the best balance between sensitivity and specificity in classifying clinical OCD from nonclinical adults (Abramowitz et al., 2010). In addition, 127 individuals (37.8% of the sample) were found to be at risk for clinical depression, based on the commonly used cutoff score of 16 on the CES-D (Radloff, 1977).

Primary Analyses

Considerations for Regression Analyses

If a large number of associations are examined together for statistical significance, the probability of finding significant values is high. The more variables examined, the higher the probability of finding significance. A common practice among researchers has been to make statistical adjustments (or “corrections”) for multiple comparisons, which typically involves decreasing the *P*-value and thus decreases the probability of significance (Rothman, 1990). This

Table 4

Zero-order correlations among all study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Tol Fear/Distress	--														
2. Tol Sadness/Depression	.60	--													
3. Tol Anger	.46	.47	--												
4. Tol Disgust	.47	.31	.50	--											
5. Tol Anxiety/Appreh.	.72	.59	.39	.28	--										
6. Tol Negative Social	.66	.58	.51	.54	.50	--									
7. DOCS-Contamination	-.13	-.16	-.14	-.17	-.17	-.15	--								
8. DOCS-Responsibility	-.22	-.17	-.09	-.12	-.25	-.17	.48	--							
9. DOCS-Thoughts	-.14	-.25	-.14	-.04	-.22	-.20	.26	.44	--						
10. DOCS-Symmetry	-.14	-.16	-.15	-.08	-.16	-.12	.40	.41	.37	--					
11. OBQ_RT	-.35	-.29	-.27	-.16	-.34	-.26	.33	.53	.40	.34	--				
12. OBQ ICT	-.23	-.28	-.25	-.15	-.26	-.21	.27	.35	.39	.32	.63	--			
13. OBQ_PU	-.32	-.27	-.28	-.16	-.31	-.29	.28	.44	.39	.42	.72	.63	--		
14. CES-D	-.28	-.22	-.22	-.09	-.30	-.24	.14	.42	.52	.30	.51	.38	.53	--	
15. DTS	.40	.43	.34	.14	.43	.33	-.21	-.40	-.47	-.33	-.57	-.42	-.59	-.59	--

Note. $N = 336$. Tol = Tolerance; Appreh. = Apprehension; DOCS = Dimensional Obsessive-Compulsive Scale; OBQ = Obsessive Beliefs Questionnaire; RT = Responsibility/Threat; ICT = Importance/Control of Thoughts; PU = Perfectionism/Uncertainty; CES-D = Center for Epidemiologic Studies Depression Scale; DTS = Distress Tolerance Scale.

Bolded values are significant at $p < .05$.

issue was taken into consideration for the current study, given that each of the TNASS scales was entered into the regression equations separately (versus using a total score).

Although statistical corrections are a common practice, Rothman (1990) argues that these adjustments can be counterproductive. He recalls that the premise for statistical adjustments is the hypothesis that there are no associations between the variables being observed (i.e., the null hypothesis) and suggests that “for the large bodies of data for which adjustments for multiple comparisons are most enthusiastically recommended, the tenability of a universal null hypothesis is most farfetched” (p. 45). He also argues that “scientists should not be so reluctant to explore leads that may turn out to be wrong that they penalize themselves by missing possibly important findings” (p. 43).

Because most previous research has measured distress tolerance as a single construct, the current study could offer new conclusions about OCD symptomatology by instead investigating specific types of emotional distress. Uncovering associations that might otherwise have been masked would provide a useful foundation for which future studies could then expand upon. Thus, following Rothman’s recommendations, statistical corrections for regression analyses were not made. Other issues that could impact the significance of findings will be explored, including multicollinearity among variables and magnitude of effect sizes.

Hypothesis 1a

To address whether intolerance to negatively valenced affective states is associated with OC symptoms after accounting for depressive symptoms, a series of hierarchical regressions was performed on each of the DOCS scales. The CES-D was entered into the first step and the TNASS scales were entered into the second step.

First, variance inflation factors (VIF) were examined to assess for the presence of multicollinearity in each of the models. If multicollinearity is high, the regression coefficients will be unstable and difficult to interpret. If none of the predictor variables are correlated (i.e., the absence of multicollinearity), VIF values will be equal to 1. A general rule that has been suggested is that the VIF should not exceed 10 (Belsley, Kuh, & Welsch, 1980). For each of the regression models, VIF values for TNASS scales all ranged from 1.13 to 3.00, suggesting that multicollinearity is not likely to be problematic in these analyses.

The results of the regressions (see Table 5) showed that after accounting for the CES-D, the TNASS scales predicted additional variance in two of the four DOCS dimensions (Contamination and Unacceptable Thoughts). These findings were specific to three of the TNASS scales (TolDisgust, TolSad, and TolFear). Specifically, decreased TolDisgust was a significant predictor of DOCS-Contamination ($F_{(7,328)} = 3.14, p < .05; \beta = -0.15, p < .05$) and decreased TolSad was a significant predictor of DOCS-Unacceptable Thoughts ($F_{(7,328)} = 20.84, p < .05; \beta = -0.17, p < .05$).

In addition, *increased* TolFear was shown to be a predictor of DOCS-Unacceptable Thoughts ($\beta = 0.20, p < .05$), which is in the opposite direction of what would be expected. However, upon further examination, this appears to be the result of a suppression effect. Zero-order correlations show that TolFear is weakly and negatively associated with DOCS-Unacceptable Thoughts ($r = -.14$), which reveals a sign reversal in the regression analysis. Zero-order correlations also show that TolFear has higher correlations with other predictors, which also have stronger associations with the criterion. This kind of suppression produces a paradoxical effect on the suppressor variable, revealing a regression weight that has an opposite sign to its zero-order correlation.

Table 5

Hierarchical regressions: TNASS predicting DOCS, accounting for CES-D

		<i>B</i>	<i>SE B</i>	β	ΔR^2	<i>t</i>	<i>p</i>
Contamination							
Step 1:	CES-D	0.03	0.01	0.14	0.02*	2.59	.01*
Step 2:	CES-D	0.02	0.01	0.10	0.04*	1.78	.07
	Fear/Distress	0.10	0.07	0.13		1.45	.15
	Sad/Depress	-0.07	0.08	-0.07		-0.94	.35
	Anger	0.01	0.06	0.01		0.09	.93
	Disgust	-0.14	0.06	-0.15		-2.24	.03*
	Anx/Appr	-0.20	0.12	-0.14		-1.70	.09
	Neg Social	-0.02	0.04	-0.03		-0.34	.69
Responsibility							
Step 1:	CES-D	0.10	0.01	0.42	0.18*	8.42	.00*
Step 2:	CES-D	0.09	0.01	0.39	0.03	7.37	.00*
	Fear/Distress	-0.01	0.07	-0.01		-0.15	.88
	Sad/Depress	-0.03	0.07	-0.03		-0.42	.67
	Anger	0.10	0.06	0.10		1.61	.11
	Disgust	-0.09	0.06	-0.09		-1.38	.17
	Anx/Appr	-0.19	0.11	-0.13		-1.70	.09
	Neg Social	0.00	0.04	0.01		0.06	.95
Unacceptable Thoughts							
Step 1:	CES-D	0.14	0.01	0.52	0.27*	11.18	.00*
Step 2:	CES-D	0.13	0.01	0.50	0.04*	10.22	.00*
	Fear/Distress	0.18	0.07	0.20		2.49	.01*
	Sad/Depress	-0.20	0.08	-0.17		-2.70	.01*
	Anger	0.03	0.06	0.03		0.50	.62
	Disgust	0.02	0.07	0.02		0.37	.71
	Anx/Appr	-0.13	0.12	-0.08		-1.08	.29
	Neg Social	-0.07	0.04	-0.11		-1.51	.13
Symmetry							
Step 1:	CES-D	0.07	0.01	0.30	0.09	5.67	.00*
Step 2:	CES-D	0.06	0.01	0.27	0.01	4.80	.00*
	Fear/Distress	0.02	0.08	0.03		0.29	.78
	Sad/Depress	-0.09	0.08	-0.08		-1.14	.26
	Anger	-0.06	0.07	-0.06		-0.92	.36
	Disgust	-0.02	0.07	-0.02		-0.25	.81
	Anx/Appr	-0.06	0.12	-0.04		-0.49	.63
	Neg Social	0.02	0.05	0.03		0.42	.68

Note. *N* = 336. TNASS = Tolerance of Negative Affective States Scales; DOCS = Dimensional Obsessive-Compulsive Scale; CES-D = Center for Epidemiologic Studies Depression Scale; Anx/Appr = Anxiety/Apprehension; Neg = Negative.

