

RESEARCH ARTICLE

Not just thinking, but believing: Obsessive beliefs and domains of cognitive fusion in the prediction of OCD symptom dimensions

Samantha N. Hellberg¹  | Jennifer L. Buchholz¹ | Michael P. Twohig² | Jonathan S. Abramowitz¹

¹Department of Psychology and Neuroscience, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA

²Department of Psychology, Utah State University, Utah, USA

Correspondence

University of North Carolina at Chapel Hill, Department of Psychology and Neuroscience Davie Hall (CB #3270), Chapel Hill, NC 27599-3270, USA.

Email: shellberg@unc.edu

Funding information

International OCD Foundation, Grant/Award Number: N/A

Abstract

Cognitive fusion (CF) involves the tendency to “buy in” to thoughts and feelings and consists of three empirically established domains: somatic concerns, emotion regulation, and negative evaluation. CF is hypothesized to play a role in obsessive-compulsive disorder (OCD). The present study examined how well the CF domains, relative to traditional cognitive-behavioural constructs (i.e., obsessive beliefs such as inflated responsibility), predict OCD symptoms. Fifty-two treatment-seeking adults with OCD completed self-report measures of CF, obsessive beliefs, OCD symptoms, and general distress. Domains of CF were differentially associated with the responsibility for harm, symmetry, and unacceptable thoughts of OCD dimensions; yet after accounting for obsessive beliefs, only the negative evaluation domain of CF significantly predicted symmetry OCD symptoms. Obsessive beliefs significantly predicted all OCD dimensions except for contamination. These findings provide additional support for existing cognitive-behavioural models of OCD across symptom dimensions, with the exception of contamination symptoms, and suggest that the believability of thoughts and feelings about negative evaluation adds to the explanation of symmetry symptoms. Conceptual and treatment implications, study limitations, and future directions are discussed.

KEYWORDS

cognitive fusion, cognitive model, obsessive beliefs, obsessive-compulsive disorder, symptom dimensions

1 | INTRODUCTION

Obsessive-compulsive disorder (OCD), which affects 1–3% of the adult population, is characterized by intrusive thoughts that evoke anxiety and distress (i.e., obsessions) and overt or covert behaviours (e.g., compulsions and avoidance) that are performed to control intrusions and reduce associated distress (American Psychiatric Association, 2013; Kessler et al., 2005). The course of OCD is chronic and without treatment, it tends to worsen over time, resulting in

significant impairment across various domains of functioning (Steketee, 1997). Moreover, OCD presents with considerable heterogeneity; the content of obsessions and compulsive behaviours varies between as well as within individuals over time (Rasmussen & Eisen, 1992). When the prevalence, course, and functional impairment associated with OCD are considered along with the diverse symptom picture, one recognizes the necessity of developing a fine-grained understanding of the presentation and persistence of this complex and multifaceted condition.

Key Practitioner Message

- Domains of cognitive fusion and obsessive beliefs differentially predicted OCD severity across empirically derived symptom dimensions.
- Findings indicate that the efficacy of therapeutic techniques derived from cognitive-behavioural (CBT) and acceptance and commitment therapy (ACT) may differ across symptom dimensions, given observed differences in mechanisms across OCD subtypes.
- Future research is warranted to extend these findings and identify for whom ACT-based augmentation approaches are optimally indicated.

A number of conceptual models have been proposed to account for the factors at work in OCD. Presently, the cognitive (or cognitive-behavioural) approach has the most empirical support (Rachman, 1998b, 1998a; Salkovskis, 1999). This model posits that obsessions begin as normally occurring intrusive thoughts that are reported by virtually everyone in the general population (Rachman & de Silva, 1978). Whereas most people appraise such intrusions (e.g., the thought of deliberately harming a loved one) as senseless and inconsequential, those with OCD catastrophically misinterpret such thoughts as personally significant or otherwise highly threatening (e.g., "This thought means I could 'snap' and harm someone, so I must take extra precautions to assure that does not happen"). This leads to an elevated sense of fear, preoccupation with the thought, and efforts to reduce the perceived threat and resulting distress using compulsive rituals and avoidance. Although rituals and avoidance may be temporarily successful in reducing distress, such behaviours prevent the individual from learning that their obsessional fears are unfounded, leading to a self-perpetuating vicious cycle (Rachman, 2002; Salkovskis, 1999). Misinterpretations of intrusive thoughts are thought to arise from a set of dysfunctional beliefs (*obsessive beliefs*; Obsessive Compulsive Cognitions Working Group, 2005) including the tendency to overestimate threat and personal responsibility, inflate the importance of and need to control intrusive thoughts, and exaggerate the need for perfectionism and certainty.

