An experimental investigation using Cognitive Bias Modification for paranoid attributions in a non-clinical sample: Effects upon interpretation bias, emotions, and paranoia following a stressful paranoia induction.

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Abstract

Background: Bentall, Corcoran, Howard, Blackwood, and Kinderman (2001) suggested that paranoid individuals display an 'external-personal bias' of blaming negative events on other people rather than situational circumstances or themselves, however, the literature remains equivocal. This study tested whether Cognitive Bias Modification for Interpretations (CBM-I) could train a positive attribution bias and affect subsequent reactions to a stressor designed to induce paranoia.

Method: Non-clinical participants were randomly assigned to positive CBM-I training (n = 18), or a neutral control CBM-I (n = 17). Participants were then subject to a stressful paranoia induction: seeing a live video of themselves whilst accessing negative self-beliefs and being given negative feedback when attempting an impossible task. The subsequent effects upon interpretation bias and state paranoia and emotions were assessed.

Results: After the paranoia induction, participants in the positive CBM-I group demonstrated a more positive interpretation bias than those in the neutral control group: they endorsed less paranoid interpretations, although there was no difference in ratings of positive interpretations. However, both groups reported a similar increase in state paranoia and suspiciousness after the stressful paranoia induction, and there was no relationship between the trained interpretation bias and the changes in state paranoia. Unexpectedly, pre-existing trait paranoia was correlated with state paranoia and interpretation bias after the stressor.

Conclusions: This study demonstrated that CBM-I can train non-clinical participants to endorse less paranoid interpretations. Pre-existing trait paranoia had a stronger relationship to interpretative bias and state paranoia under stress than the CBM-I. The lack of a subsequent effect on emotional reactions suggests that further research is necessary to refine the materials and procedure, and test for possible small or varied effects in a larger sample. Unfortunately, significant methodological problems limit the conclusions that can be drawn about the theory that an external-personal attribution bias causes paranoia.

Chapter 1

Introduction

1.1 Overview of Introduction

This chapter begins by introducing the experimental paradigm known as Cognitive Bias Modification (CBM), which involves training positive and negative cognitive biases to assess the impact upon emotions (Koster, Fox, & MacLeod, 2009). This paradigm is suggested to have both experimental utility in testing cognitive theory (e.g., Koster et al., 2009), and clinical potential in training protective positive biases (e.g., Mobini, Reynolds, & Mackintosh, 2013). There follows an overview of studies using CBM for interpretations (CBM-I) in non-clinical and clinical populations, and considerations of how CBM-I could be used.

Following this, the concept of paranoia (specifically persecutory beliefs) is introduced, and the concept of a continuum from subclinical ideas to clinical delusion is explored. Then the 'attribution – self-representation' model of paranoia by Bentall and colleagues (Bentall, Corcoran, Howard, Blackwood, & Kinderman, 2001; Bentall, Kaney, & Dewey, 1991) is presented. Given the controversy of the central role of attribution biases in this model (e.g. Freeman, 2007), a comprehensive literature review considers the evidence linking attribution biases to paranoia in various clinical and non-clinical populations. There follows a brief overview of current cognitive interventions for persecutory beliefs.

Finally, the rationale is presented for using to CBM-I modify the types of attributions which are proposed to lead to paranoia. This rationale includes hypotheses about the impact of CBM-I upon attributions and paranoid feelings, and how this study will aim to test these hypotheses.

1.2 Cognitive Bias Modification

1.2.1 Cognition and Emotion

The cognitive theory of Beck proposed that our early experiences lead to the formation of schemata: cognitive structures which store beliefs and assumptions about oneself, other people, and the world (e.g., Beck, 1963, 1976, 1991). Beck suggested that in emotional disorders, negative schemata lie dormant until activated by a stressful event, and then cause extremely polarised 'cognitive distortions' in the processing of that event (Beck, 1976). Cognitive therapy is based on the assumption that modification of distorted or biased cognition will improve problematic mood, emotions, and behaviours (Beck, 1976).

Many cross-sectional cognitive and experimental research studies have found that emotional disorders, such as anxiety and depression, do appear to be associated with negative cognitive biases in attention (e.g., Mathews & MacLeod, 1994, 2005; Yiend, 2010), memory (e.g., Gotlib & Joormann, 2010; Watkins, 2002), interpretations (e.g., Mathews & MacLeod, 1994, 2005), and causal attributions (e.g., Abramson, Seligman, & Teasdale, 1978). However, most studies have merely demonstrated that both cognitive bias and problematic emotions co-occur, and were unable to determine the direction of causality. Therefore, it remained unclear whether these cognitive biases caused problematic emotions, or problematic emotions caused cognitive biases, or both, or whether emotion and cognitive bias were caused by other variables (Mathews & MacLeod, 2005).

1.2.2 The Development of CBM Research

CBM was developed in an effort to tackle this limitation of the existing literature by providing an experimental method to test the emotional consequences of modifying cognition. Koster et al. (2009) defined CBM as procedures designed to alter a "cognitive bias known to characterise a clinical disorder, a clinically relevant symptom, or a personality trait" (p.3) linked to clinical disorder. These procedures tend to involve intensive repetition of a cognitive task. CBM is broadly categorised into two main types: CBM for attention (CBM-A), and CBM for interpretations (CBM-I), and the latter is the key focus for this thesis.

CBM-I involves training to make either positive/benign or negative interpretations of ambiguous words, sentences, stories, or pictures. The first studies to use CBM-I were Grey and Mathews (2000), and Mathews and Mackintosh (2000), who trained positive and negative interpretations in different ways.

Grey and Mathews used homographs (words which are spelt the same but can have multiple meanings) which could be interpreted in either a threat or non-threat way, to train 40 non-clinical individuals. This led to faster solution of training-congruent (threat or non-threat) word fragments in a test identical to the training, and also in a lexical decision task, demonstrating the utility of this method to train interpretations. However, they did not report the emotional effects of this.

Mathews and Mackintosh (2000) used a different methodology in several experiments, and trained 20-56 non-clinical participants by presenting stories which were ambiguous up until the final word, at which point they resolved in either a negative or positive way. They found that after the training, participants selected interpretations of new ambiguous stories which were consistent with the training they received; either positive or negative. They also reported significantly increased

anxiety after negative interpretation training. Furthermore, they ruled out mood changes as causing the interpretation bias by introducing a filler task after negative training to dissipate anxiety, and found that the negative interpretation bias remained. The authors concluded that mood changes were not sufficient to explain changes to interpretations, as interpretations were altered even when anxiety was not.

Since these pioneering studies, CBM research has developed into a burgeoning field. Recent reviews of CBM research (e.g., Beard, 2011; Hallion and Ruscio, 2011; Hertel & Mathews, 2011; MacLeod, 2012; Mathews, 2012; Wiers, Gladwin, Hofman, Salemink, & Ridderinkof, 2013) indicated that some researchers think that CBM-I has both experimental and clinical potential. A summary of the CBM-I research to date is presented below.

1.2.3 CBM-I in Non-Clinical Populations

The early studies using non-clinical samples to modify interpretations and emotions are reviewed here. This firstly includes studies which compared the effects of negative versus positive (or benign) interpretation training, to test whether negative interpretations led to negative emotions. Secondly, some studies also tested if non-clinical participants with high levels of anxious or depressive symptoms were relatively protected from negative emotions by positive bias training compared to a 'placebo training' (half negative and half positive: MacLeod, 2012).

1.2.3.1 Studies training negative versus positive/benign interpretations.

Non-clinical studies have demonstrated that CBM-I procedures can train positive/benign interpretation biases, and negative interpretation biases. This includes studies using the Grey and Mathews (2000) method using homographs

(e.g., Hertel, Mathews, Peterson, & Kintner, 2003; Hoppitt, Mathews, Yiend, & Mackintosh, 2010b; Wilson, MacLeod, Mathews, & Rutherford, 2006), and studies using the Mathews and Mackintosh (2000) method with ambiguous stories (e.g., Hawkins & Cougle, 2013; Lange et al., 2010; Lau, Molyneux, Telman, & Belli, 2011; Lester, Mathews, Davison, Burgess, & Yiend, 2011; Lothmann, Holmes, Chan, & Lau, 2011; Mackintosh, Mathews, Yiend, Ridgeway, & Cook, 2006; Salemink & van den Hout, 2010a; Salemink, van den Hout, & Kindt, 2007a, 2007b, 2010a, 2010b; Yiend, Mackintosh, & Mathews, 2005).

