



Research paper

Modifying a negative interpretation bias for ambiguous social scenarios that depict the risk of rejection in women with anorexia nervosa

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ABSTRACT

Background: A heightened sensitivity to social rejection might contribute towards the interpersonal difficulties and symptoms that characterise Anorexia Nervosa (AN). This paper examines the effect of Cognitive Bias Modification for Interpretation biases (CBM-I) training on a negative interpretation bias for ambiguous social scenarios that involve the risk of rejection and eating behaviour.

Method: Women with AN received a single session of CBM-I training to develop a more benign interpretational style or a control condition (which included 50:50 negative and benign resolutions). To measure participant's interpretation bias for social stimuli, a sentence completion task was used pre and post-training (a near-transfer outcome measure). A test meal was given after the training and salivary cortisol (stress) levels were measured as far-transfer outcome measures.

Results: CBM-I training led to a significant reduction in a negative interpretation bias in both conditions. No effect on eating behaviour or stress was found, which may be expected as the training conditions did not significantly differ in interpretation bias change.

Limitations: The control condition may have inadvertently reduced a negative interpretation bias as it involved listening to benign resolutions to ambiguous social scenarios for 50% of the trials.

Conclusions: It is possible to modify a negative interpretation bias for social stimuli. To clarify the effect of CBM-I training on AN symptomatology, repeated, more intensive, and ecologically-valid training interventions may be required. This is because any change in eating behaviour may not be immediate, particularly in a population with a low body mass index and long-illness durations.

1. Introduction

A priority for the eating disorders field is to increase understanding of the mechanisms that underpin these mental illnesses. Experimental psychopathology studies might help to address this matter by indicating whether a range of cognitive, behavioural, social and neural processes have a causal role in symptomatology (Jansen, 2016). This endeavour may ultimately lead to the development of more precise and personalised treatments, which has been highlighted as one of the top ten research agendas for eating disorders (see van Furth et al. (2016)).

Theoretical models have suggested AN is associated with a range of interpersonal difficulties, including a heightened sensitivity towards social rejection. It is suggested that perceived/ actual social rejection might cause symptoms such as dietary restriction and weight-loss to develop as a maladaptive means of trying to improve self-worth and social acceptance, as well as to reduce negative affect. This is hypothesised to occur within the context of other risk and maintenance

factors which may predispose individuals to be more attuned to social threats and vulnerable to eating disorder symptoms, such as an anxious and harm avoidant temperament, maladaptive emotion regulation skills, perfectionistic tendencies, and low core self-esteem that is unduly influenced by a person's weight (e.g., Fairburn et al., 2003; Marzola et al., 2017). These factors may increase intra- and inter-personal sensitivity and exacerbate eating disorder symptoms by further isolating the individual (Arcelus et al., 2013; Atlas, 2004; Goss and Gilbert, 2002; Riegar et al., 2010; Treasure and Schmidt, 2013; Treasure and Cardi, 2017).

In support of interpersonal theories of AN, a recent study by Cardi et al. (submitted) found that early experiences of submissiveness in childhood and a fear of negative evaluation both significantly predict eating disorder symptoms in a sample of women with AN. Furthermore, experimental studies have confirmed that people with eating disorders have a heightened sensitivity to social rejection (Cardi et al., 2013, 2014). One cognitive mechanism that might underlie this sensitivity to

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rejection in AN could be a negative interpretation bias for ambiguous social stimuli that involve the risk of rejection. This bias has been defined as a consistent tendency to resolve ambiguity in a negative manner (Hirsch et al., 2016). Indeed, Cardi et al. (2017) found that women with AN make more negative, and less benign, interpretations of ambiguous social scenarios that involve the risk for social rejection than healthy women. This negative bias was positively associated with a fear of weight gain and body dissatisfaction, as well as levels of depression and anxiety. Having established that women with AN differ from healthy controls, the aim of this study was to determine the causal role of this bias in maintaining eating disorder psychopathology. This is because casual influences could not be drawn from the findings of Cardi et al. (2017) due to the cross-sectional design of the study. Instead, approaches that modify this negative interpretation bias for social stimuli are needed to further elucidate its role in AN psychopathology and the clinical potential of targeting this bias (Treasure et al., 2015).

Cognitive Bias Modification for Interpretation (CBM-I) biases is a computerised training task that aims to ameliorate a negative interpretation bias (e.g., Grey and Mathews, 2000; Mathews and Mackintosh, 2000). It typically involves listening to ambiguous scenarios that are resolved in a benign manner. Cardi et al. (2015) piloted a novel cognitive training approach for adult women with AN receiving inpatient care by combining CBM-I with an attention bias modification training task to target cognitive biases relating to social stimuli. Promisingly, five sessions of cognitive training was associated with a reduction in participant's negative interpretation and attention biases for social stimuli (with medium effect sizes). There was a significant decrease in participant's levels of self-reported anxiety (small effect size). Furthermore, they had increased levels of self-compassion in response to a video clip that involved receiving negative feedback from a supervisor (medium effect size).