Structural analyses provide empirical support for conceptualizing obsessions and compulsions as cohering along four themes: (a) contamination obsessions with cleaning rituals; (b) obsessions about responsibility for harm with checking rituals; (c) "not just right" or symmetry obsessions with ordering and arranging rituals; and (d) obsessional thoughts pertaining to sex, religion, and violence with mental and neutralizing rituals (e.g., thought suppression; Mataix-Cols, do Rosario-Campos, & Leckman, 2005; McKay et al., 2004; Sookman, Abramowitz, Calamari, Wilhelm, & McKay, 2005). These symptom dimensions have been useful for informing more granular conceptual models that highlight the specific pathways through which the various OCD symptom dimensions are maintained. For example, contamination fears are primarily associated with overestimates of the likelihood

and severity of threats related to germs and disease (Rachman, 2004), although disgust proneness and inflated responsibility for harm have also been robustly associated with contamination-related fears (e.g., Olatunji, Armstrong, & Elwood, 2017). Concerns around symmetry present when individuals hold rigid beliefs about the need for control, perfection, and completeness and perceive "not just right" experiences to be highly intolerable (Summerfeldt, 2004). Fears regarding harm or catastrophic mistakes are thought to emerge from inflated beliefs about personal responsibility for causing or preventing harm (Salkovskis et al., 1996). Lastly, obsessions about sex, religion, or violence result from the belief that thoughts are equivalent to actions, and the strongly held sense that one should be able to control their thoughts (Rachman, 1998a; Shafran, Thordarson, & Rachman, 1996).

These "minimodels" have considerably advanced our understanding of the processes that confer risk for and maintain OCD (e.g., Abramowitz, Khandker, Nelson, Deacon, & Rygwall, 2006). Further, they have been key to developing and fine-tuning effective cognitive-behavioural interventions for different presentations of the disorder (e.g., Abramowitz, 2006; McKay et al., 2015). However, they fail to fully account for symptoms in statistical analyses. Wheaton, Abramowitz, Berman, Riemann, and Hale (2010), for example, found that obsessive beliefs along with general distress only explained from 11% (contamination) to 42% (responsibility for harm) of the variance in OCD symptom severity across symptom dimensions. Thus, it is necessary to identify additional constructs that may augment the explanatory power of existing evidence-based models and subsequently yield notable treatment implications.

Relational frame theory (RFT; Hayes, Luoma, Bond, Masuda, & Lillis, 2006) was developed to explain the bidirectional relationship between cognition and language and to enhance the understanding of psychological phenomena. According to RFT, human behaviour is not adequately explained by direct experience, and responses to stimuli are generalized broadly based on interactions between internal processes (e.g., language and cognition), rather than resulting from direct stimulus associations. In this way, an individual derives beliefs and patterns of responding (i.e., rule-governed behaviours) from various first-hand experiences that reciprocally interact and can be broadly applied, impacting responses to novel situations without direct conditioning. For example, intrusive thoughts about becoming ill after using a toilet in a public restroom may internally generalize to other contamination fears and cognitions (e.g., becoming ill after touching a sink in a public restroom, and door knobs in a building). Thus, patterns of avoidance may generalize in novel contexts (e.g., touching a door knob) without the direct conditioned reinforcer of having become ill in that particular situation. This model may be particularly useful for enhancing psychological models of OCD given that obsessional fears can be acquired, and may generalize, without direct experience or exposure to a stimulus (e.g., fear of having hit a pedestrian with a car).

One construct derived from RFT, which may additively explain the risk for and maintenance of OCD above and beyond obsessive beliefs is *cognitive fusion*, which refers to the tendency to "buy in" to thoughts and feelings and interpret the content of such internal experiences literally (Hayes et al., 2006; Herzberg et al., 2012). Although there is

conceptual overlap between cognitive fusion and obsessional beliefs—particularly obsessive beliefs pertaining to the importance of thoughts—the former is defined as a process by which the person becomes attached to thoughts or evaluations of a particular event or experience and views such thoughts or evaluations as if they were the same as the actual event or experience to which they refer, often without accounting for context (Herzberg et al., 2012). Cognitive fusion can be adaptive, for example, it is the process by which one becomes drawn in and engaged with storylines within books or movies. Obsessional beliefs, on the other hand, are defined as a set of dysfunctional cognitions or cognitive biases, such as the idea that thoughts can influence actions and lead to negative emotional and behavioural responses (Obsessive Compulsive Cognitions Working Group, 2005).

Two measures have been developed and evaluated to assess cognitive fusion: the Cognitive Fusion Questionnaire (Gillanders et al., 2014) and the Believability of Anxious Feelings and Thoughts Questionnaire (BAFT; Herzberg et al., 2012). The BAFT is composed of subscales that capture three empirically derived domains of cognitive fusion, including (a) negative evaluation, defined as the tendency to believe in negative evaluations of anxiety-related thoughts and feelings; (b) emotion regulation, defined as the tendency to struggle with trying to control unwanted emotions that are perceived as necessary to dismiss; and (c) somatic concerns, defined as the tendency to believe thoughts regarding one's body and physical sensations. Cognitive fusion may contribute to and maintain the misinterpretation of intrusive thoughts, leading individuals to view such internal experiences as highly believable (i.e., as facts).