Most studies also assessed how emotions are differentially affected by the trained positive/benign and negative cognitive biases, and at first the findings appeared inconclusive. Whilst some studies found training-congruent emotions immediately after CBM-I training (e.g., Holmes, Mathews, Dalgleish, & Mackintosh, 2006; Mathews & Mackintosh, 2000), many studies have not (e.g., Hertel et al., 2003; Hoppitt, Mathews, Yiend, & Mackintosh, 2010a; Experiment 1- Mackintosh et al., 2006; Salemink, Hertel, & Mackintosh, 2010; Yiend et al., 2005). However, emotional changes have been detected more often when participants are given a stressor after CBM-I training, like viewing distressing videos (e.g., Hoppitt et al., 2010b; Experiment 1- Lester et al., 2011; Experiment 2- Mackintosh et al., 2006; Wilson et al., 2006; Woud, Holmes, Postma, Dalgleish, & Mackintosh, 2012), doing challenging tasks (e.g., Hirsch, Mathews & Clark, 2007; Peters, Constans, & Mathews, 2011; Salemink et al., 2007a), or being irritated by a confederate (e.g., Hawkins & Cougle, 2013). However, Tran, Siemer, and Joormann (2011) did not find effects on any state emotions after their social stressor.

1.2.3.2 Studies comparing positive/benign interpretation training and placebo training.

Positive/benign training has also been found to produce a positive/benign interpretation bias compared to a placebo condition in analogue samples of non-clinical participants with high scores on measures of anxiety (e.g., MacDonald, Koerner & Anthony, 2012; Mathews, Ridgeway, Cook, & Yiend, 2007; Salemink, van den Hout, & Kindt, 2009; Steinman & Teachman, 2010), social anxiety (e.g., Amir, Bomyea & Beard, 2010; Beard & Amir, 2008; Bowler et al., 2012; Murphy, Hirsch, Mathews, Smith, & Clark, 2007; Salemink & Wiers, 2011), worry or generalised anxiety (e.g., Hirsch, Hayes, & Mathews, 2009), obsessive-compulsive symptoms (e.g., Clerkin & Teachman, 2011), or anxiety and depression (e.g., Experiment 2- Lester et al., 2011).

The effects upon emotion are more mixed when these comparisons are used in analogue samples. Seven studies have reported less negative emotion in those who have positive/benign training compared to those who did placebo CBM-I, immediately after training (social anxiety in Beard & Amir, 2008; Bowler et al., 2012) and after a stressor (e.g., desire to neutralise in Clerkin & Teachman, 2011; anxiety in Hirsch et al., 2009; anticipatory anxiety in Lester et al., 2011; anxiety sensitivity in MacDonald et al., 2012; anxious breathing in Steinman & Teachman, 2010). However, seven studies did not find differences in state anxiety after training (e.g., Amir et al., 2010; Mathews et al., 2007) or after a stressor (e.g., Clerkin & Teachman, 2011; Lester et al., 2011; Murphy et al., 2007; Salemink, van den Hout, & Kindt, 2009; Steinman & Teachman, 2010).

1.2.3.3 Summary of CBM-I in non-clinical populations.

Overall, these studies suggested that a trained negative interpretation bias can lead to more negative

emotional responses, especially after stressors, in experimental settings, thus supporting cognitive theory. However, whilst positive/benign training can attenuate negative state emotions experienced by analogue samples high in anxious or depressive symptoms when compared to a placebo training, this is often not the case; either after CBM-I training, or after a stressor.

1.2.4 CBM-I in Clinical Populations

The mixed findings comparing positive/benign CBM-I and placebo training in analogue samples has led to further experiments with clinical populations experiencing depression, anxiety, and with co-morbid psychosis.

1.2.4.1 CBM-I for depression. Blackwell and Holmes (2010) reported positive findings on measures of interpretation bias and depressive symptoms after eight sessions of CBM-I in a single case series with seven depressed individuals. A larger study with 26 depressed patients by Lang, Blackwell, Harmer, Davison, and Holmes (2012) compared seven sessions of positive CBM-I to a placebo condition, and found positive effects upon interpretations and symptoms.

1.2.4.2 CBM-I for anxiety. Hayes, Hirsch, Krebs, and Mathews (2010) found that positive CBM-I was effective at reducing anxious intrusions and depressive reactions during a stressor (a breathing focus task and worry period) over a placebo condition in 40 patients with generalised anxiety disorder. In a randomised controlled trial with 49 individuals with social anxiety disorder, Amir and Taylor (2012) reported that positive CBM-I led to a greater reduction in social anxiety and depressive symptoms over a placebo CBM-I.

Some researchers have also combined CBM-I with CBM-A to maximise the potential therapeutic benefit in anxious populations. Brosan, Hoppitt, Shelfer, Sillence, and Mackintosh (2011) delivered CBM-I and CBM-A in 12 individuals with generalised anxiety disorder. After four sessions, attentional and interpretive biases were reduced, with associated reductions in state and trait anxiety. Beard, Weisberg, and Amir (2011) randomly assigned 32 people with social anxiety to eight sessions of combined CBM-I and CBM-A, or placebo tasks. The combined CBM led to lower social anxiety scores and better speech performance than the placebo.

1.2.4.3 CBM-I for anxiety co-morbid with psychosis. Furthermore, some researchers have explored the use of CBM-I to target anxiety problems in patients who also have a diagnosis of psychosis. Steel et al. (2010) attempted to use CBM-I with 21 anxious individuals with a co-morbid diagnosis of schizophrenia, but failed to find a training effect upon anxious interpretations. Turner et al. (2011) reported a single case series with eight individuals with social anxiety and schizophrenia, and found that CBM-I targeting socially anxious interpretations led to a beneficial change in mood across participants, and in interpretation bias in three out of six patients for whom data were available. However, no CBM studies have yet attempted to modify psychotic thinking in non-clinical or clinical groups.

1.2.4.4 Summary of CBM-I in clinical populations. Therefore, whilst early findings with anxious and depressed patients showed that CBM-I has the potential to be helpful, this may not translate to those with serious mental illness, and requires further investigation. Few used stressors to test their effects (e.g., Beard et al., 2011; Hayes et al., 2010), despite the fact that non-clinical studies have shown this to be

essential to trigger emotional processing. In addition, larger controlled trials are needed to replicate these findings before this may be considered clinically useful.

1.2.5 Critique of CBM-I Studies

Whilst the studies above have produced some interesting findings on the relationship between cognitive biases and emotions, there are a number of limitations which need to be considered. This includes how outcomes are measured, how training is delivered, and the study designs and sample sizes.

1.2.5.1 Measuring outcomes. Questions remain about the most valid and reliable ways to measure interpretation bias. Many studies employ the 'recognition task' by Mathews and Mackintosh (2000) which involves presenting new ambiguous stories, and asking participants to rate training-congruent and incongruent interpretations in terms of similarity to the original meaning. This allows a calculation of an interpretation bias. Holmes and Mathews (2005) simplified this task by asking participants to rate how pleasant the scenario was rather than rating the four different interpretations, a method which has since been used in several other studies (e.g., Hirsch et al., 2007; Holmes et al., 2006, Holmes, Lang, & Shah, 2009; Hoppitt et al., 2010a; Steel et al., 2010). Reaction times in solving probe fragments during training are often used as a check of training (e.g., Mathews & Mackintosh, 2000; Yiend et al., 2005), and serve as a measure of 'online' interpretations. However, these methods have been criticised for being too similar to the CBM-I training, and therefore failing to measure if effects are generalisable (Salemink et al., 2007b, 2010a).