* = significant at $p < .05$.

Hypothesis 1b

To address whether intolerance to negatively valenced emotional states is associated with OC symptoms after accounting for general distress tolerance, another series of hierarchical regressions was performed on each of the DOCS scales (see Table 6.) This time, the DTS was entered into the first step, and the TNASS scales were entered into the second step.

Again, VIF values were examined to assess for the presence of multicollinearity in the analyses. They were found to range from 1.35 to 2.98, suggesting that multicollinearity is likely not problematic in these analyses.

Results from the regressions showed that after accounting for the DTS, the TNASS predicted variance in two of the four DOCS dimensions (Contamination and Unacceptable Thoughts). After accounting for the DTS, decreased TolDisgust remained a significant predictor of DOCS-Contamination ($F_{(7,328)} = 3.77, p < .05; \beta = -0.16, p < .05$). *Increased* TolFear was again found to be a predictor of DOCS-Unacceptable Thoughts ($F_{(7,328)} = 14.69, p < .05; \beta = 0.20, p < .05$).

As with the previous analysis, the reversed sign of the regression coefficient suggests that this is likely the result of a suppression effect. Zero-order correlations revealed that TolFear has higher correlations with other predictors than with the criterion, which also have stronger associations with the criterion.

Hypothesis 1c

To explore whether specific emotional states are generally associated with specific OC symptom dimensions, a series of simple linear regressions was computed. The TNASS scales were entered as predictor variables with each of the DOCS scales as outcome variables. The

Table 6

Hierarchical regressions: TNASS predicting DOCS, accounting for DTS

		<i>B</i>	<i>SE B</i>	β	ΔR^2	<i>t</i>	<i>p</i>
Contamination							
Step 1:	DTS	-0.62	0.16	-0.21	0.04*	-3.85	.00*
Step 2:	DTS	-0.50	0.19	-0.17	0.03*	-2.71	.01*
	Fear/Distress	0.11	0.07	0.14		1.55	.12
	Sad/Depress	-0.04	0.08	-0.04		-0.48	.63
	Anger	0.02	0.06	0.02		0.33	.74
	Disgust	-0.15	0.06	-0.16		-2.40	.02*
	Anx/Appr	-0.17	0.11	-0.12		-1.51	.13
	Neg Social	-0.02	0.04	-0.04		-0.46	.65
Responsibility							
Step 1:	DTS	-1.27	0.16	-0.40	0.16*	-7.86	.00*
Step 2:	DTS	-1.23	0.19	-0.38	0.02	-6.56	.00*
	Fear/Distress	-0.01	0.07	-0.01		-0.12	.91
	Sad/Depress	0.06	0.08	0.05		0.74	.46
	Anger	0.12	0.06	0.12		1.83	.07
	Disgust	-0.09	0.07	-0.09		-1.44	.15
	Anx/Appr	-0.18	0.12	-0.12		-1.54	.13
	Neg Social	-0.01	0.04	-0.02		-0.02	.80
Unacceptable Thoughts							
Step 1:	DTS	-1.65	0.17	-0.47	0.22*	-9.63	.00*
Step 2:	DTS	-1.60	0.20	-0.45	0.02*	-8.08	.00*
	Fear/Distress	0.18	0.08	0.20		2.36	.02*
	Sad/Depress	-0.09	0.08	-0.08		-1.11	.27
	Anger	0.05	0.07	0.04		0.71	.48
	Disgust	0.02	0.07	0.02		0.33	.74
	Anx/Appr	-0.12	0.12	-0.07		-0.97	.34
	Neg Social	-0.09	0.05	-0.14		-1.93	.06
Symmetry							
Step 1:	DTS	-1.05	0.17	-0.33	0.11*	-6.27	.00*
Step 2:	DTS	-0.99	0.20	-0.31	0.00	-5.06	.00*
	Fear/Distress	0.03	0.08	0.03		0.36	.72
	Sad/Depress	-0.02	0.08	-0.02		-0.26	.80
	Anger	-0.04	0.07	-0.04		-0.63	.53
	Disgust	-0.03	0.07	-0.03		-0.39	.70
	Anx/Appr	-0.04	0.12	-0.02		-0.30	.77
	Neg Social	0.01	0.05	0.02		0.22	.83

Note. *N* = 336. TNASS = Tolerance of Negative Affective States Scales; DOCS = Dimensional Obsessive-Compulsive Scale; DTS = Distress Tolerance Scale; Anx/Appr = Anxiety/Apprehension; Neg = Negative.

* = significant at $p < .05$.

results showed that the TNASS predicted significant variance in three of the four DOCS dimensions.

Specifically, TolDisgust predicted DOCS-Contamination ($F_{(6,329)} = 3.12, p < .05; \beta = -0.14, p < .05$). In addition, TolAnx predicted significant variance in DOCS-Responsibility ($F_{(6,329)} = 4.10, p < .05; \beta = -0.20, p < .05$). The TNASS also predicted significant variance in DOCS-Unacceptable Thoughts ($F_{(6,329)} = 5.24, p < .05$), explained by TolAnx ($\beta = -0.16, p < .05$) and TolSad ($\beta = -0.16, p < .05$). These findings are presented in Table 7.

Hypothesis 2a

To replicate previous studies that found associations between the OBQ and OCD symptoms even after accounting for depressive symptoms, another set of hierarchical regressions was computed. The CES-D was entered into the first step of the equation, and the three OBQ scales were entered into the second step. The OBQ was found to predict additional variance for each of the DOCS scales: Contamination ($F_{(4,331)} = 11.11, p < .05$), Responsibility ($F_{(4,331)} = 37.31, p < .05$), Unacceptable Thoughts ($F_{(4,331)} = 38.72, p < .05$), and Symmetry ($F_{(4,331)} = 19.10, p < .05$).

Results were found to replicate previously observed patterns. Specifically, OBQ-RT was found to predict DOCS-Contamination ($\beta = 0.24, p < .05$) and DOCS-Responsibility ($\beta = 0.40, p < .05$); OBQ-I/C was found to predict DOCS-Unacceptable Thoughts ($\beta = 0.19, p < .05$), and OBQ-P/U was found to predict DOCS-Symmetry ($\beta = 0.30, p < .05$). Findings are presented in Table 8.