Research provides initial support for an association between cognitive fusion and OCD symptoms (Reuman, Buchholz, & Abramowitz, 2018; Reuman, Buchholz, Blakey, & Abramowitz, 2017; Reuman, Jacoby, & Abramowitz, 2016), as well as the effectiveness of acceptance and commitment therapy (ACT)—which is derived from the principles of RFT—in ameliorating the symptoms of OCD by targeting cognitive fusion (Bluett, Homan, Morrison, Levin, & Twohig, 2014). Few studies, however, have specifically examined the relevance of cognitive fusion to OCD symptom dimensions. In separate nonclinical samples, Reuman et al. (2016) and Reuman et al. (2017) found that cognitive fusion and experiential avoidance predicted the unacceptable thoughts OC symptom dimension beyond combinations of obsessive beliefs. In a clinical sample of individuals diagnosed with OCD, however, Reuman et al. (2018) found that although cognitive fusion uniquely predicted unacceptable thoughts, it did not explain additional variability over and above obsessive beliefs and general distress.

A noteworthy limitation of the studies on cognitive fusion and OCD as summarized above is that all have relied exclusively on the Cognitive Fusion Questionnaire, which measures cognitive fusion as a unidimensional construct. Thus, no studies have investigated whether the various domains of cognitive fusion incrementally enhance the explanatory power of existing cognitive-behavioural models of OCD. As cognitive fusion is multidimensional, using the BAFT may provide a more nuanced understanding of the relation between this construct and OCD symptom dimensions. For example, the tendency to buy into anxious thoughts and feelings, but not physical sensations, might predict the

OCD symptom dimensions of responsibility for causing or preventing harm and unacceptable thoughts. Conversely, the tendency to believe anxious thoughts and feelings about emotion regulation and somatic concerns might predict symmetry OCD symptoms, which often involve “not just right experiences.”

Accordingly, the present study aimed to expand upon previous research by examining the relevance of specific domains of cognitive fusion to OCD symptom dimensions and their potential to augment the explanatory power of obsessive beliefs. On the basis of theory and previous empirical work, we first predicted that (a) obsessive beliefs regarding the tendency to overestimate threat and responsibility, and (b) the negative evaluation domain of cognitive fusion would predict the responsibility for harm OCD symptom dimension. Second, we predicted that (a) obsessive beliefs regarding the need for perfection and certainty, and (b) the emotion regulation and negative evaluation domains of cognitive fusion would predict the symmetry OCD dimension. Third, we predicted that (a) obsessive beliefs about the importance of and need to control thoughts, and (b) the negative evaluation and emotion regulation domains of cognitive fusion would predict the unacceptable thoughts OCD dimension. Finally, we predicted that for the three aforementioned OCD symptom dimensions, the specified cognitive fusion domains would add explanatory power to that of obsessive beliefs. We had no a priori predictions regarding contamination OCD symptoms given the lack of relationships found in previous research (e.g., Reuman et al., 2018, 2016).

2 | MATERIALS AND METHODS

2.1 | Participants

Participants in the present study were 52 treatment-seeking adults with a DSM-5 primary diagnosis of OCD who participated in a randomized controlled trial comparing traditional exposure and response prevention (ERP) with ERP conducted within an ACT framework (ACT + ERP). The methods of the parent trial are described in detail by Twohig et al. (2018). Initially, 74 individuals were assessed to determine eligibility to participate in the parent trial. Sixteen did not meet eligibility criteria and were excluded at the initial intake visit (see Twohig et al., 2018 for an explanation for exclusions). Fifty-eight individuals with a primary or coprimary diagnosis of OCD were enrolled and randomized to treatment. Six participants were further excluded from the present study due to substantial missing baseline data on our variables of interest, and thus, the present study sample size was 52. The sample had a mean age of 27.16 years ($SD = 8.48$) with a range of 18 to 56 years and included 18 males (34.6%), 33 females (63.5%), and 1 individual missing demographic information. In terms of race and ethnicity, within our sample, 76.9% of individuals identified as Caucasian and non-Hispanic ($n = 40$), 5.8% as African American ($n = 3$), 3.8% as Asian American ($n = 2$), 1.9% as Native American ($n = 1$), 7.7% as Hispanic ($n = 4$), and 1.9% as another race or ethnicity not specified ($n = 1$).

Participants were enrolled at two sites: the Anxiety and Stress Disorders Clinic at the University of North Carolina ($N = 25$) and the ACT Research Laboratory at Utah State University ($N = 27$). Eligible participants were not currently using any psychotropic medication or were stabilized in their medication dose for at least 1 month, not receiving other psychotherapy, and did not report previously receiving formal ERP or ACT for OCD. Participants were excluded if they had active suicidal ideation, a current severe major depressive episode, current mania, psychosis, or borderline or schizotypal personality disorder.

2.2 | Procedure

Participants who appeared likely to be eligible were screened by phone and invited to an on-site assessment. During this screening visit, all participants provided informed consent. The Mini International Neuropsychiatric Interview 5.0 was administered by a trained evaluator to assess for a current, primary OCD diagnosis as well as any other current or lifetime psychiatric disorders. Additional clinician-administered and self-report measures were completed, including the measures of interest for the present study (described in more detail below). All data included in the present study were obtained at the pretreatment (baseline) assessment visit. The Institutional Review Board at each university approved all study procedures, and participants and participant data were treated in accord with the American Psychological Association Ethics Code.