In an effort to counter criticisms of the above methods, some studies have shown that CBM-I can also influence interpretations measured in other ways. For example, Hayes et al. (2010) used a sentence completion task using ambiguous sentences, and found that those who had benign CBM-I training produced fewer negative completions than those in the control group. Standage, Ashwin, and Fox (2010) used the scrambled sentences task, and found participants formed sentences which matched their training. Beard and Amir (2008) used the word sentence association paradigm (WSAP) which requires participants to indicate if a positive or negative word is related to an ambiguous sentence, and found effects in line with training. Clerkin and Teachman (2010) looked at 'online' interpretations using the Implicit Association Test, which involves testing reaction times when participants press the same key for the self or others as for positive or negative words.

Novel methods continue to be developed depending on the precise bias being targeted, and may include clinical tools (e.g., Impact of Events Scale in Schartau, Dalgleish, & Dunn, 2009), measurement of related symptoms (e.g., intrusions in Hirsch et al., 2009) or behavioural measures such as performance on a task (Beard et al., 2011). MacLeod (2012) stated that there needs to be more research exploring the impact of CBM-I on a range of clinical symptoms beyond simple interpretations.

1.2.5.2 Differing CBM procedures. Hallion and Ruscio (2011) conducted a large meta-analysis of 45 CBM experiments, and found that CBM-I was more effective than CBM-A, and that there were larger effects on symptoms after a stressor than immediately after CBM training. Somewhat surprisingly, changes in cognitive bias were not associated with change in emotional symptoms, perhaps because the effect size was small. The reviewers suggested that the small effects of

CBM upon symptoms may be due to limitations in the methodology (e.g., targeting only one bias at a time, not repeating training enough, limited effect in modifying biases), or in the assumption that cognitive bias causes anxiety and depression.

Some studies have addressed these limitations. For example, Lester et al. (2011) targeted a range of cognitive distortions, and Beard et al. (2011) and Brosan et al. (2011) used CBM-I and CBM-A together. In addition, whilst early studies often used only one training session, some studies have repeated 7 to 8 sessions of CBM-I (e.g., Beard & Amir, 2008; Blackwell & Holmes, 2010; Lang et al., 2012; Salemink et al., 2009), or CBM-I and CBM-A (e.g., Beard et al., 2011; Brosan et al., 2011), with good effects upon symptoms.

1.2.5.3 Study designs. Whilst the non-clinical studies have been getting larger (from 10 to 85 per group) and increasing in statistical power to detect effects, the clinical studies remain limited between six to eight participants in single case series designs (e.g., Blackwell & Holmes, 2010; Turner et al., 2011) and about 20 per group in controlled trials (e.g., Amir & Taylor, 2012; Hayes et al., 2010). This reflects the early stage of the research as the feasibility and efficacy of procedures are established. However, larger studies are clearly required, especially as current findings of effects on emotions and clinical symptoms are small and inconsistent.

1.2.5.4 Summary. Limitations of early CBM-I studies are beginning to be addressed, such as having multiple training sessions, targeting different cognitive biases, and conducting larger randomised trials with sufficient power to detect differences. Assessments of a range of emotional and cognitive reactions to known triggers will be important in establishing the efficacy of CBM procedures in

producing clinically meaningful change. It will also be important to consider how CBM training can be further developed, for example, in terms of the range of biases and the types of clinical problems targeted (Hallion & Ruscio, 2011).

1.3 Paranoia

1.3.1 Definitions of Paranoia

Freeman and Garety (2000) defined persecutory delusions, a term often used interchangeably with paranoia, as fearful beliefs that other people are intentionally causing the believer physical, social, or psychological harm. The definition of a delusion in the Diagnostic and Statistical Manual of Mental Disorders-IV-Text Revision (American Psychiatric Association, 2000) is:

> "A false belief based on incorrect inference about external reality that is firmly sustained despite what almost everybody else believes and despite what constitutes incontrovertible and obvious proof or evidence to the contrary. The belief is not one ordinarily accepted by other members of the person's culture or subculture." (p.765)

This definition reflects Oltmanns and Mayer's (1988) view, which stated that a belief is only defined as delusional when it is unfounded (the balance of evidence is that it is not likely or shared by others); firmly held with strong conviction- even in the face of disconfirmatory evidence; extremely preoccupying for that individual; and causes significant distress or interferes with social or occupational functioning. However, Garety and Freeman (1999) noted that an individual's beliefs may change along each

of these dimensions over time, and under different circumstances, which presents a challenge to researchers of delusional phenomena.

1.3.2 Phenomenology of Paranoia

Freeman and Freeman (2008) gave examples of common paranoid thoughts which may include believing that people are: spying on you, trying to poison you, experimenting on you, trying to irritate you on purpose, wanting you to fail, or laughing about you. A qualitative exploration of the content of persecutory delusions amongst acutely unwell patients by Green et al. (2006) indicated that, for delusional patients, the persecution is viewed as a very severe level of threat: involving multiple people/organisations and the threat of harm/death. Campbell and Morrison (2007b) also found that persecutory beliefs among patients were less probable, involved more malicious intent, related to more severe past incidents, and indicated more powerlessness than in students with subclinical paranoid symptoms.

Chadwick (1995) stated that paranoia can involve feelings of apprehension, anxiety or terror, guilt or shame, and suspicion or anger, which shows the significant variation in emotional responses to paranoid beliefs. Trower and Chadwick (1995) suggested that there may be two types of responses to paranoid ideas: the 'bad me' response where an individual agrees with the persecution because they view themselves as bad and the punishment as justified; and the 'poor me' response which disagrees, viewing the other people as bad and unfairly making them victims. Therefore, the precise emotional experience may be dictated by thoughts about deservedness and attributions of blame. Behavioural consequences to deal with the perceived threat may include social isolation, violence to the self or others, drug/alcohol abuse, relationship breakdown, and hospital admission (Freeman &

Garety, 2004). Clearly, paranoia can have a devastating impact on the safety, emotional, social, and psychological wellbeing of the believer and others.

1.3.3 Prevalence

Data are presented below about the prevalence of paranoia at clinical delusional levels, and at subclinical levels in the normal population.

1.3.3.1 Persecutory delusions. Appelbaum, Robbins, and Roth (1999) reported that delusions of persecution are the most common among those with schizophrenia (e.g., 84% of inpatients), are linked to higher levels of distress compared to other delusions, and are often associated with hospital admission (Castle, Phelan, Wessely, & Murray, 1994). However, paranoia is also frequently present in other psychological problems such as paranoid personality disorder, delusional disorder, mania, depression, post-traumatic stress disorder, and in those with cognitive problems such as dementia (Freeman & Garety, 2004). As such, over the last 20 years paranoia has been studied in its own right, rather than just as a symptom of schizophrenia (Bentall, 2003), including in the general population.

1.3.3.2 Prevalence of subclinical paranoia. Several studies have used self-report questionnaires to assess the prevalence of non-clinical paranoid ideas. Fenigstein and Vanable (1992) reported that 62% of their student sample endorsed at least one paranoid thought on their Paranoia Scale (PS) as being at least slightly applicable. Ellett, Lopes, and Chadwick (2003) reported clear examples of paranoid thinking in 47% of their student sample. Freeman, Garety, Bebbington, Smith, et al. (2005) found that one third of their large student sample reported at least weekly

thoughts that people were saying bad things about them or persecuting them, and 5% reported more severe symptoms of paranoia as well. Around 5-10% held these beliefs with strong conviction and distress. Green et al. (2007) found that on the Green et al. Paranoid Thoughts Scale (GPTS), 6% of the non-clinical sample scored above the mean of the clinical participants for social reference items, 2% scored higher on the persecution items, and 3% scored higher on the total score, indicating that a significant minority exhibited paranoia comparable to paranoid patients.

Several groups of researchers have attempted to create conditions which may induce paranoid thoughts and feelings in non-clinical samples, as a more direct test of paranoia in action. Green et al. (2011) tested responses to two ambiguous events during testing: a stooge interrupting the session, and laughter outside the testing room. They found that 15% of participants reported a mildly paranoid explanation (i.e., ideas of reference) for at least one of these events. This was related to higher levels of trait paranoia on the PS and GPTS, and a negative attribution bias consistent with depressive thinking. The researchers concluded that mild paranoia can be induced in anyone, even for relatively neutral events.

