Behaviour Research and Therapy 83 (2016) 45–52

Contents lists available at ScienceDirect

Behaviour Research and Therapy

journal homepage: www.elsevier.com/locate/brat

# Imagery versus verbal interpretive cognitive bias modification for compulsive checking

Melissa J. Black, Jessica R. Grisham*

*School of Psychology, The University of New South Wales, Kensington, NSW 2052, Australia*

ARTICLE INFO

*Article history:*
Received 3 November 2015
Received in revised form
27 May 2016
Accepted 31 May 2016
Available online 6 June 2016

*Keywords:*
Cognitive bias modification
Interpretation biases
Obsessive-compulsive disorder
Repeated checking
Imagery
Memory uncertainty

ABSTRACT

Pathological doubting and checking is a common symptom presentation in obsessive-compulsive disorder (OCD). Previous research has established that compulsive checkers do not display an actual memory deficit, but lack confidence in their memories and experience intolerance of uncertainty regarding the completion of tasks. We investigated whether interpretive cognitive bias modification (CBM-I) reduced memory distrust and intolerance of uncertainty in a nonclinical sample. We also examined the possible enhancement of CBM-I for OCD through imagery training. The results provide evidence that participants who received positive imagery CBM-I training may have interpreted novel ambiguous checking scenarios more adaptively and endorsed negative checking beliefs less relative to participants in the control imagery CBM-I condition. Findings on behavioural checking tasks did not indicate any specific response to CBM-I training. Future research may translate these suggestive findings into a useful adjunct to traditional strategies targeting maladaptive OCD beliefs.



In an unpredictable world, beliefs about the need for certainty and a distrust of one's memory can lead to frequent anxiety. For individuals with obsessive-compulsive disorder (OCD), these types of beliefs are common (OCCWG, 1997) and may lead to an interpretive bias, a tendency to interpret ambiguous stimuli in a manner consistent with maladaptive beliefs. In the current study, we examined whether this subset of OCD-relevant interpretative biases are amenable to change using a novel adaptation of a cognitive procedure.

In OCD, repeated checking is aimed at reducing the risk of harm, but paradoxically increases memory distrust, feelings of personal responsibility, and anxiety (Rachman, 2002). Intolerance of uncertainty may serve as an integral link between doubting, repeated checking, and memory distrust (OCCWG, 1997). Ambiguous situations that elicit feelings of uncertainty are negatively interpreted as indicating a memory deficit and foretelling harm (Summerfeldt & Endler, 1998), which then leads to compulsive checking (e.g., Van den Hout & Kindt, 2003).

Cognitive bias modification for interpretation (CBM-I) is an approach that aims to target interpretive biases in psychological disorders. Mathews and Mackintosh (2000) altered anxiety response through a CBM-I procedure inducing either a threatening or benign interpretation of ambiguous stimuli. Different CBM-I procedures have been investigated as potential approaches to modifying maladaptive interpretive biases across a range of disorders (see Menne-Lothmann et al., 2014 for a comprehensive review). Although the findings are mixed, procedures that have effectively modified interpretive biases have been developed for a range of psychopathologies (e.g., depression, Blackwell & Holmes, 2010; social anxiety, Salemink, van den Hout, & Kindt, 2009). MacLeod, Koster, and Fox (2009) suggested that CBM could be applied to different forms of memory and interpretive bias to further explore the mechanisms of different types of dysfunction, and a combination of behavioural, somatic, and self-report measures could be used to assess its effectiveness. These results are promising for applications to other clinical disorders, including OCD (Beard, 2011; MacLeod, 2012).

Testing the premises of cognitive models of OCD, Clerkin and Teachman (2011) trained interpretation biases among individuals with subclinical OCD and found that maladaptive processing associated with anxiety can be changed through CBM procedures (Clerkin & Teachman, 2011). Williams and Grisham (2013) and Beadel, Smyth, and Teachman (2013) partially replicated these results, showing that CBM-I reduced maladaptive OC beliefs and increased adaptive contingency learning, but did not change

* Corresponding author.
*E-mail addresses:* melissa.black@unsw.edu.au (M.J. Black), jessicag@unsw.edu.au (J.R. Grisham).

http://dx.doi.org/10.1016/j.brat.2016.05.009
0005-7967/

responding to OC stressor tasks or subjective fear/arousal. A few studies have examined the effect of CBM-I training procedures for specific belief domains related to OCD, given the idiosyncratic nature of symptoms (e.g., responsibility in compulsive checking, Grisham, Becker, Williams, Whitton, & Makkar, 2014; importance and control of thoughts, Clerkin, Magee, & Parsons, 2014). These studies found small but promising effects of CBM-I on the modification of beliefs associated with OCD. As the field progresses, multi-method assessments of responses to CBM-I training procedures are vital to examine specific subsets of beliefs in OCD, including intolerance of uncertainty and memory distrust (Rachman, 2002).

A number of CBM-I studies have examined whether imagery may enhance engagement with the training scenarios and lead to more positive outcomes (Holmes, Lang, & Shah, 2009). Examining these adjustments across different domains of CBM-I research is important in order to ensure that participants are actively processing the material presented and to facilitate imagination of the scenarios in a personally-relevant manner. Images in OCD are often recurrent, disruptive, and uncontrollable (Rachman, 2007). Given the relevance of imagery in the maintenance of a number of psychopathologies (for review, see Holmes & Mathews, 2010), the current study included imagery-based CBM-I for OC-relevant beliefs as an alternative method of reshaping threatening images.

