



Effects of standard and explicit cognitive bias modification and computer-administered cognitive-behaviour therapy on cognitive biases and social anxiety



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ABSTRACT

Background and objectives: This study examines the effects of a single session of Cognitive Bias Modification to induce positive Interpretative bias (CBM-I) using standard or explicit instructions and an analogue of computer-administered CBT (c-CBT) program on modifying cognitive biases and social anxiety.

Methods: A sample of 76 volunteers with social anxiety attended a research site. At both pre- and post-test, participants completed two computer-administered tests of interpretative and attentional biases and a self-report measure of social anxiety. Participants in the training conditions completed a single session of either standard or explicit CBM-I positive training and a c-CBT program. Participants in the Control (no training) condition completed a CBM-I neutral task matched the active CBM-I intervention in format and duration but did not encourage positive disambiguation of socially ambiguous or threatening scenarios.

Results: Participants in both CBM-I programs (either standard or explicit instructions) and the c-CBT condition exhibited more positive interpretations of ambiguous social scenarios at post-test and one-week follow-up as compared to the Control condition. Moreover, the results showed that CBM-I and c-CBT, to some extent, changed negative attention biases in a positive direction. Furthermore, the results showed that both CBM-I training conditions and c-CBT reduced social anxiety symptoms at one-week follow-up.

Limitations: This study used a single session of CBM-I training, however multi-sessions intervention might result in more enduring positive CBM-I changes.

Conclusions: A computerised single session of CBM-I and an analogue of c-CBT program reduced negative interpretative biases and social anxiety.

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1. Introduction

Cognitive-behavioural models of social anxiety (Beck, Emery, & Greenberg, 1985; Clark & Wells, 1995; Rapee & Heimberg, 1997) propose that negative self-appraisals in social situations influence the development and maintenance of social anxiety. These negative

appraisals may result from elaborative processing of negative information including biases in attention, interpretation, judgement, and memory (Clark & McManus, 2002; Heinrichs & Hofmann, 2001; Hirsch & Clark, 2004; Ledley & Heimberg, 2006; Musa & Lépine, 2000). A wealth of literature suggests that socially-anxious individuals are more likely to attend to social threat information (see Bögels & Mansell, 2004; Schultz & Heimberg, 2008, for reviews). Similarly, a number of studies reported that socially-anxious individuals interpret ambiguous social information in a negative or less positive manner (Amir, Beard, & Bower, 2005; Hertel, Brozovich, Joormann, & Gotlib, 2008; Huppert, Pasupuleti, Foa, & Mathews, 2007; Stopa & Clark, 2000). Given that social anxiety is associated with negative cognitive biases, a next phase of research is to establish whether such biases are amenable to modifications or treatment (Mobini, Reynolds, & Mackintosh, 2013).

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Cognitive Bias Modification for interpretative biases (CBM-I) method is a text-based computerised task aimed at systematically training individuals to interpret emotionally ambiguous information in a particular direction (Mathews & Mackintosh, 2000). Subsequently, laboratory studies have developed a number of CBM interventions to directly modify cognitive biases associated with anxiety via repeated practice on computerised cognitive tasks (see Beard, 2011). This line of research suggests that it is possible to experimentally manipulate (or 'train') interpretation bias in healthy volunteers (e.g., Mackintosh, Mathews, Yiend, Ridgeway, & Cook, 2006; Mathews & Mackintosh, 2000; Yiend, Mackintosh, & Mathews, 2005). So far, a few published studies have used CBM procedures to modify interpretation biases in participants who have social anxiety (e.g., Beard & Amir, 2008; Murphy, Hirsch, Mathews, Smith, & Clark, 2007; Turner, Hoppitt, Hodgekin, Mackintosh, & Fowler, 2011). The results of these studies have shown that it is possible to induce positive interpretations in socially-anxious individuals and reduce social anxiety symptoms.

Although these CBM studies have reported successful modifications of interpretative bias, the method invariably avoids providing explicit instructions about the intention of the training. Instead, repeated practice is provided in which participants are guided to take a particular interpretation and they typically are not explicitly informed of the training contingency. This is based on the assumption that the training contingency is registered standardly and exerts an incidental impact on processing selectivity (Mathews & Mackintosh, 2000). If CBM-I operates at a more habitual level, then it may be resistant to manipulation by verbal instructions. Despite anticipating a continuing role for incidental learning in many CBM variants, it may be likely that the judicious use of explicit instructions at times will enhance conscious processing of the training materials, and hence enhancing CBM efficacy. A few recent studies using different variants of CBM with explicit instructions reported beneficial effects of CBM delivery (Krebs, Hirsch, & Mathews, 2010; Schartau, Dalgleish, & Dunn, 2009; Watkins, Baeyens, & Read, 2009). Watkins et al. (2009) explicitly told participants with dysphoria that the training exercises were designed to reduce their negative thinking and thereby reduce depression. Participants in Schartau et al.'s (2009) study were required to systematically practice appraising events so as to reduce the negative affect they experienced. Similarly, in the present study participants in the explicit CBM-I condition were made aware of the intention of the CBM positive training, however, unlike two previous studies they were not asked to practice the training materials at home (Watkins et al., 2009) or transfer what they learned to day-to-day experience (Schartau et al., 2009). More recently, using an attentional variant of CBM Krebs and colleagues (Krebs et al., 2010) found that providing participants with explicit instructions about the relationship between word valence and target location in a dot-probe task resulted in more effective attention modification.