Freeman and colleagues have used virtual reality to investigate how members of the general population (students and the general public) respond to a social environment (a library, or the London underground) populated only by characters programmed to be neutral. This method was used to counter the possibility that paranoid thoughts are reality-based. In these studies, whilst most people endorsed neutral or positive interpretations of the people they encountered in the virtual environment, a significant minority endorsed paranoid attributions about the characters (Freeman et al., 2003; Freeman, Garety, Bebbington, Slater, et al., 2005; Freeman, Pugh, et al., 2008).

1.3.3.3 Summary of prevalence. Paranoid delusions are common amongst those with a variety of severe mental illnesses, and healthy non-clinical participants also report some aspects of paranoid thinking in their lives on a regular basis (e.g., Ellett et al., 2003; Fenigstein & Vanable, 1992), or in response to negative or ambiguous situations (e.g., Ellett & Chadwick, 2007; Green et al., 2011). However, Mullen (2003) noted that many non-clinical studies only considered the content of paranoid threat ideas, and not the variables of conviction, preoccupation, and distress which separate non-clinical ideas from clinical delusions. Similarly, David (2010) cautioned about the conclusions to be drawn from these studies, as many sub-clinical paranoia questionnaires are worded in a normalised way that may overestimate prevalence and invalidate comparisons with clinical paranoia.

1.3.4 Continuum Perspectives of Paranoia

Strauss (1969) is often credited as an early proponent of dimensional models of psychotic symptoms like delusions. Since then, researchers have investigated whether delusional beliefs may lie on a continuum with normal beliefs across the general and clinical population (e.g., Allardyce, Suppes, & van Os, 2007; Chapman & Chapman, 1980; Claridge, 1994; Freeman, 2007; Krabbendam, Myin-Germeys, & van Os, 2004; van Os, Hanssen, Bijl, & Ravelli, 2000; Verdoux et al., 1998).

1.3.4.1 Two approaches to continua. Costello (1994) proposed that the concept of a continuum of psychopathology can be approached in two ways. The first is the 'phenomenological perspective' which suggests that symptoms, like paranoid beliefs, may exist in the normal population, but may be less intense, persistent or debilitating (but not qualitatively different) compared to those with a

mental illness. This suggests that clinical disorders may represent an extreme form of normal phenomena, and therefore considers the continuum in the context of the population. Johns and Os (2001) made a similar suggestion, that symptoms may be distributed across the population, and that clinical disorder depends on quantitative differences in frequency, intrusiveness, and co-morbidity with other symptoms. This suggests that the differences across the population continuum are quantitative rather than qualitative, and is similar to what David (2010) labelled an 'epidemiological view' with symptoms having a normal distribution in the population. Costello proposed that this approach can be tested through investigations of the distribution of symptoms in the population, or group comparisons of normal and clinical samples. Costello suggested that support for the phenomenological perspective would include a normal, uni-modal distribution of symptoms across the general population (although Johns & Os, 2001, suggested that skew would be expected in the case of psychotic symptoms), and intensity, persistence, or debilitating effects of symptoms discriminating between normal and clinical groups. A critical implication of this perspective is that studying symptoms in non-clinical populations will be informative about how they develop in clinical populations.

The second approach highlighted by Costello (1994) is the 'vulnerability perspective,' which suggests that the degree that someone has a normal symptom-like characteristic (which may be qualitatively different to the clinical disorder) is predictive of their personal vulnerability to a clinical disorder. This approach can be tested through studies which assess the value of certain symptom-like characteristics in predicting the onset or course of a clinical symptom or disorder, in longitudinal studies. This approach attempts to identify qualitative differences which influence the transition along a continuum from subclinical to clinical symptoms within an

individual. Somewhat confusingly, David (2010) called this a 'phenomenological view,' but for clarity Costello's term 'vulnerability view' will be used here. Unfortunately, most research into these hypotheses has only considered psychosis in general rather than paranoia specifically.

1.3.4.2 A continuum of psychosis. In two reviews relating to delusions in general, Mullen (2003) and Lawrie, Hall, McIntosh, Owens, and Johnstone (2010) suggested that the prevalence of ideas with delusional content across the population (such as that cited in 1.3.3.2) does not exclude the possibility of qualitative differences between clinical and non-clinical symptoms. As mentioned above, many studies only measured the content of the thoughts, although some have found non-clinical samples may display high levels of conviction and distress too (e.g., Freeman, Garety, Bebbington, Smith, et al., 2005).

In a substantial review of the psychosis literature, Van Os, Linscott, Myin-Germys, Delespaul, and Krabbendam (2009) suggested that it is the persistence of subclinical psychotic symptoms (in conjunction with environmental stressors) that leads to psychotic disorder, and thus this review appears to support the phenomenological perspective. A recent meta-analysis by Kaymaz et al. (2012) examined six longitudinal studies, and found a dose-response relationship between subclinical psychotic experiences and developing clinical psychosis 3 to 24 years later: as number, frequency, certainty, and persistence of symptoms increased, so did the chance of later clinical psychosis. This finding could be taken to support the phenomenological perspective as the differences leading to movement along the spectrum can be viewed as quantitative rather than qualitative, or the vulnerability

perspective as it concerns the influence of subclinical symptoms within an individual over time. However, these studies did not focus on paranoia specifically.

1.3.4.3 A continuum of paranoia. In a rare study looking at paranoia, Edens, Marcus, and Morley (2009) found that continuous scores of the severity of paranoid symptoms across large clinical and healthy community samples were more valid than dichotomous categories of paranoid personality disorder, and concluded that paranoid traits are dimensional across the population and diagnostic categories. This study therefore supports the phenomenological perspective of a paranoia continuum in the population.

Freeman, Garety, Bebbington, Smith, et al. (2005) proposed a hierarchy of paranoid ideas (see Figure 1.1), which includes both qualitative individual differences and quantitative population differences along a spectrum of paranoia. In this model, common thoughts in the population may be built on by progressively rarer thoughts as the threat level increases. So, social concerns (e.g., that people may think negatively of you) may represent a low level of paranoid threat that are commonly experienced by many people, then ideas of reference (that events have personal relevance) may then build on these in some people, followed by increasingly severe ideas of persecution in much smaller proportions of the population. Interestingly, in their large non-clinical study, those endorsing the more severe threats at the top of this hierarchy also tended towards greater conviction and distress as well. Bebbington et al. (2013) found an exponential distribution of paranoia scores across their very large sample (non-clinical and clinical), which appears to lend support to such a hierarchy rather than a simple linear relationship, however, they acknowledged that their factor mixture modelling analysis also found

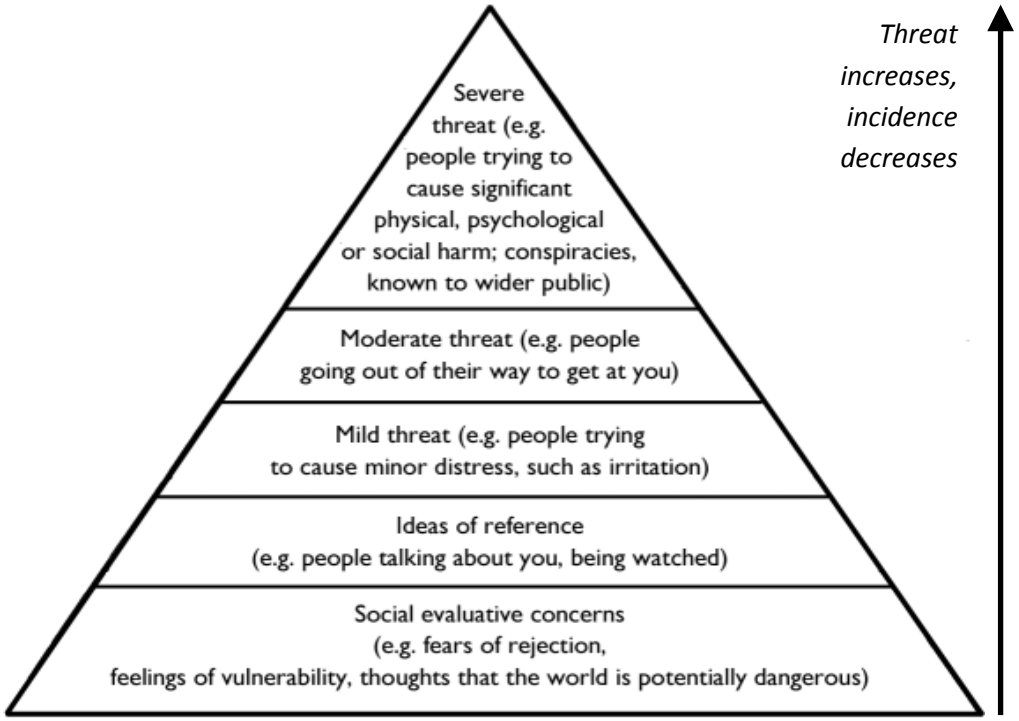


Figure 1.1. The paranoia hierarchy. Reproduced from "Psychological investigation of the structure of paranoia in a non-clinical population," by D. Freeman, Garety, Bebbington, Smith, et al., 2005, *British Journal of Psychiatry, 186,* p.433. Copyright 2005 by The Royal College of Psychiatrists.