Table 7

Regressions for TNASS predicting DOCS

	<i>B</i>	<i>SE B</i>	β	R^2	<i>t</i>	<i>p</i>
Contamination				0.05*		
Fear/Distress	0.10	0.07	0.12		1.35	.18
Sad/Depress	-0.07	0.08	-0.07		-0.91	.36
Anger	-0.01	0.06	-0.01		-0.09	.93
Disgust	-0.13	0.06	-0.14		-2.06	.04*
Anxious/Appr	-0.22	0.11	-0.16		-1.93	.06
Negative Social	-0.02	0.04	-0.04		-0.52	.60
Responsibility				0.07*		
Fear/Distress	-0.04	0.08	-0.05		-0.54	.59
Sad/Depress	-0.02	0.08	-0.02		-0.29	.78
Anger	0.05	0.07	0.05		0.78	.44
Disgust	-0.04	0.07	-0.04		-0.61	.54
Anxious/Appr	-0.29	0.12	-0.20		-2.42	.02*
Negative Social	-0.02	0.05	-0.03		-0.43	.67
Unacceptable Thoughts				0.09*		
Fear/Distress	0.14	0.08	0.15		1.65	.10
Sad/Depress	-0.19	0.09	-0.16		-2.21	.03*
Anger	-0.04	0.07	-0.03		-0.51	.61
Disgust	0.09	0.07	0.08		1.20	.23
Anxious/Appr	-0.27	0.13	-0.16		-2.04	.04*
Negative Social	-0.10	0.05	-0.16		-1.20	.05
Symmetry				0.04		
Fear/Distress	0.00	0.08	0.00		0.00	.99
Sad/Depress	-0.08	0.08	-0.08		-1.03	.30
Anger	-0.09	0.07	-0.10		-1.38	.17
Disgust	0.02	0.07	0.02		0.22	.83
Anxious/Appr	-0.13	0.12	-0.09		-1.04	.30
Negative Social	0.00	0.05	0.01		0.08	.94

Note. $N = 336$. TNASS = Tolerance of Negative Affective States Scales; DOCS = Dimensional Obsessive-Compulsive Scale; Anx/Appr = Anxiety/Apprehension.

* = significant at $p < .05$.

Table 8

Hierarchical regressions: TNASS predicting DOCS, accounting for OBQ

		<i>B</i>	<i>SE B</i>	β	ΔR^2	<i>t</i>	<i>p</i>
Contamination							
Step 1:	R/T	0.05	0.01	0.33	0.11*	6.33	.00*
Step 2:	R/T	0.05	0.01	0.31	0.03*	5.56	.00*
	Fear/Distress	0.14	0.07	0.18		2.01	.04*
	Sad/Depress	-0.05	0.07	-0.05		-0.72	.47
	Anger	0.03	0.06	0.03		0.50	.62
	Disgust	-0.15	0.06	-0.16		-2.37	.02*
	Anx/Appr	-0.16	0.11	-0.11		-1.43	.15
	Neg Social	-0.02	0.04	-0.04		-0.52	.60
Responsibility							
Step 1:	R/T	0.09	0.01	0.53	0.28*	11.37	.00*
Step 2:	R/T	0.09	0.01	0.52	0.02*	10.24	.00*
	Fear/Distress	0.03	0.07	0.04		0.51	.61
	Sad/Depress	0.01	0.07	0.01		0.10	.92
	Anger	0.12	0.06	0.12		1.20	.04*
	Disgust	-0.07	0.06	-0.07		-1.11	.27
	Anx/Appr	-0.18	0.11	-0.12		-1.71	.09
	Neg Social	-0.02	0.04	0.03		-0.44	.66
Unacceptable Thoughts							
Step 1:	I/C	0.10	0.01	0.39	0.15*	7.74	.00*
Step 2:	I/C	0.09	0.01	0.35	0.04*	6.57	.00*
	Fear/Distress	0.13	0.08	0.15		1.71	.09
	Sad/Depress	-0.13	0.08	-0.11		-1.58	.12
	Anger	0.01	0.07	0.01		0.18	.86
	Disgust	0.09	0.07	0.08		1.33	.19
	Anx/Appr	-0.20	0.13	-0.12		-1.57	.12
	Neg Social	-0.10	0.05	-0.16		-2.10	.04*
Symmetry							
Step 1:	P/U	0.07	0.01	0.42	0.18*	8.42	.00*
Step 2:	P/U	0.06	0.01	0.41	0.01	7.53	.00*
	Fear/Distress	0.04	0.07	0.04		0.50	.62
	Sad/Depress	-0.08	0.08	-0.07		-1.01	.31
	Anger	-0.03	0.06	-0.03		-0.51	.61
	Disgust	-0.01	0.06	-0.01		-0.15	.88
	Anx/Appr	-0.05	0.12	-0.03		-0.40	.69
	Neg Social	0.03	0.04	0.04		0.58	.56

Note. *N* = 336. TNASS = Tolerance of Negative Affective States Scales; DOCS = Dimensional Obsessive-Compulsive Scale; OBQ = Obsessives Beliefs Questionnaire; RT = Responsibility/Threat; Anx/Appr = Anxiety/Apprehension; Neg = Negative; ICT = Importance/Control of Thoughts; PU = Perfectionism/Uncertainty. * = significant at *p* < .05.

Hypothesis 2b

To examine whether intolerance to negative affective states predicts OC variance beyond obsessive beliefs, another set of hierarchical regressions was conducted on each of the DOCS scales (see Table 9). The OBQ scale that was found to be significantly associated to the specific DOCS symptom dimension (e.g., OBQ-R/T for DOCS-Contamination) was entered into the first step of the equation to account for the associated obsessive belief. All of the TNASS variables were then entered into the second step.

VIF values were examined in each of the analyses to assess for the presence of multicollinearity. They were found to range from 1.12 to 3.00, suggesting that multicollinearity is not likely to be problematic for any of these analyses.

Results showed that the TNASS predicted additional variance for three of the four DOCS dimensions. Specifically, after accounting for OBQ-R/T, the TNASS scales were predictive of DOCS-Contamination ($F_{(7,328)} = 7.32, p < .05$), explained by decreased TolDisgust ($\beta = -0.16, p < .05$) and increased TolFear ($\beta = 0.18, p < .05$). After accounting for OBQ-R/T, an increased TolAnger was predictive of DOCS-Responsibility ($F_{(7,328)} = 19.60, p < .05; \beta = 0.12, p < .05$). After accounting for OBQ-I/C, decreased TolSocial was found to be predictive of DOCS-Unacceptable Thoughts ($F_{(7,328)} = 11.23, p < .05; \beta = -0.16, p < .05$).

The two findings that revealed *increased* emotion tolerance as a predictor of OCD symptoms (i.e., TolFear predicting Contamination, and TolAnger predicting Responsibility) again seem to be resulting from suppression effects. Similar to the previous analyses, the zero-order correlations between emotion tolerance and OCD symptoms were slightly negative to

Table 9

Hierarchical regressions: OBQ predicting DOCS, accounting for CES-D

	<i>B</i>	SE <i>B</i>	β	ΔR^2	<i>t</i>	<i>p</i>
Contamination						
Step 1: CES-D	0.03	0.01	0.14	0.02*	2.59	.01*
Step 2: CES-D	-0.01	0.01	-0.06	0.10*	-0.96	.34
R/T	0.04	0.01	0.24		3.05	.00*
P/U	0.01	0.01	0.08		0.98	.33
I/C	0.02	0.02	0.09		1.30	.20
Responsibility						
Step 1: CES-D	0.10	0.01	0.42	0.18*	8.42	.00*
Step 2: CES-D	0.05	0.01	0.19	0.14*	3.44	.00*
R/T	0.07	0.01	0.40		5.60	.00*
P/U	0.01	0.01	0.06		0.82	.41
I/C	-0.00	0.02	-0.01		-0.17	.87
Unacceptable Thoughts						
Step 1: CES-D	0.14	0.01	0.52	0.27*	11.18	.00*
Step 2: CES-D	0.11	0.01	0.41	0.05*	7.53	.00*
R/T	0.01	0.01	0.07		0.96	.34
P/U	0.00	0.01	0.01		0.12	.90
I/C	0.05	0.02	0.19		3.05	.00*
Symmetry						
Step 1: CES-D	0.07	0.01	0.30	0.09*	5.67	.00*
Step 2: CES-D	0.02	0.01	0.09	0.10*	1.56	.12
R/T	0.01	0.01	0.04		0.51	.61
P/U	0.05	0.01	0.30		3.83	.00*
I/C	0.02	0.02	0.07		1.04	.30

Note. $N = 336$. OBQ = Obsessive Beliefs Questionnaire; DOCS = Dimensional Obsessive-Compulsive Scale; CES-D = Center for Epidemiologic Studies Depression Scale; RT = Responsibility/Threat; ICT = Importance/Control of Thoughts; PU = Perfectionism/Uncertainty. * = significant at $p < .05$.

nonsignificant, revealing changes in sign and magnitude of the associations in the regression analyses.