2.3 | Measures

2.3.1 | Obsessive Beliefs Questionnaire

The Obsessive Beliefs Questionnaire (OBQ; Obsessive Compulsive Cognitions Working Group, 2005), a 44-item self-report instrument, measures dysfunctional (“obsessive”) beliefs thought to contribute to the escalation of normal intrusive thoughts into clinical obsessions. It contains three subscales: (a) responsibility and threat overestimation (OBQ-RT), (b) importance and control of thoughts (OBQ-ICT), and (c) perfectionism and need for certainty (OBQ-PC). Individual items (e.g., “Having bad thoughts means I am weird or abnormal”) are rated from 1 (*disagree very much*) to 7 (*agree very much*). The instrument’s good validity, internal consistency, and test–retest reliability are described in Obsessive Compulsive Cognitions Working Group (2005). The reliability of the OBQ subscales (OBQ-RT $\alpha = .93$, OBQ-ICT $\alpha = .92$, and OBQ-PC $\alpha = .92$) were excellent in the present study sample.

2.3.2 | Dimensional Obsessive–Compulsive Scale

The Dimensional Obsessive–Compulsive Scale (DOCS; Abramowitz et al., 2010) is a 20-item self-report measure that assesses OCD symptom severity across the four most empirically supported symptom dimensions: responsibility for harm, symmetry (i.e., the need for things to be “just right”), unacceptable (repugnant) thoughts, and contamination. Within each dimension (subscale), five items are rated on a 5-

point Likert scale (0–4) to assess time occupied by obsessions and compulsions, avoidance behaviours, associated distress, functional interference, and difficulty disregarding the obsessions and refraining from the compulsions over the past month. A sample item reads, “About how much time have you spent each day with unwanted unpleasant thoughts and with behavioural or mental actions to deal with them?”

The DOCS subscales have good to excellent reliability in both clinical and undergraduate samples ($\alpha = .83-.96$), and test–retest reliability analyses indicate adequate stability of test scores. In the present study, the reliability across the DOCS subscales was similarly excellent ($\alpha = .93-.96$). The measure converges well with other measures of OCD symptoms and discriminates from general measures of depression, anxiety, stress, and social anxiety in patients and students.

2.3.3 | Beck Depression Inventory

(Beck, Epstein, Brown, & Steer, 1988). The Beck Depression Inventory (BDI-II) is a 21-item self-report scale that assesses the severity of depressive symptoms experienced during the past week. Respondents rate items related to depressive symptoms (e.g., sadness and fatigue) on a Likert scale ranging from 0 to 3. Total scores range from 0 to 63, and higher scores indicate greater depressive symptomatology. The reliability of the BDI in the present study sample was excellent ($\alpha = .93$).

2.3.4 | Believability of Anxious Thoughts and Feelings

The BAFT (Herzberg et al., 2012) is a 16-item self-report scale that assess cognitive fusion as it pertains to the believability of thoughts and feelings. Respondents rate the believability of each item on a 7-point Likert scale ranging from *not at all believable* to *completely believable*. Total scores range from 0 to 96, with higher score indicative of greater cognitive fusion. The three empirically derived BAFT subscales correspond to three domains of cognitive fusion: negative evaluations (BAFT-NE; e.g., “My anxious thoughts and feelings are a problem”), emotion regulation (BAFT-ER; e.g., “I must do something about my anxiety and fear when it shows up”), and somatic concerns (BAFT-SC; e.g., “My anxious thoughts and feelings are not normal”). The BAFT has demonstrated strong psychometric validity in both undergraduate students and anxious community samples (Herzberg et al., 2012). Specifically, the BAFT showed excellent internal consistency for the total BAFT score and subscale scores (e.g., $>.9$) in both undergraduate and community samples. Moreover, the BAFT and its subscales presented with high convergent validity to measures that assess overlapping cognitive constructs (e.g., experiential avoidance, thought suppression, and mindfulness) as well as other related clinical symptoms (e.g., anxiety symptoms, worry, and anxiety sensitivity). Factor analytic findings suggested a hierarchical factor structure with three lower order factors and one overall hierarchical factor, supporting that cognitive fusion represents a cohesive construct that can present in various domain-specific ways, which merit consideration. For example, the subscales of the

BAFT were differentially associated with clinical correlates and outcome measures assessed by Herzberg et al. (2012). In the present study sample, the reliability of the BAFT total score was good ($\alpha = .87$), and the reliability of its subscales was acceptable (BAFT-NE $\alpha = .78$, BAFT-ER $\alpha = .78$, and BAFT-SC $\alpha = .68$).

2.4 | Data analytic plan

Our approach to data analysis included the following steps: first, we computed descriptive statistics for all study variables. Second, we computed a series of two-tailed zero-order correlations to examine associations among the BDI-II, OBQ subscales, BAFT subscales, and DOCS subscales. Third, to examine the unique and combined contributions of the three domains of obsessive beliefs and the three cognitive fusion domains in predicting OCD symptom dimensions over and above general distress, we computed four conceptually informed hierarchical regression equations (one for each DOCS subscale). In each regression, the BDI-II was entered in Step 1, the OBQ subscales in Step 2, and the BAFT subscales in Step 3.