distinct subgroups with qualitative differences. Therefore, this study appears to lend more support to a hierarchical model or the vulnerability perspective.

Some remain sceptical of the evidence suggested to support continuum hypotheses. Lawrie et al. (2010) stated that the necessary research is absent, and several studies have acknowledged that existing research can neither support nor challenge the phenomenological or vulnerability perspective (e.g., Ellett et al., 2003). Allardyce et al. (2007) took an intermediate position suggesting that combining dimensions and categorical representations of psychosis has the best clinical validity,

and this appears to have been echoed in studies focused on paranoia specifically (e.g., Bebbington et al., 2013; Freeman, Garety, Bebbington, Smith, et al., 2005). The validity of continuum models of paranoia requires further testing of predictive factors which lead to paranoia (Ellett et al., 2003).

1.3.5 Risk Factors for Paranoia

In order to understand how paranoia may develop, researchers have investigated the environmental, psychological, and emotional risk factors associated with paranoid ideation in clinical and non-clinical populations. Morrison, Read and Turkington (2005) suggested that the early interpersonal trauma (i.e., abuse, bullying) which is commonly linked to clinical (e.g., Bebbington et al., 2004; Kelleher et al., 2008; Read, 1997; Rutten, van Os, Dominguez, & Krabbendam, 2008) and non-clinical paranoia (e.g., Campbell & Morrison, 2007a; Gracie et al., 2007) might lead to the formation of negative beliefs about the self and/or other people, which then cause emotional disturbances and cognitive biases. Disturbed emotions like anxiety, depression, and irritability, often precede paranoid episodes in patients (Freeman & Garety, 2004; Yung & McGorry, 1996), and Freeman and colleagues (Freeman, 2007; Freeman, Garety, Kuipers, Fowler, & Bebbington, 2002) suggested that such emotional disturbances have reciprocal relationships with cognition at different levels.

Biased cognition has been linked to paranoia in terms of negative core beliefs, attentional biases, and interpretation biases. There is some evidence of negative core beliefs or self-esteem in clinical (e.g., Bentall et al., 2009; Bentall, Kinderman & Moutoussis, 2008; Ben-Zeev, Granholm, & Cafri, 2009; Fowler et al., 2012) and non-clinical studies (e.g., Cicero & Kerns, 2011; Ellett et al., 2003; Fisher,

Appiah-Kusi, & Grant, 2012; Gracie et al., 2007); particularly negative other-to-self beliefs (Lincoln, Mehl, Ziegler, et al., 2010). The types of attentional biases found have varied, including towards (e.g., Bentall & Kaney, 1989; Fear, Sharp, & Healy, 1996) or away from threat (e.g., Green & Phillips, 2004) in clinical samples, and towards the self in non-clinical samples (Ellett & Chadwick, 2007; Fenigstein & Vanable, 1992; Martin & Penn, 2001). Three interpretation biases have also been linked to paranoia: impaired theory of mind (ToM: Frith, 1992), jumping to conclusions (JTC), and attributional biases. ToM appears to be more strongly linked to thought disorder than paranoia (Corcoran & Kaiser, 2008), and whilst JTC is associated with delusions (Fine, Gardner, Craigie, & Gold, 2007; Garety & Freeman, 1999), the more ambivalent evidence in non-clinical samples may suggest that JTC only increases vulnerability for clinical, not subclinical, paranoia (Lincoln, Peter, Shafer, & Moritz, 2010). The evidence for attribution biases is also unclear. Bentall and colleagues suggested that paranoid individuals display an excessive 'self-serving bias' (SSB), due to a strong externalising bias (EB) for negative events (Kaney & Bentall 1989, 1992), and/or an external-personal bias (PB; Kinderman & Bentall, 1997). However, Freeman (2007) considered this evidence unpersuasive.

In summary, both clinical and nonclinical paranoia have been linked to similar risk factors, however it has been difficult to disentangle the influences of cognitive and emotional factors.

1.3.6 The Attribution – Self-Representation Model of Paranoia

This section will focus on the cognitive model by Bentall and colleagues (e.g., Bentall et al., 1991, 2001) which is centred on attributional biases in relation to self-representations (see Figure 1.2). It is often called the 'delusion as defence'