Hypothesis 2c

To determine whether intolerance of emotions moderates the association between obsessive beliefs and OC symptoms, an interaction term was created between the OBQ and TNASS total scores (see Table 10). A series of hierarchical regressions was conducted on the DOCS scales with the OBQ and TNASS total scores entered into the first step of the equation and the interaction variable entered into the second step. None of the interaction variables were found to be a significant predictor of the DOCS scales.

Table 10

Hierarchical regressions: OBQ TNASS interaction predicting DOCS*

		<i>B</i>	SE <i>B</i>	β	ΔR^2	<i>t</i>	<i>p</i>
Contamination							
Step 1:	OBQ	0.02	0.00	0.30	0.12*	5.45	.00*
	TNASS	-0.01	0.01	-0.08		-1.43	.16
Step 2:	OBQ	0.00	0.01	0.07	0.00	0.33	.74
	TNASS	-0.05	0.03	-0.26		-1.64	.10
	OBQ*TNASS	0.00	0.00	0.25		1.22	.23
Responsibility							
Step 1:	OBQ	0.03	0.00	0.50	0.26*	9.69	.00*
	TNASS	-0.01	0.01	-0.03		-0.57	.57
Step 2:	OBQ	0.03	0.01	0.41	0.00	2.19	.03*
	TNASS	-0.02	0.03	-0.10		-0.66	.51
	OBQ*TNASS	0.00	0.00	0.09		0.49	.62
Unacceptable Thoughts							
Step 1:	OBQ	0.03	0.00	0.43	0.20*	8.08	.00*
	TNASS	-0.01	0.01	-0.05		-0.98	.33
Step 2:	OBQ	0.04	0.01	0.58	0.00	3.01	.00*
	TNASS	0.01	0.03	0.06		0.42	.67
	OBQ*TNASS	0.00	0.00	-0.16		-0.82	.41
Symmetry							
Step 1:	OBQ	0.03	0.00	0.41	0.17*	7.56	.00*
	TNASS	-0.00	0.01	-0.02		-0.28	.78
Step 2:	OBQ	0.04	0.01	0.53	0.00	2.68	.01*
	TNASS	0.02	0.03	0.08		0.49	.63
	OBQ*TNASS	0.00	0.00	-0.12		-0.62	.53

Note. $N = 336$. OBQ = Obsessive Beliefs Questionnaire; TNASS = Tolerance of Negative Affective States Scales.

* = significant at $p < .05$.

CHAPTER 4

DISCUSSION

General Findings Regarding Emotion Tolerance and OCD

The current study sought to investigate the role of emotion intolerance in OCD symptoms. Associations between OCD symptoms and one's ability to tolerate several specific emotional states were examined. Effects of depressive symptoms, overall distress tolerance, and obsessive beliefs were also considered in the analyses. In general, findings provided some evidence that one's ability to tolerate emotional experiences may be important in OCD; however, it should be noted that the effect sizes were quite small in this study.

Simple linear regressions showed that intolerance to disgust, anxiety/apprehension, and sadness/depression were significantly associated with OCD symptoms. Specifically, contamination aversion was associated with intolerance of disgust; responsibility for harm was related to intolerance of anxiety/apprehension; and unacceptable thoughts were related to intolerance of sadness/depression as well as intolerance of anxiety/apprehension. Symptoms of OCD related to symmetry were not significantly associated with one's ability to tolerate any particular emotional experience that was measured in this study.

The significant association between intolerance to disgust and contamination aversion in OCD was robust. Specifically, this association was found even after controlling for various symptom domains, including depression, general distress tolerance, and obsessive beliefs (specifically, inflated responsibility/overestimation of threat). This is consistent with previous

studies that have investigated the experience of disgust in OCD. Extant evidence supports the role of both cognitive and affective mechanisms in OCD symptoms (e.g., Adams et al., 2013; Cisler et al., 2010). As such, it seems likely that obsessive beliefs regarding responsibility and threat, as well as intolerance to disgust, both play a role in contamination fears in OCD.

Intolerance to anxiety/apprehension was associated with higher levels of OCD symptoms related to unacceptable thoughts (e.g., unpleasant thoughts about sex, immorality, or violence that come to mind against one's will). In other words, individuals who are bothered by unwanted distressing thoughts appear to be less tolerant to feelings of anxiety and apprehension. These individuals are more likely to engage in efforts to decrease or eliminate these thoughts as well as to decrease or eliminate feelings of anxiety.

Intolerance of anxiety/apprehension was also associated with OCD symptoms related to concerns about being responsible for harm, injury or bad luck. Therefore, individuals who are intolerant of anxiety may be more likely to engage in excessive efforts to prevent the occurrence of negative outcomes, such as accidents or injuries. Such efforts may include excessive checking behaviors (e.g., checking to see if the stove is on), counting (e.g., the number of steps one takes), reassurance seeking (e.g., asking others for confirmation that something is okay), or following special routines (e.g., locking doors in a particular order) to try to prevent harm. These individuals may be engaging in these actions both to prevent negative outcomes as well as to decrease their feelings of anxiety.

Although intolerance of anxiety/apprehension was shown to predict OCD symptoms in two domains (i.e., unacceptable thoughts, concerns about responsibility/harm), after accounting for depressive symptoms, general distress tolerance, or obsessive beliefs, these associations were no longer significant. This suggests that intolerance of anxiety/apprehension is not a robust or

strong predictor of OCD symptoms. It might be the case that anxiety associated with OCD symptoms is very specific to particular feared consequences, but general anxiety that spans across various situations is experienced differently. For example, anxiety about running late for an appointment might be tolerated more effectively than anxiety about leaving the oven on, which could cause a fire, which could burn the house down, etc. Individuals may feel differently about their overall ability to tolerate anxiety versus their ability to tolerate the very specific type of anxiety that is associated with their individual OCD symptoms.

In addition, after accounting for variance explained by obsessive beliefs, intolerance of negative social emotions was found to be predictive of unacceptable thoughts in OCD. In other words, individuals who are bothered by unacceptable thoughts may also feel unable to tolerate emotional experiences like guilt, shame, and embarrassment. This makes sense, as unacceptable thoughts in OCD often reflect themes that are perceived as immoral or embarrassing. For example, someone who feels incapable of dealing with shame/guilt may be particularly distressed by intrusive thoughts regarding behaviors that are perceived as immoral (e.g., engaging in sexual/aggressive acts).

Findings also revealed that intolerance to sadness/depression was related to the OCD domain of unacceptable thoughts. This is consistent with previous studies that have shown associations between obsessions and poor tolerance for sadness (e.g., Cogle et al., 2013). This association remained after accounting for depressive symptoms. However, it was no longer significant after accounting for the DTS, suggesting that intolerance to sadness/depression may already be accounted for by the construct of “distress tolerance.” In addition, the association was not present when controlling for obsessive beliefs, specifically for importance/control of thoughts.

It seems as though each of these constructs—intolerance to sadness, unacceptable thoughts in OCD, and obsessive beliefs (i.e., importance/control of thoughts)—could be associated with an overall tendency toward rumination, or general over-engagement with thoughts. This is important to consider regarding treatment of symptoms. For example, if rumination and over-engagement with thoughts are important processes with regard to development or maintenance of symptoms, mindfulness and/or cognitive defusion strategies might be helpful in treatment to facilitate present-moment thinking and disengagement from thoughts. Although some studies have suggested the usefulness of mindfulness for reducing OCD symptoms (e.g., Hanstede, Gidron, & Nyklíček, 2008), it might be beneficial to examine the effects of these strategies on the *unacceptable thoughts* symptom domain specifically.

