



# Experimental modification of dysfunctional interpretations in individuals with contamination concerns

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## ABSTRACT

**Background and objectives:** Dysfunctional interpretations of intrusive thoughts are implicated in the etiology and maintenance of Obsessive-Compulsive Disorder (OCD). Cognitive Bias Modification training for interpretations (CBM-I) has successfully modified dysfunctional interpretations in the context of several disorders, including OCD. However, research regarding CBM-I's impact on symptom reduction and behavior is mixed, which limits its clinical application. Further, support for the specific efficacy of CBM-I in individuals with contamination concerns is limited. The current study aimed to modify dysfunctional interpretations in individuals with contamination concerns, and examine the effect of the modification on both interpretation bias and performance on a behavioral approach task (BAT).

**Methods:** Participants ( $N = 74$ ) completed a word-sentence association task by indicating whether a threatening or benign word was related to an ambiguous scenario. The active condition received feedback designed to reduce maladaptive interpretations; the control condition received random feedback.

**Results:** Findings revealed that the active—but not the control—condition showed a significant decrease in interpretation bias for threat cues. Analyses of behavioral effects indicated that when ceiling effects were accounted for, the active condition completed more BAT steps than the control condition ( $p = 0.06$ ;  $d = 0.45$ ).

**Limitations:** The current study is preliminary and requires replication with a clinical sample.

**Conclusions:** Completion of the CBM-I was beneficial for reducing dysfunctional interpretations relevant to naturally-occurring contamination concerns and, importantly, this reduction may help those individuals approach feared situations.

## 1. Introduction

Obsessive-Compulsive Disorder (OCD) is a debilitating condition that causes impairment across multiple life domains (American Psychiatric Association, 2013). Notably, OCD is heterogeneous, with varying symptom presentations and numerous possibilities for obsessional content and compulsive behaviors. Various models examine the etiology, maintenance, and exacerbation of OCD (e.g., Armstrong & Olatunji, 2017; Doron & Kyrios, 2005; Rosenberg & Keshavan, 1998; Taylor et al., 2006); however, the cognitive-behavioral model is the contemporary psychological model with the most empirical support (Abramowitz, Taylor, & McKay, 2009). This approach posits that obsessions and compulsions arise from certain dysfunctional beliefs and are contingent upon the importance allotted to those beliefs.

The cognitive-behavioral model is based on the finding that unwanted intrusive thoughts, images, or impulses are experienced by most individuals in the general population (Gibbs, 1996), often are reflective of important issues in one's life, and can be triggered by internal or

external cues (Rachman, 1997). However, the intrusions do not develop into obsessions unless the individual attributes exaggerated significance to the intrusion or appraises it as highly important, threatening, distressing, or immoral (Salkovskis, 1985; 1989). These flawed interpretations are considered a primary cause of obsessions (OCCWG, 2003, 2005) and have been linked to the frequency, importance, and persistence of intrusions (Moulding et al., 2014). The putative causal role of dysfunctional interpretations in obsessions, and the key role of these interpretations in the etiology and maintenance of OCD, suggest a need for experimental investigation of how to modify OC-relevant interpretations and beliefs.

Cognitive bias modification (CBM) involves modifying information processing biases implicated in a number of disorders (Hertel & Mathews, 2011). CBM interventions often are attention-focused (CBM-A) or interpretation-focused (CBM-I), with CBM-I paradigms aiming to correct biases by reducing dysfunctional interpretations. CBM paradigms have been utilized successfully with anxiety disorders (e.g., Beard & Amir, 2008; Hirsch, Hayes, & Mathews, 2009; Teachman &

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Addison, 2008); however, fewer studies have targeted OCD (Grisham, Becker, William, Whitton, & Makkar, 2014).

In recent years, emphasis on examining the efficacy of CBM on OCD has increased, with results from these studies suggesting that CBM approaches successfully manipulate and modify dysfunctional OC-relevant beliefs and interpretations (e.g., Amir, Kuckertz, Najmi, & Conley, 2015; Clerkin & Teachman, 2011; Najmi & Amir, 2010; Stech & Grisham, 2017). CBM-I procedures shown to be successful with anxiety disorders include computer tasks, such as the scenario paradigm (Clerkin & Teachman, 2011; Hirsch & Mathews, 1997; Mathews & Mackintosh, 2000) and the word sentence association paradigm (WSAP; Amir, Bomyea, & Beard, 2010; Beard & Amir, 2008). However, when examining studies completed within the OCD literature, the scenarios paradigm is more commonly used. In fact, to our knowledge, only one study has examined the effectiveness of the WSAP in OCD (Amir et al., 2015). Available data support the reduction or modification of maladaptive intrusions, but evidence supporting CBM-I as an intervention tool to foster behavioral change is limited.

For example, studies have found that a single-session of CBM-I is successful in reducing a range of maladaptive intrusions. Compared to control conditions, individuals trained to resolve incomplete scenarios in a manner *inconsistent* with negative OC interpretations reported more benign interpretations, fewer dysfunctional interpretations, and fewer urges to neutralize after a stressor task (Clerkin & Teachman, 2011; Williams & Grisham, 2013). However, attempts to generalize this modification of interpretations to OC-relevant behavioral tasks encompassing contamination beliefs or threat estimation have been unsuccessful (Williams & Grisham, 2013). Attempts to submit CBM-I paradigms to a rigorous test of effectiveness of bias modification have yielded similar results. After completing two CBM-I sessions, university students displayed a reduction in maladaptive OC beliefs, but not reduced OC symptoms or improved stressor task performance (Stech & Grisham, 2017).