3 | RESULTS

3.1 | Group mean scores

Table 1 presents the means, standard deviations, skewness, and kurtosis for all measures. Scores on the DOCS and OBQ were typical of treatment-seeking individuals with OCD and indicated moderate to severe levels of obsessions, compulsions, and obsessive beliefs (Jacoby, Fabricant, Leonard, Riemann, & Abramowitz, 2013). The mean BDI-II score indicated moderate depressive symptomatology. Scores on the BAFT in this sample were considerably higher than those

TABLE 1 Descriptive statistics for study measures

Measure	Mean	SD	Skewness	Kurtosis
DOCS harm/responsibility	8.30	5.56	-0.06	-1.19
DOCS symmetry	6.85	5.17	0.18	-1.04
DOCS unacceptable thoughts	9.33	4.99	-0.41	-0.79
DOCS contamination	7.89	6.35	0.06	-1.51
BDI-II	15.74	9.86	0.34	-0.74
OBQ-PC	78.62	20.56	-0.73	0.23
OBQ-RT	72.45	22.79	-0.13	-0.65
OBQ-ICT	47.44	17.12	0.45	-0.82
BAFT-NE	34.24	5.69	-0.98	1.29
BAFT-ER	28.89	4.76	-0.59	-0.42
BAFT-SC	19.30	6.29	0.28	-0.60

Note. BAFT, Believability of Feelings and Thoughts; BDI-II, Beck Depression Inventory-II; DOCS, Dimensional Obsessive Compulsive Scale; ER, emotion regulation; ICT, Importance of Controlling Thoughts; NE, negative evaluation; OBQ, Obsessive Beliefs Questionnaire; PC, perfectionism/certainty; RT, responsibility/threat; SC, somatic concerns.

reported in a nonclinical sample and similar to samples of individuals with anxiety disorders (Herzberg et al., 2012).

3.2 | Correlation analyses

Table 2 presents zero-order bivariate (Pearson) correlation coefficients among all study measures. As can be seen, there was a considerable range in the strength of associations between variables: r s ranged from .00 (OBQ-RT with BDI-II) to .69 (OBQ-RT with DOCS Responsibility for Harm). We applied a Benjamini-Hochberg procedure to correct for the false discovery rate among the correlations (Benjamini & Hochberg, 1995). This yielded a corrected alpha level of $p < .019$.

The table shows that the DOCS subscales were not significantly intercorrelated. The OBQ-ICT subscale was significantly and positively correlated with OBQ-RT, but no other OBQ subscales were intercorrelated. The BAFT subscales were significantly correlated, yet the magnitude of these relationships suggests that they may be treated as meaningfully distinct constructs (r s = .41-.55). Finally, the BDI-II was associated with the DOCS unacceptable thoughts subscale symptom dimension, both the OBQ-ICT and OBQ-PC subscales, and all three BAFT subscales.

The DOCS subscales were uniquely correlated with different patterns of OBQ and BAFT subscales. The DOCS responsibility for harm subscale was strongly associated with the OBQ-RT. The DOCS symmetry subscale was associated with OBQ-PC and BAFT-NE. The DOCS-unacceptable thoughts subscale was positively correlated with the OBQ-ICT as well as the BAFT-ER and SC subscales. Finally, the DOCS contamination subscale was not significantly associated with any OBQ or BAFT subscales.

3.3 | Predictors of OCD symptom dimensions

Summary statistics for the full model in each hierarchical regression analysis predicting the DOCS subscales appear in Table 3. The data structure met all statistical assumptions regarding linear regression models.

3.3.1 | Predicting DOCS responsibility for harm

In Step 1, the BDI-II did not explain significant variance in DOCS responsibility for harm scores ($R^2 = .04$, $p = .18$). Addition of the OBQ subscales in Step 2, however, did account for significant additional variance (R^2 change = .53, $p < .001$). Addition of the BAFT subscales in Step 3 did not explain significant additional variance (R^2 change = .02, $p = .54$). The final model accounted for 59% of the variance in DOCS responsibility for harm scores, $F(7,51) = 8.89$, $p < .001$, and only the OBQ-RT subscale emerged as a significant unique predictor.