As noted, OCD symmetry symptoms were not associated with any of the emotional states that were examined in the current study. However, it should be noted that the OCD measure utilized in this study (i.e., the DOCS) includes “feelings that something isn’t ‘just right’” within the symmetry symptom domain. These feelings, otherwise considered “not just right experiences” (NJREs), have been described as uncomfortable *internal sensations* and as *feelings of incompleteness* (Summerfeldt, 2004; Summers, Fitch, & Cogle, 2014). In other words, NJREs are *internal sensations/feelings* that certain individuals might find distressing and not be able to tolerate. In this way, NJREs are similar to the other emotions that were measured in this study and might be thought of within the same framework. For example, someone who cannot tolerate feeling anxious might frequently engage in checking behaviors; someone who cannot tolerate feeling disgusted might frequently engage in washing behaviors; and someone who cannot tolerate feeling “incomplete” (or “not just right”) might frequently engage in ordering/symmetry behaviors.

NJREs were not measured in the current study, particularly because these experiences were already accounted for in the OCD measure that was utilized and conceptualized within the symmetry symptom domain. However, it seems as though there might be an important difference in experiencing NJREs and *tolerating the experience* of NJREs—similar to experiencing anxiety compared to *tolerating the experience* of anxiety. It seems likely that some individuals can feel “not just right” without subsequently engaging in behaviors to decrease this feeling, whereas others might experience this sensation and engage in compulsions until the feeling decreases (or becomes more tolerable). It might be important to distinguish between these experiences in future studies and examine their impact on OCD symptoms.

Findings Regarding Obsessive Beliefs and OCD

Obsessive beliefs as measured by the OBQ were found to predict specific OCD dimensions measured by the DOCS. Specifically, beliefs regarding inflated responsibility and overestimation of threat were associated with contamination aversion and responsibility for harm; beliefs regarding the importance and need to control thoughts were associated with the unacceptable thoughts dimension of OCD (e.g., religious, sexual, violent obsessions; neutralizing strategies); and intolerance of uncertainty and perfectionism were related to concerns about symmetry, ordering, and completeness. These associations were significant even after controlling for variance from depression symptoms, suggesting that these relations are not better accounted for by depression or general distress.

These findings replicated those found by Wheaton and colleagues (2010), using the same measures. Ólafsson and colleagues (2013) also examined associations between the DOCS and the OBQ and found similar results. The only difference in this study was that responsibility/

threat beliefs (instead of beliefs regarding the importance of and need to control thoughts) predicted the unacceptable thoughts domain in OCD.

As pointed out by Wheaton et al. (2010), previous studies examining associations between OCD symptoms and obsessive beliefs have not been consistent. It was suggested that associations might have been obscured in studies that measured types, or *form*, of OCD symptoms (e.g., checking rituals, washing behaviors), rather than measuring empirically supported symptom dimensions (e.g., contamination fears, concerns about being responsible for harm), which emphasize *function*. In addition, as previously discussed, the measurement of specific OCD symptoms is problematic as this confounds OCD severity with the range of symptoms present. For example, an individual may experience a wide range of symptoms with only mild distress and impairment, whereas another individual may experience few types of symptoms accompanied by extreme distress and impairment. Accordingly, this was one of the reasons the DOCS was chosen to measure OCD symptoms in the current study, as this measure has been suggested to be a conceptually valid measure of the dimensional structure of OCD symptoms.

Although OBQ belief domains have been found to be associated with OCD symptoms, several studies suggest that at least some of these beliefs do not discriminate between individuals with OCD and those with anxiety in general (e.g., Shams & Milosevic, 2015). This is an important limitation to cognitive theories of OCD, as these theories argue that OCD symptoms develop as a result of misinterpretation of one's intrusive thoughts. Thus, even if obsessive beliefs are important in the development of OCD symptoms, it remains unclear why some individuals with these beliefs develop OCD while others develop other kinds of psychopathology.

This study examined whether intolerance to particular emotional states would predict variance in OCD symptoms *beyond what could be explained by OBQ beliefs*. However, the only finding that remained significant was the association between intolerance to disgust and contamination symptoms in OCD. None of the other emotional states was found to be predictive of OCD symptoms after controlling for relevant OBQ belief domains. Another hypothesis of the current study was that the relationship between obsessive beliefs and OCD symptoms would be stronger for individuals with low tolerance to negative emotion. For example, beliefs about the importance and controllability of thoughts may be more likely to predict unacceptable thoughts in OCD for individuals who are intolerant to feelings of shame or guilt. However, this hypothesis was not supported. Possible explanations are explored below.

Limitations and Future Directions

Study Design

As previously noted, the effect sizes found in this study were rather small, and some findings did not remain significant after controlling for other relevant variables. This could suggest that emotion tolerance is not a strong or relevant predictor of OCD symptoms. However, the study design might not have been adequate to capture the relevant findings.

Recalling the motivation for the current study, there have been research findings that high levels of dysfunctional obsessive beliefs are not characteristic of *all individuals with OCD*. The current study sought to explore the hypothesis that affective experiences, rather than cognitive experiences (or beyond cognitive experiences), contribute to the development of OCD symptoms. However, this study did not explore the possibility that some individuals may

develop OCD through cognitive mechanisms while others may develop OCD through affective/sensory experiences. Future research might explore this hypothesis by utilizing techniques such as cluster analysis to identify subgroups of individuals with OCD and then examining group differences on various characteristics (similar to Chik et al., 2010). For example, if cluster analysis can replicate the finding that a low-beliefs OCD subgroup exists, it would be beneficial to know if emotion tolerance could differentiate OCD subgroups. This would provide support for the hypothesis that two distinct pathways might be contributing to OCD symptoms. Structural equation modeling could also be utilized to examine more complex associations among variables (e.g., mediation, moderation) as well as to compare the fit of separate models to different variants of OCD.

Measurement Issues

Regarding measurement issues of the current study, it is important to consider that some of the subscales on the TNASS only consist of two or three items. Each item is a different emotion with the same base question: “Please rate how tolerant you typically were of feeling each emotion over the past year.” Utilizing single-item scales or scales with very few items can be problematic for several reasons. For example, these scales are more vulnerable to measurement error or unknown biases in interpretation, whereas longer, more comprehensive scales can assess a broader range of meaning and cover a fuller range of the construct. In addition, a simulation study that examined predictive validity of single- versus multi-item measures found that, under most conditions, multi-item scales outperform single items (Diamantopoulos, Sarstedt, Fuchs, Wilczynski, & Kaiser, 2011). Thus, it might be useful for future studies to measure emotion tolerance with broader measures that can assess the construct

from different angles. For example, instead of (or in addition to) asking directly about one's ability to tolerate an emotion, it might be beneficial to provide examples of situations or real-life applications of the construct to make it more relatable to participants.

Another issue to consider is regarding potential content overlap of the measures utilized in the study. For example, someone who frequently “repeats a routine action until it feels ‘just right’ or ‘balanced’” (i.e., OCD symmetry symptoms on the DOCS) seems likely to also believe “I must keep working at something until it’s done exactly right” (i.e., OBQ item assessing intolerance of uncertainty/perfectionism). These two questions seem to be nearly identical. There are various other questions that also appear to be measuring similar content on different measures (e.g., DOCS-OCD responsibility symptoms vs. OBQ responsibility/threat beliefs). With such overlap, it seems possible that associations could be artificially inflated.