Two studies completed with individuals diagnosed with OCD showed translational effects of interpretation modification to behavior and symptom reduction. Salemink, Wolters, and de Haan (2015) examined the effect of an eight-session, online CBM-I scenarios paradigm as an adjunct to CBT + pharmacotherapy combination treatment in adolescents diagnosed with OCD. Results indicated that individuals in the active condition displayed modified interpretation biases and reduced OCD symptoms. However, a Group x Time interaction effect for symptom reduction was not statistically significant, which limits the clinical impact of this finding. Amir et al. (2015) examined the effects of a word-sentence association CBM-I paradigm as part of a larger treatment study with adult participants who reported clinical levels of OCD. Unlike previous studies, ideographic stimuli were used and participants were asked to complete self-conducted exposure exercises following training. Results indicated that completing the CBM-I paradigm resulted in reduced dysfunctional interpretations and reduced distress when completing self-conducted exposures. However, due to the unmatched control condition, nested study design, and individualized scenarios, generalization of clinical change may be limited.

A potential explanation for the mixed findings related to the clinical utility of bias modification (i.e., the ability for modified biases to translate to behavioral changes and/or symptom reduction) could be the mechanisms through which CBM-I is effective. Beadel, Smyth, and Teachman (2014) suggested that CBM-I successfully modifies dysfunctional interpretations via alteration of contingency learning patterns, a cognitive processing variable. Early research indicated habituation of fear and arousal as a mechanism of change for exposure-based interventions (e.g., Foa & Kozak, 1986; Foa, Huppert, & Cahill, 2006); however, more recent research has suggested that learning occurring during exposure-based interventions does not replace fear-based associations as originally predicted. Instead, inhibitory learning theory literature (e.g., Myers & Davis, 2007) suggests that new associations are developed, and with repeated practice, access to the previous fear

association is reduced, making the new association more prevalent (Jacoby & Abramowitz, 2016). An alteration in contingency learning may make it easier for individuals to engage in exposure-based interventions (Beadel et al., 2014), and increase the speed with which individuals are able to develop new, non-fear associations with previously feared stimuli. That is, altering cognitive processes to inhibit expectations that ambiguous scenarios are associated with a dangerous outcome (and generating benign outcomes) may increase the ease with which individuals are able to interact with feared stimuli, thereby allowing for cognitive and behavioral learning of non-threat associations.

Moreover, existing research largely is focused on overarching OC beliefs, with few studies examining the effect of training more adaptive interpretations for specific belief domains (Black & Grisham, 2016). Given the significant heterogeneity of OCD, it is unlikely that individuals with OCD will endorse all domains; further research utilizing domain-specific scenarios is needed to examine the impact of CBM-I on specific beliefs. Targeting specific beliefs may increase the likelihood of identifying successful translational effects from CBM-I (i.e., symptom reduction or decreased emotional vulnerability). To this end, the effect of CBM-I training procedures on responsibility in compulsive checking (e.g., Grisham et al., 2014) and importance and control of thoughts (e.g., Clerkin, Magee, & Parsons, 2014; Stech & Grisham, 2017) have been examined; however, research specific to contamination-based OC symptoms is lacking. Individuals with contamination concerns have been shown to display implicit, attentional, and interpretation biases for contamination-related stimuli (e.g., Armstrong, Sarawgi, & Olatunji, 2012; Charash & McKay, 2009; Mathews & MacLeod, 2005). For example, an individual with contamination concerns may view going grocery shopping as highly aversive. Typically, this situation is interpreted as ambiguous or benign by most individuals; however, individuals with contamination concerns are likely to focus on feared aspects of the situation (e.g., coming in contact with other people, touching items that have been touched by others and may carry disease, bringing germs into the home once finished) instead of benign features.

Such biases have been shown to predict avoidance during behavioral tasks (Armstrong et al., 2012; Kuckertz, Amir, Tobin, & Najmi, 2013; Najmi & Amir, 2010). In fact, Najmi and Amir (2010) found that completing active attention re-training resulted in decreased attention to threatening information and completion of significantly more contamination-related behaviors in an approach task. Similarly, Kuckertz et al. (2013) administered a paper version of the WSAP (Word Sentence Association Test for OCD; WASO) to individuals with contamination concerns. Participants who completed the WASO endorsed threatening stimuli as being more related to ambiguous scenarios, and this endorsement was a better predictor of behavioral performance than an OCD symptom measure (Kuckertz et al., 2013).

### 1.1. Current study

This study assessed the efficacy of a single-session CBM-I intervention in individuals with elevated contamination concerns and examined the relationship between CBM-I completion and behavioral task performance (i.e., willingness to engage, reported anxiety, and disgust). To further explore the utility of WSAPs for OCD and related beliefs, this paradigm was used to measure baseline interpretation biases and bias change. The Interpretation Modification Paradigm (IMP) and Interpretation Control Condition (ICC; Beard & Amir, 2008) were used to measure and manipulate dysfunctional interpretations of contamination-relevant stimuli.

Consistent with reviewed findings, we hypothesized that participants randomly assigned to the active condition (IMP) would display a significant (1a) reduction in interpretation bias for threatening information and (1b) increase in interpretation bias for benign interpretation. Conversely, we hypothesized that participants in the control condition (ICC) would display neither a significant (2a) reduction in interpretation bias for threatening information nor (2b) an increase in

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