3.3.2 | Predicting DOCS symmetry

In Step 1, the BDI-II did not explain significant variance in DOCS symmetry scores ($R^2 < .02$, $p = .31$). Addition of the OBQ subscales in Step

TABLE 2 Zero-order bivariate (Pearson) correlations

Measure	1	2	3	4	5	6	7	8	9	10	11
DOCS responsibility for harm	--										
DOCS symmetry	.13	--									
DOCS unacceptable thoughts	-.01	.11	--								
DOCS contamination	.18	.14	-.08	--							
BDI-II	.19	.14	.42*	.18	--						
OBQ-ICT	.00	-.01	.60*	-.05	.34*	--					
OBQ-RT	.69*	.17	.16	.16	.01	.36*	--				
OBQ-PC	-.20	.47*	.25	.01	.42*	.27	.31	--			
BAFT-NE	.12	.49*	.29	.28	.62*	.28	.32	.47*	--		
BAFT-ER	-.12	.33*	.39*	.12	.42*	.60*	.18	.32	.55*	--	
BAFT-SC	.34*	.29	.39*	.15	.38*	.45*	.55*	.32	.59*	.42*	--

Note. BAFT, Believability of Feelings and Thoughts; BDI-II, Beck Depression Inventory-II; DOCS, Dimensional Obsessive Compulsive Scale; ER, emotion regulation; ICT, Importance of Controlling Thoughts; NE, negative evaluation; OBQ, Obsessive Beliefs Questionnaire; PC, perfectionism/certainty; RT, responsibility/threat; SC, somatic concerns.

*Benjamini-Hochberg corrected alpha: $p < .019$.

2, however, explained significant additional variance (R^2 change = .22, $p = .008$). Addition of the BAFT subscales in Step 3 also explained significant additional variance (R^2 change = .20, $p = .003$). The final model accounted for 44% of the variance in DOCS symmetry scores, $F(7,51) = 4.92$, $p = .001$, and the BDI-II, OBQ-PC, and BAFT-NE emerged as significant unique predictors.

3.3.3 | Predicting DOCS unacceptable thoughts

In Step 1, the BDI-II explained significant variance ($R^2 = .18$, $p = .002$) in DOCS unacceptable thoughts scores. Addition of the OBQ subscales in Step 2 explained significant additional variance (R^2 change = .24, $p = .001$) yet addition of the BAFT subscales in Step 3 did not (R^2 change = .02, $p = .76$). The final model accounted for 43% of the variance in DOCS unacceptable thoughts scores, $F(7,51) = 4.81$, $p < .001$, and the OBQ-ICT was the only significant unique predictor.

3.3.4 | Predicting DOCS contamination

In Step 1, the BDI-II did not explain significant variance in DOCS contamination scores ($R^2 = .03$, $p = .21$). The OBQ subscales in Step 2 did not explain significant additional variance (R^2 change = .08, $p < .24$). Similarly, the BAFT subscales in Step 3 did not add to the explanatory power of the model (R^2 change = .04, $p = .58$). The final model accounted for 15.0% of the variance in DOCS contamination scores, $F(7,51) = 1.11$, $p = .37$.

4 | DISCUSSION

The aim of the present study was to elucidate the relationships among domains of cognitive fusion, obsessive beliefs, and OCD symptoms and to examine their independent and relative contributions in the

prediction of OCD symptom dimensions. To date, few studies have examined cognitive fusion in OCD, and the existing work has used only unifactorial measures of this construct. The present study therefore adds to this body of work by examining the extent to which different domains of cognitive fusion predict OCD symptoms and the extent to which they add explanatory power to the traditional cognitive-behavioural model.

Our first prediction was partially supported in that, after accounting for general distress, the tendency to overestimate threat and responsibility explained significant variance in obsessions and compulsions focused on responsibility for harm. The negative evaluation domain of cognitive fusion, however, as well as the other cognitive fusion domains, were not significantly associated with this OCD symptom dimension. Thus our correlational analyses indicate that this presentation of OCD is associated with cognitive distortions but not the tendency to “buy into” intrusive thoughts or doubts. Our regression analyses further suggest that overestimates of threat and responsibility are such a robust predictor of OCD symptoms related to the fear of causing or not doing enough to prevent harm or mistakes that they leave little variance to be explained by cognitive fusion.

Our second hypothesis was also partially supported. Beliefs pertaining to the need for perfection and certainty (in addition to general distress) significantly predicted the symmetry and ordering OCD symptom dimension. Also as expected, the emotion regulation and negative evaluation domains of cognitive fusion were strongly associated with these types of obsessions and compulsions; however, in our regression analysis, only the negative evaluation domain additively explained variance in these symptoms above and beyond obsessive beliefs and general distress. This study is the first to elucidate an additive role for cognitive fusion in accounting for symmetry and ordering OCD symptoms. Moreover, the contribution of cognitive fusion appears to be domain specific; our findings indicate that judging unwanted internal experiences to be problematic and as having

TABLE 3 Summary statistics for Beck Depression Inventory II, Obsessive Beliefs Questionnaire subscales, and Believability of Feelings and Thoughts subscales predicting Dimensional Obsessive Compulsive Scale subscales