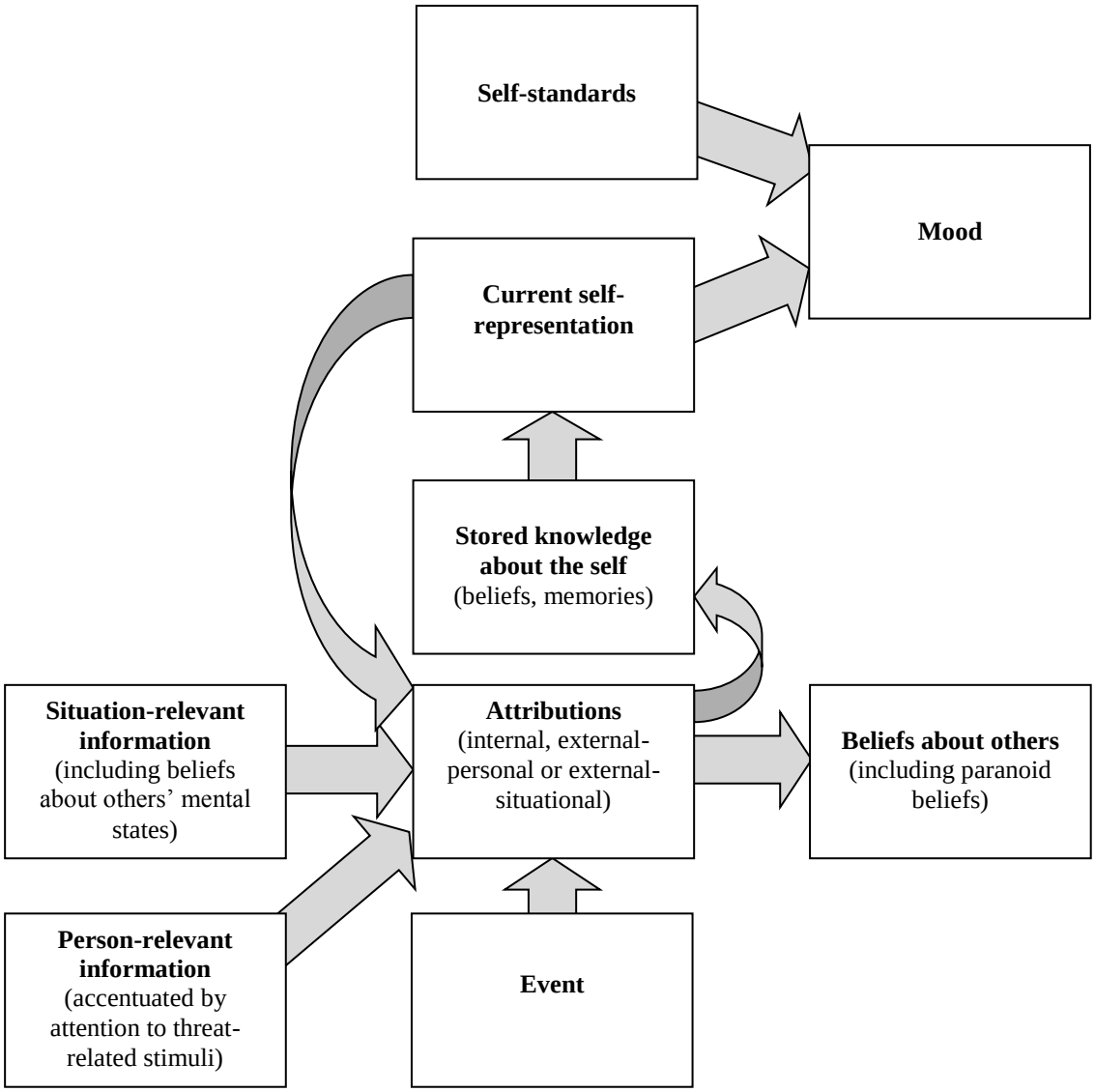


Figure 1.2. The attribution – self-representation cycle of persecutory delusions. Reproduced from "Persecutory delusions: A review and theoretical integration," by R. Bentall et al., 2001, *Clinical Psychology Review, 21*, p.1168. Copyright 2001 by Elsevier Ltd.

model (Garety & Freeman, 1999), although Bentall and colleagues described it as an 'attribution – self-representation cycle.' The components of this cycle will be described, then the evidence relating to self-esteem and attribution biases will be evaluated, and remaining questions outlined.

1.3.6.1 The 'attribution – self-representation cycle.' This theory proposed that paranoid attributions function as a defence when negative events occur by preventing access to latent negative self-schemata (i.e., by blaming other people rather than the self) to preserve self-esteem.

Bentall and colleagues suggested that if an event does not match the current self-view, an external cause will be sought. External-personal attributions (blaming other people) are the default option over external-situational attributions as those require effortful processing which can be diminished under stress. A limited search strategy may end at this point due to reasoning biases like JTC and poor ToM skills in considering other people's intentions. The paranoid attribution also primes negative other-to-self schemata ('people dislike me'), thus reinforcing the attribution – self-representation cycle. The feedback between self-schemata and attributions can then lead to dynamic changes in mood and self-esteem.

In considering developmental origins of psychotic symptoms like paranoia, Bentall, Fernyhough, Morrison, Lewis, and Corcoran (2007) suggested that the external-personal attributional bias for negative events may be a result of parental modelling and other environmental factors such as victimising traumas (as noted above) and insecure parental attachment. However, Bentall et al. (2007) acknowledged that such research remains limited.

The attribution – self-representation cycle theory has been criticised due to the lack of consistency in research relating to both self-esteem and attributional biases in paranoia (e.g., Freeman, 2007). This evidence is reviewed below.

1.3.6.2 Evaluation of literature on self-esteem in paranoia. Bentall, Kinderman, and Kaney (1994) proposed that paranoid individuals may harbour latent negative self-beliefs, which are attributed to others in an attempt to maintain a consistent self-representation. Cicero and Kerns (2011) suggested that the theory predicts low implicit self-esteem, and normal/high explicit self-esteem, and there have been mixed findings in relation to self-esteem and paranoia.

Several researchers found high explicit self-esteem in paranoid patients as predicted when measured explicitly (e.g., Candido & Romney, 1990; Havner & Izard, 1962; Lyon, Kaney, & Bentall, 1994). However, when Kinderman and Bentall (1996b) asked paranoid patients about their views of their actual self, ideal self, and how they thought close others saw them, they found that whilst their reports of actual and ideal self were consistent, they reported more negative perceptions of how others viewed them (other-to-self views).

Bentall et al. (2001) stated that there is more consistent evidence of low self-esteem in measures of implicit or latent self-esteem. For example, Kinderman (1994) found interference on low self-esteem words on an emotional Stroop test with paranoid patients, a result replicated by Lee (2000) in patients and healthy participants. However, Mackinnon, Newman-Taylor, and Stopa (2011) reported that paranoid patients had a similar implicit self-esteem to normal controls.

Bentall et al. (2001) suggested that the mixed findings relating to explicit measures of global self-worth are due to an instability in self-concepts, with paranoid

individuals engaged in "an intense struggle to maintain positive self-representations that often fails," (p.1166). Thewissen, Bentall, Lecompte, van Os, and Myin-Germys (2008) found that fluctuations in self-esteem predicted the level of subsequent paranoia, supporting this theory. Bentall et al. (2008) also suggested that the presence of co-morbid depression may have obscured many findings, and similarly, Ben-Zeev et al. (2009) found that relationships between self-esteem and paranoia were mediated by symptoms of depression and anxiety in a large clinical study. These findings highlight the potential for additional roles of emotional processing in paranoia (Ben-Zeev et al., 2009), alternatively, Freeman (2007) proposed that perhaps self-esteem is less important than specific beliefs about the self and other people.

In summary, it appears that the evidence suggests that low self-esteem characterises people with paranoid ideas in both clinical and non-clinical samples, although the data are mixed with implicit and explicit measures, and the possibility remains that emotions like depression and anxiety are significant confounding factors (Ben-Zeev et al., 2009; Bentall et al., 2008).

1.3.6.3 Evaluation of literature on attribution biases. Similarly, the evidence supporting an excessive self-serving attribution bias in paranoia has been criticised for its inconsistency and poor methodological rigour (e.g., Freeman, 2007).

Attributions are interpretations of who or what has caused something, and normal people commonly exhibit particular biases. When considering the cause of another person's behaviour, we tend to attribute this to a personal disposition within that person, whilst minimising external situational factors: this is called the 'fundamental attribution error' (Ross, 1977). Heider (1958) suggested that we do

this because it makes our world simpler and more predictable. Conversely, if something negative happens to ourselves, we usually attribute it to external circumstances, whereas if something positive happens, we attribute the cause internally to ourselves (e.g., Heider, 1958; Miller, 1976). This latter pattern is known as the SSB, and Weiner (1986) suggested that in the face of success or failure, the SSB minimises negative self-cognitions and emotions, and maintains positive emotions and high expectations for future success; thus motivating further drive for achievement. In their meta-analysis, Campbell and Sedikides (1999) reported that the SSB was most pronounced when there was a higher threat to the self, which was interpreted to support the theory that the SSB is employed to protect self-esteem when it is most in danger of being undermined. However, depressed people show the opposite pattern to the SSB; internalising negatives and externalising positives (Abramson et al., 1978).

As stated above, it has been suggested that paranoid individuals have an excessive SSB compared to normal controls (and opposite to depressed individuals), mainly due to a particularly strong EB for negative events (e.g., Kaney & Bentall, 1989; 1992). Kinderman and Bentall (1997) later suggested that this EB could be specified more precisely as a PB.

Therefore, a literature review was carried out to investigate the current evidence base for the suggested role of attribution biases in paranoia across clinical and non-clinical populations, to clarify the current status of attribution research, and whether attributions vary across the non-clinical to clinical continuum of paranoia.

Search strategy. In November 2010, three databases were searched: PsycInfo, Medline, and Web of Science/Web of Knowledge. The initial terms

searched were “paranoi*” combined with “attribution*” and “external*” producing 159 results. Inclusion/exclusion criteria (see Table 1.1) were applied, leaving 22 articles. A separate search was conducted replacing the keyword “paranoi*” with “persecut*” returning 170 articles. Duplicates of the previous search were removed and remaining articles were scrutinised using the inclusion/exclusion criteria, yielding six more articles. A total of 28 articles from these two searches were then examined more closely. References were inspected to ensure all relevant papers were included, and a check on more recent publications was performed in January 2013, yielding a further seven, and making a total of 35.