This possibility was explored by correlating similar items to assess the actual strength of the relationships. For example, the OBQ item, “I must keep working at something until it’s done exactly right,” was correlated with all of the DOCS items on the symmetry scale (an example provided in this symptom domain is, “repeating a routine action until it feels ‘just right’ or ‘balanced’”). Surprisingly, despite sounding very similar, the correlations ranged from a relatively modest .24 to .35. In addition, the OBQ item, “Even when I am careful, I often think that bad things will happen,” was correlated with DOCS items on the responsibility scale (an example provided: “the thought that a terrible accident, disaster, injury, or other bad luck might have occurred and you weren’t careful enough to prevent it”). These correlations ranged from .33 to .44. Ultimately, although item content may appear highly similar across scales, the current data do not support the conclusion that they merely are redundant questions.

Quality of Online Data

Although previous studies have shown the effectiveness of using MTurk to collect research samples, the potential risks of online data collection were also considered. It was particularly of note that 32.1% of the current sample was eliminated due to issues of invalidity (e.g., answering validity questions incorrectly, completing the study too quickly, skipping an excessive number of items/incomplete questionnaires). The majority of these participants were disqualified for answering one or both of the validity questions incorrectly (27.9%), which appears to be quite high.

A recent study (Necka, Cacioppo, Norman, & Cacioppo, 2016) sought to compare the prevalence of problematic respondent behaviors across MTurk, campus, and community samples. In the study, manipulation checks were used to verify that participants were paying attention. Participants were excluded if they provided incorrect answers to the manipulation checks, if they reported age less than 18 years old, and/or if their location was determined to be outside of the United States. These exclusion criteria resulted in the exclusion of only 2.25% of the MTurk sample (0% of campus participants; 2% of community participants⁵), compared to 32.1% of the sample from the current study.

Another study included two screening questions of varying difficulty to identify participants who were not responding conscientiously to questions (Downs, Holbrook, Sheng, & Cranor, 2010). The easier question aimed to identify respondents who were answering arbitrarily and not considering item content at all. The more difficult question was assessing careful participation of respondents. This study identified 764 of 1,962 participants (38.9%) that did not

⁵ One community participant was excluded on the basis of previously being included in the campus sample.

answer one or both of the questions correctly, which is more consistent with the current findings. However, 88% of participants in this study answered the easier question correctly, whereas only 64% answered the difficult question correctly. The validity items used in the current study would both be considered “easy” questions, as they were both assessing for arbitrary responding of respondents.

Thus, the percentage of respondents who missed the validity questions in the current study (27.9%) still appears to be rather high. It is unclear why there were so many invalid responders in the current study. It is possible that the study was too long or tedious, which could cause respondents to exit the study before completion and/or result in overall inattentiveness of participants.

Generally, studies have shown that internet participants appear to be no less motivated than in traditional studies (Casler, Bickel, & Hackett, 2013; Gosling, Vazire, Srivastava, & John, 2004). The study by Necka and colleagues (2016) found relatively few differences in how often participants from MTurk, campus, and community samples engaged in behaviors that may be problematic for integrity. They did suggest that MTurk participants are somewhat more distracted than participants from traditional studies, as they are more likely to multitask and to leave the page of a study while completing it. It also was emphasized to screen for participants who may have already completed the study, as individuals may try to complete the same study more than once. Importantly, this was done in the current study. Additionally, MTurk workers that demonstrate poor performance could receive reduced approval ratings, which can restrict future access to “higher quality” and better paying studies, thus providing additional incentive to complete studies appropriately (Casler, Bickel, & Hackett, 2013).

Necka and colleagues (2016) also found that various factors appear to influence problematic behaviors in respondents, including the belief that surveys measure meaningful psychological phenomena, participants' use of compensation from studies as their primary form of income, and the amount of time participants typically spend completing studies. Although time spent completing studies was considered for the current study, the other questions were not assessed. It potentially would be useful to measure and explore the impact of these factors in future internet-based studies.

In addition to convenience, the use of MTurk (rather than using a typical student-based sample) aimed to increase diversity among participants. It has been suggested that although MTurk participants are not typically representative of the populations from which they are drawn (e.g., consider internet users vs. non-internet users), they have been reported to be much more demographically varied than participants recruited through traditional methods, such as with student samples (Casler, Bickel, & Hackett, 2013; Paolacci & Chandler, 2014).

In the current study, ages of respondents ranged from 18-69, with an average age of 35.9 years. This average is higher than the typical student sample and similar to the average ages in other MTurk samples (32-36 years) that have been reported elsewhere (Casler, Bickel, & Hackett, 2013; Necka et al., 2016; Paolacci, Chandler, & Ipeirotis, 2010; Rouse, 2015).

The current study was not as racially/ethnically diverse as expected, with 82.1% of the sample self-reporting as White/Caucasian. Other studies using MTurk to recruit participants appear to have varied in the amount of ethnic/racial diversity of their samples. For example, various samples have reported the percentage of White/Caucasian/Euro-American participants at 37.5% (Casler, Bickel, & Hackett, 2013), 53% (Rouse, 2015), and 71.8% (Levay, Freese, & Druckman, 2016).

Although the current sample was not as diverse as anticipated, based on research findings and the efforts taken to maintain data integrity in the current study (e.g., use of validity items, screening out individuals who already completed the study), the data is considered to be valid and comparable in quality to traditional campus- and community-based samples.

Assessment of Emotion Tolerance

Another issue to consider in the current study concerns the measurement of emotion tolerance. This study utilized the TNASS, which provides definitions for “tolerance” and “intolerance” and then asks participants to identify how much they believe they can tolerate different emotions. This assumes that individuals have the insight and emotional awareness to distinguish among their negative emotional states as well as to evaluate their ability to tolerate these feelings. Of course insight and self-awareness need to be considered with all self-report questionnaires; however, recognition and insight into one’s own emotional experiences can be a complicated process. In future studies, behavioral measurement of emotion tolerance (e.g., using video clips with emotionally charged content) might be able to provide additional useful information from a less biased approach.

Another approach might be to examine the effects of specific interventions that target emotion tolerance on OCD symptoms. These interventions might include techniques such as acceptance or emotion exposure. Given the heterogeneity of OCD, it would be useful to identify whether increased tolerance (or acceptance) of specific emotional states is associated with reduced symptom severity for particular OCD dimensions.

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APPENDIX A

MEASURES

Dimensional Obsessive-Compulsive Scale

This questionnaire asks you about 4 different types of concerns that you might or might not experience. For each type there is a description of the kinds of thoughts (sometimes called *obsessions*) and behaviors (sometimes called *rituals* or *compulsions*) that are typical of that particular concern, followed by 5 questions about your experiences with these thoughts and behaviors. Please read each description carefully and answer the questions for each category based on your experiences in the last month.

Category 1: Concerns about Germs and Contamination

Examples...

- Thoughts or feelings that you are contaminated because you came into contact with (or were nearby) a certain object or person.
- The feeling of being contaminated because you were in a certain place (such as a bathroom).
- Thoughts about germs, sickness, or the possibility of spreading contamination.
- Washing your hands, using hand sanitizer gels, showering, changing your clothes, or cleaning objects because of concerns about contamination.
- Following a certain routine (e.g., in the bathroom, getting dressed) because of contamination -Avoiding certain people, objects, or places because of contamination.