Variable	R ²	Beta	t	p
Predicting DOCS responsibility for harm				
Full model	.59			<.001
BDI-II		-.17	-1.24	n.s.
OBQ-ICT		-.18	-1.33	n.s.
OBQ-RT	.67		5.07	<.001
OBQ-PC	.11		.93	n.s.
BAFT-NE	.03		.19	n.s.
BAFT-ER	-.17		-1.18	n.s.
BAFT-SC	.13		.91	n.s.
Predicting DOCS symmetry				
Full model	.44			<.001
BDI-II		-.35	-2.12	<.05
OBQ-ICT		-.26	-1.58	n.s.
OBQ-RT		-.10	-.66	n.s.
OBQ-PC	.40		2.95	<.05
BAFT-NE	.43		2.26	<.05
BAFT-ER	.23		1.39	n.s.
BAFT-SC	.11		.68	n.s.
Predicting DOCS unacceptable thoughts				
Full model	.43			<.001
BDI-II		.22	1.32	n.s.
OBQ-ICT		.53	3.25	<.001
OBQ-RT		-.12	-.76	n.s.
OBQ-PC	.04		.31	n.s.
BAFT-NE	-.06		-.29	n.s.
BAFT-ER	-.05		-.31	n.s.
BAFT-SC	.18		1.05	n.s.
Predicting DOCS contamination				
Full model	.15			.37
BDI-II		.20	.99	n.s.
OBQ-ICT		-.27	-1.37	n.s.
OBQ-RT	.27		1.44	n.s.
OBQ-PC	-.20		-1.21	n.s.
BAFT-NE	.19		.82	n.s.
BAFT-ER	.14		.67	n.s.
BAFT-SC	-.07		-.32	n.s.

Note. BAFT, Believability of Feelings and Thoughts; BDI-II, Beck Depression Inventory-II; DOCS, Dimensional Obsessive Compulsive Scale; ER, emotion regulation; ICT, Importance of Controlling Thoughts; NE, negative evaluation; OBQ, Obsessive Beliefs Questionnaire; PC, perfectionism/certainty; RT, responsibility/threat; SC, somatic concerns.

undesirable consequences contributes to the symmetry OCD dimension, even above and beyond obsessive beliefs about the importance of certainty and exactness. In line with conceptual models (Summerfeldt, 2004) and previous empirical work (Coles, Frost, Heimberg, & Rhéaume, 2003; Coles, Heimberg, Frost, & Steketee, 2005; Smith, Wetterneck, Hart, Short, & Björgvinsson, 2012), perhaps cognitive fusion specifically manifests as the intolerability of “not-just-right experiences” observed among individuals with symmetry and ordering symptoms.

Relatedly, it is unclear whether “not just right experiences” are fundamentally sensory or affective phenomena, or the extent to which they have a cognitive (dysfunctional belief) component (Taylor et al., 2006). Our finding that the tendency to negatively judge unwanted internal experiences better explains symmetry OCD symptoms relative to beliefs about the need for perfection, and certainty indicates a shortcoming in current obsessive belief models of this type of OCD symptom and represents an area for future research. It also highlights the heterogeneity of OCD symptoms and the importance of a dimensional approach to understanding the phenomenology and aetiology of this disorder.

Our third hypothesis that the tendency to overestimate the importance and need to control intrusive thoughts would predict the unacceptable thoughts OCD symptom dimension was supported as well, replicating previous research (Reuman et al., 2018, 2017, 2016). Although the negative evaluation and emotion regulation domains of cognitive fusion were strongly associated with the unacceptable thoughts OCD symptom dimension, they failed to add to the predictive power of the cognitive-behavioural model accounting for obsessive beliefs and general distress. Of note, previous research has implicated a role for cognitive fusion in unacceptable thoughts symptoms (Reuman et al., 2018). One explanation for this discrepant finding in our sample is the conceptual overlap between the emotion regulation domain of cognitive fusion and the importance and control of thoughts domain of obsessive beliefs. Both constructs integrate the need to regulate internal experiences, yet, whereas the OBQ-ICT specifically assesses this phenomenon as it relates to intrusive thoughts, the BAFT-ER assesses the need to control anxious affect and physiological sensations (Herzberg et al., 2012; Obsessive Compulsive Cognitions Working Group, 2005). The strong association between these two measures indicates that both constructs tap into psychological inflexibility regarding the acceptability of private, distressing experiences. Conceptually, our results suggest that psychological inflexibility in this regard may be particularly relevant to symmetry and ordering OCD symptoms. Statistically, however, this leaves little room for the emotion regulation domain of cognitive fusion to add explanatory power of the cognitive-behavioural model in addition to obsessive beliefs.

Neither obsessive beliefs nor cognitive fusion predicted contamination symptoms, which was unsurprising given that previous findings have been mixed regarding the utility of these constructs in explaining contamination obsessions and washing/cleaning rituals (Reuman et al., 2018; Viar, Bilsky, Armstrong, & Olatunji, 2011; Wheaton et al., 2010). To this effect, obsessions and compulsions regarding contamination

primarily focus on *external* situations and stimuli (Rachman, 2004), rather than unwanted private experiences such as responsibility, guilt, unacceptable thoughts and feelings, and not-just-right experiences that characterize other presentations of OCD. As such, beliefs and thoughts regarding internal experiences may play less of a role in contamination concerns relative to other OCD symptom dimensions.