Methodologies. A variety of methodologies have been used to investigate attributions. Early studies often used questionnaires such as the Attributional Style Questionnaire (ASQ: Peterson et al., 1982), and the Internal, Personal and Situational Attributions Questionnaire (IPSAQ: Kinderman & Bentall, 1996a). These questionnaires require participants to read positive and negative scenarios, and to write down a cause for the events. On the ASQ, participants then rate the cause on internality (caused by oneself or something/someone eternal), globality, and stability. Unfortunately, the ASQ has been criticized for use in paranoia research as it was developed to investigate depression, and does not differentiate external attributions (personal or situational; Kinderman & Bentall, 1996a). The ASQ has also been criticized for poor reliability and accessibility (Bentall et al., 2001). The IPSAQ was designed to address these issues by focusing on social situations, and separating different types of external attributions (personal and situational).

However, other new questionnaire measures continue to be developed, such as the Ambiguous Intentions Hostility Questionnaire (AIHQ; Combs, Penn, Wicher

Table 1.1

Inclusion and exclusion criteria for literature review of attribution biases in paranoia.

Inclusion Criteria	Exclusion Criteria
Article in English language, peer-reviewed journal.	Book chapters. Dissertations or theses.
Cross-sectional studies with attributions as a key focus.	Intervention studies. Reviews or meta-analyses. Commentaries, notes or theories.
Attributions related to paranoia.	Exclusion of either concept/their relationship.
Adult participants aged 18-65 years, confounds measured.	Confounds not reported. Forensic participants.
Reliable and valid measure of paranoia, preferably as a continuous variable.	No measure of paranoia. Vague diagnoses where paranoia is unclear.
Reliable and valid measure of internal and external attributions.	No quantitative measure of attributions. No differentiation of internal and external attributions.

& Waldheter, 2007), and Achievement and Relationships Attributions Task (ARAT; Fornells-Ambrojo & Garety, 2009a). Alternatively, some studies have employed qualitative assessment of real personal events or hypothetical situations, or implicit measures (e.g., the Pragmatic Inference Test: PIT; Winters & Neale, 1986).

Firstly, studies are presented which compared paranoid patients to non-clinical controls, depressed controls, non-paranoid psychotic controls, previously

paranoid (remitted) patients, and those at high risk of psychosis. Finally, studies examining paranoia in non-clinical samples are presented, including those which explored attributions across a general population or compare groups on the basis of the level of subclinical paranoia.

Attribution studies of paranoid patients compared to non-clinical controls. Four studies focused on exploring how paranoid ideation may differ between clinical populations and 'normal' information processing. All of these studies demonstrated a greater EB in patients with persecutory delusions compared to non-clinical controls, using both questionnaires (IPSAQ: Langdon, Ward, & Coltheart, 2010; ASQ: Melo, Taylor, & Bentall, 2006) and qualitative methods for hypothetical (Craig, Hatton, Craig, & Bentall, 2004) and real events (Lee, Randall, Beattie, & Bentall, 2004). However, Melo et al. (2006) only found an EB for negative events in paranoid patients classified under the 'poor me' (and not 'bad me') dichotomy (Trower & Chadwick, 1995).

In summary, questionnaire measures and qualitative analyses suggested that compared to non-clinical controls, patients with persecutory delusions show an increased EB, although it is possible this may be limited to 'poor me' paranoia.

Attribution studies of paranoid and depressed patients. Many early studies used depressed patients as psychiatric controls. Four such studies using the ASQ supported the notion of an exaggerated SSB in paranoia compared to both depressed patients and non-clinical controls (Candido & Romney, 1990; Kaney & Bentall, 1989; Kinderman, Kaney, Morley, & Bentall, 1992; Lyon et al., 1994).

Three studies found that the EB/SSB was the same in paranoid patients and non-clinical controls, but greater than for depressed patients when measured implicitly using the PIT (Lyon et al. 1994), and explicitly using the IPSAQ (Kinderman & Bentall, 1997) and ARAT (Fornells-Ambrojo & Garety, 2009b).

In regard to PB on the IPSAQ, whilst the first study was supportive of a PB (Kinderman & Bentall, 1997), a later study (Merrin, Kinderman, & Bentall, 2007) found no difference in the final decisions made, although there was the expected EB and PB in the decision-making process when participants were allowed to ask questions. Finally, Fornells-Ambrojo and Garety (2009b) found no differences in PB on the ARAT, although patients were more likely to blame others rather than themselves (when situational attributions were excluded).

To summarise, the evidence again suggested that paranoid patients have a SSB or EB as high as or higher than non-clinical controls, and consistently when compared to depressed patients. Studies using more novel methods have also suggested that compared to healthy individuals and depressed people, paranoid patients will spend more time considering external-personal attributions even if they are then able to revise their decisions (Merrin et al., 2007), and less time considering their own role in events (Fornells-Ambrojo & Garety, 2009b).

Attribution studies of paranoid and non-paranoid psychotic patients.

Seven studies compared patients with a diagnosis of psychosis with and without paranoia. This has been considered a better psychiatric control group than depressed patients who are expected to lack a SSB. It also allows more precise conclusions to be made about paranoia over delusions or psychosis in general.

There was some limited support for attribution biases specific to persecutory delusions over other psychotic presentations in analyses from four studies (Combs et al., 2009; Jolley et al., 2006; Moritz, Woodward, Burlon, Braus, & Andresen, 2007; Sharp, Fear, & Healy, 1997), although all of these studies contained contradictory findings depending upon the attribution measure, type of data analysis, and co-morbidity. Conversely, analyses from four studies failed to find the expected differences in EB or SSB between psychotic patients with and without persecutory delusions (Fear et al., 1996; Humphreys & Barrowclough, 2006; Martin & Penn, 2002; Moritz, et al., 2007).

Four studies linked grandiose delusions to a similar SSB or EB as that in paranoia, either on its own (Moritz et al., 2007) or possibly co-morbid with persecutory delusions (Fear et al., 1996; Jolley et al. 2006; Sharp et al., 1997). Depression was also linked to reducing the SSB in three studies (Humphreys & Barrowclough, 2006; Jolley et al. 2006; Moritz, et al., 2007). Interestingly, Moritz et al. (2007) reported reduced internal attributions in paranoid patients across all events, which was interpreted as feeling less in control.

In summary, there are fewer studies which show a greater EB in paranoid patients compared to non-paranoid psychotic patients, although co-morbid grandiosity might increase a SSB and co-morbid depression may reduce it.

Attribution studies of current and remitted paranoid patients. Whilst the studies reviewed so far have generally supported an EB, SSB or PB in paranoid patients (and sometimes non-paranoid patients with psychosis), the question remains about whether an attributional bias is part of the paranoid state or remains as an

underlying vulnerability (although it would be impossible to infer that such a vulnerability existed before the paranoid state).

Eight studies compared remitted (past paranoid) patients to acutely paranoid patients, and the findings are very mixed. Three studies have found that acutely paranoid patients had a greater PB than remitted or non-clinical controls (e.g., Aakre, Seghers, St Hilaire, & Docherty, 2009; Diez-Alegria, Vasquez, Nieto-Moreno, Valiente, & Fuentenebro, 2006; Lincoln, Mehl, Exner, Lindenmeyer, & Rief, 2010). Mehl et al. (2010) also reported more 'self-decreasing' (external) attributions in acutely paranoid patients over remitted and non-clinical controls on an implicit measure (PIT), and a correlation between EB on the IPSAQ and level of paranoia.

Alternatively, there is also evidence from six studies that acute and remitted patients have a similarly high EB (e.g., Diez-Alegria et al., 2006; Langdon, Corner, McLaren, Ward, & Coltheart, 2006; Lincoln, Mehl, Exner et al., 2010; McKay, Langdon, & Coltheart, 2005; Moritz, Burnette, et al., 2011) and PB (Langdon et al., 2006; McKay et al., 2005, Mehl et al., 2010; Moritz, Burnette, et al., 2011). However, Randall, Corcoran, Day and Bentall (2003) reported that remitted patients had a PB in-between acute patients and controls. Contrary to expectations, Mehl et al. (2010) also found that remitted patients had a lower EB compared to both acute patients and normal controls.