Nevertheless, it should be noted that directly instructing participants to process information in a certain way could have a paradoxical effect (Wegner & Schneider, 2003). Consistent with this view, it is suggested that explicit instructions to selectively avoid specific categories of information may sometimes be unhelpful in CBM approaches (MacLeod, Martinez, & Williams, 2009). However, the validity of this assumption has not yet been tested adequately by a direct comparison between standard and explicit instructions in CBM-I training. It is not yet clear whether the provision of explicit instructions about the purpose of the training in the CBM-I paradigm developed by Mathews and Mackintosh (2000) would enhance or compromise the training effects on interpretative bias and social anxiety. The first aim of this study was, therefore, to assess the effects of standard vs. explicit instructions methods of

the CBM-I training on interpretative bias and social anxiety in a high socially-anxious sample.

There is a juxtaposition between the CBM-I approach which operates through standard learning and other established therapies, such as cognitive-behaviour therapy (CBT), in which patients are made consciously aware of the thought–emotion link as a mechanism for therapeutic change and are encouraged to actively engage in modifying unhelpful thinking and misinterpretations in order to feel less anxious or depressed. Franklin and colleagues found that group CBT reduced negative interpretation bias in socially phobic individuals (Franklin, Huppert, Langner, Leiberg, & Foa, 2005). However, no study has yet compared two versions of CBM-I methods (standard vs. explicit) and CBT in modification of cognitive biases in social anxiety. For the purpose of comparing CBM-I approach with a more explicit therapeutic intervention, an analogue of computer-administered CBT (c-CBT) program was developed and used in this study. Thus, the second aim of the present study was to investigate whether CBM-I induced changes are comparable with a treatment method whereby participants were directly educated about and subsequently made fully aware of the role of negative thinking in causing and maintaining social anxiety.

A third and final aim of the study was to examine whether any positive effects caused by CBM-I training or c-CBT are specific to interpretation biases or these changes can also affect the earlier stage of information processing, i.e., attention allocation. Beck and Clark (1997) introduced a three-stage model of information processing of anxiety consisting of (a) initial registration, (b) immediate preparation, and (c) secondary elaboration. It is assumed that attentional bias operates at the early stages of information processing which are responsible for initial orienting to, and rapid detection of, threat in the environment (Beck & Clark, 1997; McNally, 1995). In contrast, interpretative bias appears to operate at the later stages of information processing, possibly 'immediate preparation', which are responsible for interpreting and judging about the threat in the environment. Thus, the recognition of a negative stimulus leads to the immediate preparation stage involving the activation of the primal mode. Beck and Clark (1997) suggested that automatic anxious thoughts and biased cognitive processing result from the activation of the orienting and primal threat modes at the earlier stages of information processing. One of the questions to be investigated is whether modification of one of the cognitive processes, i.e., attention or interpretation, can result in changes in the other aspect of cognitive processing. In a study, White and colleagues found that individuals trained to attend to threat were more likely than individuals in a placebo training group to interpret ambiguous information in a threat-related manner (White, Suway, Pine, Bar-Haim, & Fox, 2011). These data suggest that the preferential allocation of attention towards threat in the initial stages of information may result in a cascade of subsequent processing biases. However, it is not clear whether modification of negative interpretative biases can deactivate negative attentional deployment. Thus, bias modification procedures targeting both attention and interpretation biases would have clinical implications for the treatment of anxiety disorders (see Mobini & Grant, 2007; Mobini et al., 2013). One can assume that developing more benign and positive interpretations of ambiguous situations may modify the orienting mode towards threat and reduce negative attentional biases.

To our knowledge, no study has yet compared the effects of two methods of CBM-I (standard vs. explicit instructions) and an analogue of computer-administered CBT (c-CBT) on modifying cognitive biases in social anxiety. Taken together, using experimental methodology, the present study aims to investigate three interesting research questions: 1) whether providing explicit instructions in CBM-I training can enhance its effects on

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