A notable exception to this distinction worthy of consideration is “mental contamination” (Coughtrey, Shafran, Knibbs, & Rachman, 2012; Radomsky, Rachman, Shafran, Coughtrey, & Barber, 2014). This manifestation of contamination symptoms presents as feelings of “moral dirtiness” in the absence of contact with an external contaminant. Although we did not specifically assess moral contamination in the present study, it may be informative for future research to examine whether cognitive fusion plays a differential role in the prediction of this form of contamination symptoms, given their internalized nature. This further raises the possibility that the heterogeneity of contamination concerns in OCD limits the explanatory power of constructs such as obsessive beliefs and cognitive fusion. Indeed, contamination obsessions in OCD can present as a fear of illness, concerns about germs *per se* (i.e., without the fear of illness), disgust, and moral contamination. Thus future research should also address conceptual models among these manifestations of contamination fears.

Our findings have implications for future research and for the treatment of OCD. This study provides additional support for the utility of considering symptom dimensions when examining factors that contribute to the maintenance of OCD. Our findings serve as a replication and extension of existing work examining the relevance of cognitive fusion and overlapping cognitive constructs (e.g., thought-action fusion and obsessive beliefs) with a novel measure that facilitates a more dimensional, domain-specific assessment of cognitive fusion. To this effect, future research will be beneficial for understanding this condition to the extent that it focuses on symptom dimensions as opposed to treating OCD as a homogeneous condition. Such a dimensional understanding is also necessary to inform more precise, idiographic targets for treatment and contributes to the development of more effective, tailored treatment approaches. Despite empirically supported psychological interventions for OCD, our knowledge of what factors predict which treatments will work best for whom is still limited. Findings, such as those provided by the present study, and future work along these lines, may refine our ability to optimally tailor and match individuals to evidence-based therapeutic techniques. For example, defusion strategies employed in ACT may be utilized to augment the effectiveness of ERP for treating obsessions and compulsions related to symmetry and ordering. This approach may maximize gains by concurrently challenging core beliefs and targeting cognitive processes (e.g., cognitive fusion) contributing to the maintenance of symptoms. On the other hand, OCD symptoms related to harm may be most efficiently targeted through exposure and cognitive restructuring techniques that challenge core beliefs around responsibility and threat.

It is also important to consider a number of limitations of the present study. Notably, our data are cross sectional and thus do not permit causal conclusions. To address this limitation, prospective studies may build upon this work to clarify the temporal and directional

nature of our findings. Our results align with cognitive-behavioural and psychological flexibility conceptualizations of OCD, supporting that implicated constructs (e.g., beliefs and cognitive fusion) lead to the development and maintenance of obsessions and compulsions. However, it is important to note that symptoms of OCD could lead to obsessive beliefs and cognitive fusion or that variables not assessed in the present study contribute to or explain the effects observed in the present study. Participants in the present study were formally diagnosed with primary (or coprimary) OCD through a clinical interview; however, secondary analyses were not adequately powered to examine the impact of comorbid diagnoses on our findings. To address this limitation, we controlled for general distress (with the BDI-II) in all analyses. Although we used this control for general distress, we were not able to include a control group in the present study; and therefore, it is possible that our findings are not specific to OCD. Indeed, given that psychological flexibility has been implicated transdiagnostically across anxiety disorders and commonly comorbid psychological conditions (e.g., depression, eating disorders, and substance use; (Bardeen & Fergus, 2016; Steven C. Hayes & Pankey, 2002; Luoma, Kohlenberg, Hayes, & Fletcher, 2012), an important next step may be to examine the implications and relevance of these findings to the maintenance and treatment of complex, comorbid presentations of OCD.

An additional limitation is that our results relied exclusively on self-report instruments. Such method invariance can inflate associations among constructs. However, limited validated and objective paradigms exist to assess obsessive beliefs and cognitive fusion outside of self-report measures. The promise of empirically derived, behavioural paradigms for informing our conceptualization and treatment of OCD has been evidenced in existing work in this area regarding intolerance of uncertainty (Jacoby, Abramowitz, Reuman, & Blakey, 2016) and thought-action fusion (Berman, Abramowitz, Wheaton, Pardue, & Fabricant, 2011). The development and validation of ecologically valid, multimethod assessment approaches for constructs relevant to psychological flexibility and implicated in OCD symptom dimensions would be a substantial contribution to this line of work and would facilitate important future research to explain the onset and maintenance of OCD. Finally, although the present study valuably examined these relationships in a clinical population, our sample was relatively small ($N = 52$) and consistent of treatment-seeking outpatients with primary OCD. As such, our results may be limited in generalizability, and future work in this area is needed to investigate the relevance of our findings in larger, diverse samples and settings of individuals with OCD (e.g., inpatient).

Funding information

This study was supported by a grant from the International OCD Foundation (this agency does not provide grant numbers).

ACKNOWLEDGEMENTS

None.

CONFLICT OF INTEREST

The authors have no conflicts of interest to report.

ORCID

Samantha N. Hellberg  <https://orcid.org/0000-0002-0302-2382>

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How to cite this article: Hellberg SN, Buchholz JL, Twohig MP, Abramowitz JS. Not just thinking, but believing: Obsessive beliefs and domains of cognitive fusion in the prediction of OCD symptom dimensions. *Clin Psychol Psychother*. 2020;27:69–78. <https://doi.org/10.1002/cpp.2409>