The next questions ask about your experiences with thoughts and behaviors related to contamination over the last month. Keep in mind that your experiences might be different than the examples listed above. Please circle the number next to your answer:

1. About how much time have you spent each day thinking about contamination and engaging in washing or cleaning behaviors because of contamination?
 - 0 None at all
 - 1 Less than 1 hour each day
 - 2 Between 1 and 3 hours each day
 - 3 Between 3 and 8 hours each day
 - 4 8 hours or more each day

2. To what extent have you avoided situations in order to prevent concerns with contamination or having to spend time washing, cleaning, or showering?
 - 0 None at all
 - 1 A little avoidance
 - 2 A moderate amount of avoidance
 - 3 A great deal of avoidance
 - 4 Extreme avoidance of nearly all things

3. If you had thoughts about contamination but could not wash, clean, or shower (or otherwise remove the contamination), how distressed or anxious did you become?
 - 0 Not at all distressed/anxious
 - 1 Mildly distressed/anxious
 - 2 Moderately distressed/anxious
 - 3 Severely distressed/anxious
 - 4 Extremely distressed/anxious

4. To what extent has your daily routine (work, school, self-care, social life) been disrupted by contamination concerns and excessive washing, showering, cleaning, or avoidance behaviors?
 - 0 No disruption at all.
 - 1 A little disruption, but I mostly function well.
 - 2 Many things are disrupted, but I can still manage.
 - 3 My life is disrupted in many ways and I have trouble managing.
 - 4 My life is completely disrupted and I cannot function at all.

5. How difficult is it for you to disregard thoughts about contamination and refrain from behaviors such as washing, showering, cleaning, and other decontamination routines when you try to do so?
- 0 Not at all difficult
 - 1 A little difficult
 - 2 Moderately difficult
 - 3 Very difficult
 - 4 Extremely difficult

Category 2: Concerns about being Responsible for Harm, Injury, or Bad Luck

Examples...

- A doubt that you might have made a mistake that could cause something awful or harmful to happen.
- The thought that a terrible accident, disaster, injury, or other bad luck might have occurred and you weren't careful enough to prevent it.
- The thought that you could prevent harm or bad luck by doing things in a certain way, counting to certain numbers, or by avoiding certain "bad" numbers or words.
- Thought of losing something important that you are unlikely to lose (e.g., wallet, identify theft, papers).
- Checking things such as locks, switches, your wallet, etc. more often than is necessary.
- Repeatedly asking or checking for reassurance that something bad did not (or will not) happen.
- Mentally reviewing past events to make sure you didn't do anything wrong.
- The need to follow a special routine because it will prevent harm or disasters from occurring.
- The need to count to certain numbers, or avoid certain bad numbers, due to the fear of harm.

The next questions ask about your experiences with thoughts and behaviors related to harm and disasters over the last month. Keep in mind that your experiences might be slightly different than the examples listed above. Please circle the number next to your answer:

1. About how much time have you spent each day thinking about the possibility of harm or disasters and engaging in checking or efforts to get reassurance that such things do not (or did not) occur?
 - 0 None at all
 - 1 Less than 1 hour each day
 - 2 Between 1 and 3 hours each day
 - 3 Between 3 and 8 hours each day
 - 4 8 hours or more each day

2. To what extent have you avoided situations so that you did not have to check for danger or worry about possible harm or disasters?
 - 0 None at all
 - 1 A little avoidance
 - 2 A moderate amount of avoidance
 - 3 A great deal of avoidance
 - 4 Extreme avoidance of nearly all things

3. When you think about the possibility of harm or disasters, or if you cannot check or get reassurance about these things, how distressed or anxious did you become?
 - 0 Not at all distressed/anxious
 - 1 Mildly distressed/anxious
 - 2 Moderately distressed/anxious
 - 3 Severely distressed/anxious
 - 4 Extremely distressed/anxious

4. To what extent has your daily routine (work, school, self-care, social life) been disrupted by thoughts about harm or disasters and excessive checking or asking for reassurance?
- 0 No disruption at all.
 - 1 A little disruption, but I mostly function well.
 - 2 Many things are disrupted, but I can still manage.
 - 3 My life is disrupted in many ways and I have trouble managing.
 - 4 My life is completely disrupted and I cannot function at all.
5. How difficult is it for you to disregard thoughts about possible harm or disasters and refrain from checking or reassurance-seeking behaviors when you try to do so?
- 0 Not at all difficult
 - 1 A little difficult
 - 2 Moderately difficult
 - 3 Very difficult
 - 4 Extremely difficult

Category 3: Unacceptable Thoughts

Examples...

- Unpleasant thoughts about sex, immorality, or violence that come to mind against your will.
- Thoughts about doing awful, improper, or embarrassing things that you don't really want to do.
- Repeating an action or following a special routine because of a bad thought.
- Mentally performing an action or saying prayers to get rid of an unwanted or unpleasant thought.
- Avoidance of certain people, places, situations or other triggers of unwanted or unpleasant thoughts

The next questions ask about your experiences with unwanted thoughts that come to mind against your will and behaviors designed to deal with these kinds of thoughts over the last month. Keep in mind that your experiences might be slightly different than the examples listed above. Please circle the number next to your answer:

1. About how much time have you spent each day with unwanted unpleasant thoughts and with behavioral or mental actions to deal with them?
- 0 None at all
 - 1 Less than 1 hour each day
 - 2 Between 1 and 3 hours each day
 - 3 Between 3 and 8 hours each day
 - 4 8 hours or more each day
2. To what extent have you been avoiding situations, places, objects and other reminders (e.g., numbers, people) that trigger unwanted or unpleasant thoughts?
- 0 None at all
 - 1 A little avoidance
 - 2 A moderate amount of avoidance
 - 3 A great deal of avoidance
 - 4 Extreme avoidance of nearly all things
3. When unwanted or unpleasant thoughts come to mind against your will how distressed or anxious did you become?
- 0 Not at all distressed/anxious
 - 1 Mildly distressed/anxious
 - 2 Moderately distressed/anxious
 - 3 Severely distressed/anxious
 - 4 Extremely distressed/anxious

4. To what extent has your daily routine (work, school, self-care, social life) been disrupted by unwanted and unpleasant thoughts and efforts to avoid or deal with such thoughts?
- 0 No disruption at all.
 - 1 A little disruption, but I mostly function well.
 - 2 Many things are disrupted, but I can still manage.
 - 3 My life is disrupted in many ways and I have trouble managing.
 - 4 My life is completely disrupted and I cannot function at all.
5. How difficult is it for you to disregard unwanted or unpleasant thoughts and refrain from using behavioral or mental acts to deal with them when you try to do so?
- 0 Not at all difficult
 - 1 A little difficult
 - 2 Moderately difficult
 - 3 Very difficult
 - 4 Extremely difficult

Category 4: Concerns about Symmetry, Completeness, and the Need for Things to be “Just Right”

Examples...

- The need for symmetry, evenness, balance, or exactness.
- Feelings that something isn't “just right.”
- Repeating a routine action until it feels “just right” or “balanced.”
- Counting senseless things (e.g., ceiling tiles, words in a sentence).
- Unnecessarily arranging things in “order.”
- Having to say something over and over in the same way until it feels “just right.”

The next questions ask about your experiences with feelings that something is not “just right” and behaviors designed to achieve order, symmetry, or balance over the last month. Keep in mind that your experiences might be slightly different than the examples listed above. Please circle the number next to your answer:

1. About how much time have you spent each day with unwanted thoughts about symmetry, order, or balance and with behaviors intended to achieve symmetry, order or balance?
- 0 None at all
 - 1 Less than 1 hour each day
 - 2 Between 1 and 3 hours each day
 - 3 Between 3 and 8 hours each day
 - 4 8 hours or more each day
2. To what extent have you been avoiding situations, places or objects associated with feelings that something is not symmetrical or “just right?”
- 0 None at all
 - 1 A little avoidance
 - 2 A moderate amount of avoidance
 - 3 A great deal of avoidance
 - 4 Extreme avoidance of nearly all things
3. When you have the feeling of something being “not just right,” how distressed or anxious did you become?
- 0 Not at all distressed/anxious
 - 1 Mildly distressed/anxious
 - 2 Moderately distressed/anxious
 - 3 Severely distressed/anxious
 - 4 Extremely distressed/anxious

4. To what extent has your daily routine (work, school, self-care, social life) been disrupted by the feeling of things being “not just right,” and efforts to put things in order or make them feel right?
- 0 No disruption at all.
 - 1 A little disruption, but I mostly function well.
 - 2 Many things are disrupted, but I can still manage.
 - 3 My life is disrupted in many ways and I have trouble managing.
 - 4 My life is completely disrupted and I cannot function at all.
5. How difficult is it for you to disregard thoughts about the lack of symmetry and order, and refrain from urges to arrange things in order or repeat certain behaviors when you try to do so?
- 0 Not at all difficult
 - 1 A little difficult
 - 2 Moderately difficult
 - 3 Very difficult
 - 4 Extremely difficult

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OBQ-44

This inventory lists different attitudes or beliefs that people sometimes hold. Read each statement carefully and decide how much you agree or disagree with it. For each of the statements, choose the number matching the answer that *best describes how you think*. Because people are different, there are no right or wrong answers. To decide whether a given statement is typical of your way of looking at things, simply keep in mind what you are like *most of the time*.