## 1. Aims and hypotheses

Our primary aim was to use a multi-method procedure to investigate the effect of training modality on response to training in a sample of OCD checkers; namely, whether auditory imagery training would enhance the effect of positive CBM-I training compared to written verbal training (see Holmes et al., 2009). We predicted that there would be a greater positive interpretive bias, decreased OCD symptoms and beliefs, and less checking during behavioural tasks for participants who received imagery training compared to those who received verbal training. Consistent with previous studies (Clerkin & Teachman, 2011; Grisham et al., 2014; Williams & Grisham, 2013), we also predicted that compared to participants in a control condition, participants in a positive CBM-I training condition would report more adaptive interpretation bias, decreased OCD beliefs and symptoms, and less checking following training.

## 2. Method

### 2.1. Participants

Participants were recruited via the undergraduate psychology and paid community participant pools at the University of New South Wales. Undergraduate participants received course credit for their participation, and community participants received $15 per hour. Results did not differ between these groups so all were combined in the analyses. Participants were randomly allocated to one of the four CBM-I training conditions (see Fig. 1 for allocation and exclusions). The final sample consisted of 137 participants (86 females, mean age = 22.51, *SD* = 5.43, range 17–50).

### 2.2. Materials and measures

**Padua Inventory – Washington State University Revision (PI-WSUR).** The PI-WSUR is a 39-item self-report measure of the degree of disturbance caused by obsessions and compulsions (Burns, Keortge, Formea, & Sternberger, 1996). The internal consistency of the total scale is excellent at 0.92, and was comparable in the current study at 0.95.

**Obsessive Beliefs Questionnaire – 44-item version – Perfectionism and Certainty Subscale (OBQ-PC).** The 16-item Perfectionism and Certainty self-report subscale of the OBQ was included because these beliefs were the focus of this investigation (OCCWG, 2003). The subscale has good-excellent internal consistency at 0.93 and was comparable in the current study at 0.93.

**Memory and Cognitive Confidence Scale (MACCS).** The MACCS is a 28-item questionnaire that measures beliefs about memory and cognition relevant to OCD (Nedeljkovic & Kyrios, 2007). The internal consistency of the total scale is excellent at 0.92, and was comparable in the current study at 0.94.

**Depression Anxiety Stress Scales – 21 item version (DASS-21).** The DASS-21 is a 21-item questionnaire that was used to measure the negative emotional states of depression, anxiety and stress over the past week (Lovibond & Lovibond, 1995). The internal consistencies of the DASS-21 are excellent (depression: 0.94; anxiety: 0.87; stress: 0.91; Antony, Bieling, Cox, Enns, & Swinson, 1998), and were comparable in the current study (depression: 0.92; anxiety: 0.85; stress: 0.89).

**Spontaneous Use of Imagery Scale (SUIS).** The SUIS is a 12-item self-report measure that was included to assess how the tendency towards general imagery use may affect engagement with the training (Reisberg, Pearson, & Kosslyn, 2003). The SUIS has good internal consistency of 0.76 (Nelis, Holmes, Griffith, & Raes, 2014), and was comparable in the current study at 0.84.

**Recognition Scenarios Task (modified from** Mathews & Mackintosh, 2000**).** The recognition scenarios task was used to assess interpretation biases pre- and post-training. Pre-training, participants were presented with ten ambiguous scenario descriptions that were paired with a title. Following this, participants completed the neutral images filler task. Participants were then presented with the titles for each of the ten scenarios and rated the similarity of four emotionally-valenced disambiguated descriptions for each scenario. The targets were included to assess whether the CBM-I procedure would produce training-congruent changes in memory ability and uncertainty biases, while foils were used to assess for a general positive or negative bias. Pre- and post-training overall Target and Foil Bias Index scores were calculated by subtracting ratings for negative items from ratings for positive items (Clerkin & Teachman, 2011). See Table 1 for an example of this task.

**Cognitive Bias Modification – Interpretation (CBM-I) task.** The CBM-I task was based on the procedures used by Clerkin and Teachman (2011) and Holmes et al. (2009). Training items were developed based on memory and checking-relevant beliefs described in a large online pilot study, the uncertainty items from Clerkin and Teachman (2011), and items from relevant questionnaires (e.g., OCCWG, 2003; Nedeljkovic & Kyrios, 2007). Thus the training paradigm consisted of 32 scenarios, each presented twice (either written or in a recorded female voice), which were designed to either increase memory confidence, tolerance for uncertainty, or adaptive beliefs about checking (positive CBM-I training) or hold biases at a neutral level (control CBM-I training, based on Black, Stech, & Grisham, 2014). The first part of each description was presented for a maximum of 8 s, followed by the final part of the sentence which appeared on the screen for a maximum of 15 s and disambiguated the scenario description once completed (presented on the screen or stereophonically via headphones), and half of the training items were followed by a comprehension question. See Fig. 2 for a summary of the procedure.

**Imagery training.** This manipulation followed the procedure used by Holmes et al. (2009). In the imagery condition, participants were given a practice task in which they were asked to