Given the encouraging finding that the effect of CBM-I transferred to a self-report measure of sensitivity to social rejection in AN (Cardi et al., 2015), an interesting next step could be to examine whether facilitating a more benign interpretational style for social stimuli also has an influence on eating behaviour and a biological marker of interpersonal stress levels (salivary cortisol). The present study tests these hypotheses by comparing a single session of benign interpretation training to a control condition on 'near-' (i.e., bias change) and, if differential bias change is achieved, then the impact on 'far-' transfer (i.e., eating behaviour, salivary cortisol) outcome measures.

As previous research has focused on inpatients, it would also be of interest to examine the effect of CBM-I training for women from the community as well. This may be an important research gap because women in the community could potentially experience increased feelings of isolation in comparison to women in inpatient services who have continuous support from their treatment team and other service-users (e.g., Treasure et al., 2011).

The aim of this study was to examine the impact of a single session of CBM-I training on interpretation biases for social stimuli that depict the risk of rejection and other AN related symptoms in both inpatient and community women. It was hypothesised that a 100% dose of CBM-I training (experimental condition) would produce a significantly greater change in participants' interpretation bias than a 50% dose (control condition). This was considered a 'near-transfer' outcome for CBM-I training. The study also included exploratory 'far-transfer' outcomes (i.e., effects on anxiety, salivary cortisol and test meal consumption).

2. Methods

2.1. Design

A within-subjects design was used, with participants completing a single session of an experimental and control version of CBM-I training. The different versions of the training were completed during two separate sessions, which were scheduled one week apart. To reduce order

effects, an AB/BA crossover design was used with the random allocation of participants to either the experimental/ control condition first (e.g., Suresh, 2011).

2.2. Participants

A total of 55 women with AN were recruited. This included 26 adult women from inpatient eating disorder services (i.e., from the Bethlem Royal Hospital ($N = 18$), St Ann's Hospital ($N = 6$) and Vincent Square's Eating Disorders Service ($N = 2$)) and 29 adult women from the community. Participants were told that the study is, 'looking to learn more about how people with AN relate to social scenarios' and, 'computer brain training tasks in eating disorders'.

Eligibility criteria for the study included: a diagnosis of AN based upon DSM-5 criteria (American Psychiatric Association, 2013), an age range between 18 and 65, no current substance abuse, no neurological condition, no acute suicidality and no severe co-morbidity, such as psychosis. Participants were screened using the Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders – fifth edition (American Psychiatric Association, 2013). An NHS Research Ethics Committee gave approval for the study (reference number, 14/LO/2166).

2.3. Materials

2.3.1. Questionnaires

2.3.1.1. *Eating Disorders Examination Questionnaire (EDEQ)*. The EDEQ (Fairburn and Beglin, 1994) measures participants eating psychopathology based upon their cognitions and behaviour over the previous 28 days. It has four subscales: weight concerns, shape concerns, dietary restraint, and eating concerns and gives an overall total score. The EDEQ has been found to be both a reliable (Luce and Crowther, 1999) and valid measure (Mond et al., 2004). The Cronbach's alpha for the weight concerns subscale = .8; shape concerns = .88; dietary restraint = .86; eating concerns = .8; total score = .95.

2.3.1.2. *Depression Anxiety Stress Scales (DASS-21)*. This 21-item questionnaire was developed by Lovibond and Lovibond (1995) and assesses participants' levels of depression, anxiety and stress during the past week. The measure has been reported to have good internal consistency and concurrent validity (Antony et al., 1998; Henry and Crawford, 2005). The Cronbach's alpha for the depression subscale = .91; anxiety = .88; stress = .87; total score = .94.

2.3.1.3. *Adult Rejection Sensitivity-Questionnaire (ARS-Q)*. The ARS-Q (Downey and Feldman, 1996) consists of nine scenarios that depict the risk for social rejection. For each scenario, participants are instructed to rate their levels of anxiety related to it and how likely they would expect to be rejected. The measure has been found to have satisfactory psychometric properties (Berenson et al., 2011). The Cronbach's alpha for the total score = .82.

2.3.1.4. *Work and Social Adjustment Scale (WSAS)*. This five-item self-report measure was developed by Marks (1986) and can be used to assess the level of impairment an identified problem causes to work and social functioning. The WSAS has been reported to be both a reliable (Zahra et al., 2014) and valid psychometric measure (Mundt et al., 2002). The Cronbach's alpha for the total score = .86.

2.3.2. Computer tasks

2.3.2.1. *Sentence completion task*. This task was adapted from Cardi et al. (2015), Hayes et al. (2010) and Huppert et al. (2007). Following a brief practice of the task participants completed 10 stem-sentences, which describe hypothetical ambiguous social scenarios that involve the potential for social rejection (e.g., "You message your close friend, it's been four hours and they haven't replied yet, you think that they are...").

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