Use the following scale:

1	2	3	4	5	6	7
disagree very much	disagree moderately	disagree a little	neither agree nor disagree	agree a little	agree moderately	agree very much

In making your ratings, try to avoid using the middle point of the scale (4), but rather indicate whether you usually disagree or agree with the statements about your own beliefs and attitudes.

- ___ 1. I often think things around me are unsafe.
- ___ 2. If I'm not absolutely sure of something, I'm bound to make a mistake.
- ___ 3. Things should be perfect according to my own standards.
- ___ 4. In order to be a worthwhile person, I must be perfect at everything I do.
- ___ 5. When I see any opportunity to do so, I must act to prevent bad things from happening.
- ___ 6. Even if harm is very unlikely, I should try to prevent it at any cost.
- ___ 7. For me, having bad urges is as bad as actually carrying them out.
- ___ 8. If I don't act when I foresee danger, then I am to blame for any consequences.
- ___ 9. If I can't do something perfectly, I shouldn't do it at all.
- ___ 10. I must work to my full potential at all times.
- ___ 11. It is essential for me to consider all possible outcomes of a situation.
- ___ 12. Even minor mistakes mean a job is not complete.
- ___ 13. If I have aggressive thoughts or impulses about my loved ones, this means I may secretly want to hurt them.
- ___ 14. I must be certain of my decisions.
- ___ 15. In all kinds of daily situations, failing to prevent harm is just as bad as deliberately causing harm.
- ___ 16. Avoiding serious problems (for example, illness or accidents) requires constant effort on my part.
- ___ 17. For me, not preventing harm is as bad as causing harm.
- ___ 18. I should be upset if I make a mistake.

- ___ 19. I should make sure others are protected from any negative consequences of my decisions or actions.
- ___ 20. For me, things are not right if they are not perfect.
- ___ 21. Having nasty thoughts means I am a terrible person.
- ___ 22. If I do not take extra precautions, I am more likely than others to have or cause a serious disaster.
- ___ 23. In order to feel safe, I have to be as prepared as possible for anything that could go wrong.
- ___ 24. I should not have bizarre or disgusting thoughts.
- ___ 25. For me, making a mistake is as bad as failing completely.
- ___ 26. It is essential for everything to be clear cut, even in minor matters.
- ___ 27. Having a blasphemous thought is as sinful as committing a sacrilegious act.
- ___ 28. I should be able to rid my mind of unwanted thoughts.
- ___ 29. I am more likely than other people to accidentally cause harm to myself or to others.
- ___ 30. Having bad thoughts means I am weird or abnormal.
- ___ 31. I must be the best at things that are important to me.
- ___ 32. Having an unwanted sexual thought or image means I really want to do it.
- ___ 33. If my actions could have even a small effect on a potential misfortune, I am responsible for the outcome.
- ___ 34. Even when I am careful, I often think that bad things will happen.
- ___ 35. Having intrusive thoughts means I'm out of control.
- ___ 36. Harmful events will happen unless I am very careful.
- ___ 37. I must keep working at something until it's done exactly right.
- ___ 38. Having violent thoughts means I will lose control and become violent.
- ___ 39. To me, failing to prevent a disaster is as bad as causing it.
- ___ 40. If I don't do a job perfectly, people won't respect me.
- ___ 41. Even ordinary experiences in my life are full of risk.
- ___ 42. Having a bad thought is morally no different than doing a bad deed.
- ___ 43. No matter what I do, it won't be good enough.
- ___ 44. If I don't control my thoughts, I'll be punished.

TNASS

Below, you will be asked to rate how tolerant you are of a number of emotions. First, please read the following description of tolerance and intolerance of emotions until it is clear to you.

Tolerance is the ability to withstand or endure feeling an emotion. For example, a person who is tolerant of an emotion is able to feel that emotion without trying to avoid, stop, or replace it.

In contrast, intolerance is the inability to withstand or endure feeling an emotion. For example, a person who is intolerant of an emotion may try to avoid, stop, or replace it.

Now, please think about instances in the past year in which you felt each emotion listed below. Then, please rate how tolerant you typically were of feeling each emotion over the past year. Please check only one box per emotion item below. Please complete all items. Remember, there are no right or wrong answers.

	1 <i>Very Intolerant</i>	2 <i>Intolerant</i>	3 <i>Somewhat Tolerant</i>	4 <i>Tolerant</i>	5 <i>Very Tolerant</i>
1. Sad					
2. Angry					
3. Fearful					
4. Disgusted					
5. Guilty					
6. Ashamed					
7. Embarrassed					
8. Anxious					
9. Distressed					
10. Nervous					
11. Socially Awkward					
12. Grossed Out					
13. Feeling At Fault					
14. Scared					
15. Humiliated					
16. Mad					
17. Depressed					
18. Regret					
19. Feeling Disgraced					
20. Feeling Self-					
21. Tense					
22. Feeling Down					
23. Furious					
24. Afraid					
25. Repulsed					

Distress Tolerance Scale

Directions: Think of times that you feel distressed or upset. Select the item from the menu that best describes your beliefs about feeling distressed or upset.

1. Strongly agree
2. Mildly agree
3. Agree and disagree equally
4. Mildly disagree
5. Strongly disagree

1. Feeling distressed or upset is unbearable to me.
2. When I feel distressed or upset, all I can think about is how bad I feel.
3. I can't handle feeling distressed or upset.
4. My feelings of distress are so intense that they completely take over.
5. There's nothing worse than feeling distressed or upset.
6. I can tolerate being distressed or upset as well as most people.
7. My feelings of distress or being upset are not acceptable.
8. I'll do anything to avoid feeling distressed or upset.
9. Other people seem to be able to tolerate feeling distressed or upset better than I can.
10. Being distressed or upset is always a major ordeal for me.
11. I am ashamed of myself when I feel distressed or upset.
12. My feelings of distress or being upset scare me.
13. I'll do anything to stop feeling distressed or upset.
14. When I feel distressed or upset, I must do something about it immediately.
15. When I feel distressed or upset, I cannot help but concentrate on how bad the distress actually feels.

CES-D

Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week.

1	2	3	4
Rarely or None of the time <i>(less than 1 day)</i>	Some or a little of the time <i>(Most or all of the time)</i>	Occasionally or a moderate amount of time <i>(3-4 days)</i>	Most or all of the time <i>(5-7 days)</i>

1. I was bothered by things that usually don't bother me.
2. I did not feel like eating; my appetite was poor.
3. I felt that I could not shake off the blues even with help from my family or friends.
4. I felt I was just as good as other people.
5. I had trouble keeping my mind on what I was doing.
6. I felt depressed.
7. I felt that everything I did was an effort.
8. I felt hopeful about the future.
9. I thought my life had been a failure.
10. I felt fearful.
11. My sleep was restless.
12. I was happy.
13. I talked less than usual.
14. I felt lonely.
15. People were unfriendly.
16. I enjoyed life.
17. I had crying spells.
18. I felt sad.
19. I felt that people dislike me.
20. I could not get "going"