In summary, patients in recovery from persecutory delusions may be similar in their EB to those with acute delusions, however, there was some evidence that suggested a greater PB in acute patients. It has been suggested that those prone to paranoia overestimate external influences and underestimate their own, but only focus on other people as an external cause during the acute paranoid state (e.g., Lincoln, Mehl, Exner, et al., 2010; Mehl et al., 2010; Moritz, Burnette, et al., 2007;

Randall, et al., 2003). Lincoln, Mehl, Ziegler, et al. (2010) suggested this might reflect a reality for patients in an inpatient setting, or who might have experienced interpersonal trauma in the past (e.g., Rutten et al., 2008).

Attribution studies of paranoid patients and those at high risk. There were only three studies which assessed whether those at risk of developing psychosis show attribution biases. These had the potential to identify if attribution biases represent a pre-existing vulnerability for paranoia, however, none were longitudinal.

Using the IPSAQ, Janssen et al. (2006) only found an EB in the patients with psychosis (but not those at risk of psychosis), but no group differences in PB. Furthermore, the EB was found to have a strong association with delusions in general, and delusions of reference particularly, but the association with persecutory delusions only approached significance.

Second, An et al. (2010) found a similarly high hostility bias (measuring the perceived intention behind another's actions) on the AIHQ in young patients with schizophrenia and participants at ultra-high risk for psychosis, compared to matched normal controls. When depression was then included as a covariate (as recommended by the discussions above), the hostility bias was significantly correlated with paranoia scores only in the patients, but not the high risk group.

Third, DeVylder, Ben-David, Kimhy, and Corcoran (2013) found no differences in either EB or PB on the IPSAQ between young people at high clinical risk for psychosis and age-matched controls. Likewise, there was no relationship of EB or PB with suspiciousness scores, or with later transition to psychosis.

Therefore, it remains to be seen whether attribution biases represent a risk factor for developing paranoia, as whilst one study found comparable bias in patients

and those at risk of psychosis (An et al., 2010), one only found bias in the patients (Janssen et al., 2006), and one found high risk individuals no different to non-clinical counterparts (DeVylder et al., 2013). Furthermore, correlations of attribution bias with paranoia were non-significant in two studies (DeVylder et al., 2013; Janssen et. al., 2006), and only significant in patients (not non-clinical controls) in the second (An et al., 2010). This may imply that attribution biases are representative of the state of paranoia, rather than a risk factor. However, participants were not selected for paranoia in these studies, and hence the conclusions are limited to psychosis.

Attribution studies of paranoia in non-clinical samples. Of most relevance when considering the concept of a continuum of paranoia is the presence of attribution biases which are shown in the paranoid state, and in non-clinical populations. The evidence relating to attributional biases and paranoia within non-clinical samples is very mixed. Some studies have looked at correlations between attribution biases and paranoia across unselected non-clinical samples, and others have compared attributions in those who score particularly high or low on paranoia measures in an attempt to test the phenomenological view of a continuum of paranoia (i.e., that attribution biases present in a similar form across the continuum).

Out of six studies investigating paranoia across non-clinical samples, four found attribution biases related to paranoia level, and two did not. Using the IPSAQ, Kinderman and Bentall (1996a), and Lincoln, Mehl, Exner et al. (2010) linked PB to higher paranoia, and so did Fornells-Ambrojo and Garety (2009a) using the ARAT. Combs, Penn, Wicher, et al. (2007) similarly reported that hostility bias (attributing hostile intent to others' actions) on the AIHQ predicted paranoia in students.

However, Martin and Penn (2001) and McKay et al. (2005) failed to find any relationship between attributions and paranoia.

When investigating subgroups of non-clinical participants who display heightened paranoid ideation, the findings are also mixed. Firstly, in their cluster analysis of a large non-clinical sample, Combs, Penn, Chadwick et al. (2007) reported that one paranoid subgroup labelled 'poor me' showed a stronger PB and high self-esteem, whilst another subgroup labelled 'bad me' showed a weak EB linked to heightened depression. Fornells-Ambrojo and Garety (2009a) found a greater bias for blaming others rather than the self in a high paranoia group. Also, Green et al. (2011) found that those non-clinical participants who offered a paranoid interpretation of events displayed a lower SSB (but no difference in PB) compared to controls. Therefore, higher non-clinical paranoia was linked to a stronger PB in some, and a weaker EB in others.

However, several non-clinical studies have failed to find differences in attribution biases between people who score high or low on paranoia measures (e.g., Combs & Penn, 2004; Lincoln, Mehl, Exner, et al., 2010), and in fact, contrary to expectations, Combs, Penn, Chadwick et al. (2007) found paranoia was actually negatively correlated with EB across their non-clinical sample.

In summary, the studies of non-clinical paranoia suggest that as non-clinical paranoia increases, so do attribution biases, but again the role of confounds like depression (which decreased the EB/SSB), and possible subtypes of paranoia with different attributional patterns (e.g., 'bad me' and 'poor me'), are suggested to contribute to this mixed evidence base.

Summary of studies into attribution biases in paranoia. In summary, whilst early research of attributions biases with the ASQ and IPSAQ was promising when comparing patients with persecutory delusions to healthy controls or depressed patients, later studies are more equivocal in relation to an EB, SSB or PB when comparing acutely paranoid patients to non-paranoid patients with psychosis, remitted past-paranoid patients, those at high risk of psychosis, and those with subclinical paranoia. Bentall et al. (2001) admitted that comparisons to remitted or non-paranoid psychotic patients were less clear than comparisons to healthy controls, a finding which is replicated in this review. Attribution biases appear to be commonly (but not consistently) present in psychotic patients with and without persecutory delusions, and findings are especially mixed among those at high risk for developing psychosis. Studies of remitted patients suggested that those prone to paranoia may have a SSB, but the PB only emerges during the acute paranoid state. The presence of some attribution biases in line with levels of paranoia across the clinical and non-clinical spectrum provides limited support for a phenomenological continuum of paranoia, however, the relative strength of findings in clinical over non-clinical participants suggests at least a skewed rather than normal distribution.

The inconsistency in findings might be due to the presence of other delusions (such as grandiosity), co-morbid depression, differing reactions to paranoia (as deserved or undeserved), and differences in group or correlation analyses. Of particular interest are a handful of findings of an inverse EB being found in paranoid groups, similar to the pattern found in depressives, and an external locus of control regardless of event valence, perhaps reflecting a real sense of powerlessness. In addition, Freeman (2007) questioned the validity of the questionnaire studies in relation to clinical paranoia, and the capability to detect true attribution biases.

In an attempt to unravel such findings, it has been proposed that stress may increase the likelihood of paranoia and cognitive biases, and may explain why biases are most commonly found in the acutely paranoid state. For example, Bentall and Kaney (2005) found that a mild stressor (anagrams) altered the SSB on the ASQ in patients with persecutory delusions and depression (but not for healthy controls), concluding that attributional style is more labile in paranoia and depression than for normal people. Moritz, Burnette, et al. (2011) found that stress increased paranoia, PB, and other cognitive biases amongst patients with schizophrenia. However, Lincoln, Peter, et al. (2010) found no link between stress and PB in a non-clinical population despite an increase in paranoia, leading the authors to suggest the presence of a "critical threshold ... where... reasoning biases become more pronounced" (pp.170). Therefore, these findings may imply that stress can induce vulnerable people to make paranoid attributions, but not healthy individuals, however, the disparities in the literature make this an important hypothesis to test. No studies have attempted to manipulate attributions or measure them over time to test a vulnerability model of how paranoia develops within an individual.

1.3.6.4 Conclusions. The Bentall et al. (1991, 2001) attribution – self-representation cycle model of paranoia places attribution biases and self-concepts at the centre of a complex dynamic model where negative events relating to the self are attributed externally in order to protect the self-representation. The dynamic nature of this process is suggested to contribute to the conflicting findings in the literature (Bentall et al., 2008) summarised above, however, further research is needed to test specific aspects of the model, particularly the prediction that an event which causes

negative self-cognitions may lead to external-personal attributions and increased state paranoia.

1.3.7 Cognitive Treatments for Paranoia

In 1952, Beck published an account of therapy for paranoid delusions, using what would later become recognised as core cognitive strategies. Unfortunately, for many years delusional paranoia was seen as untreatable by psychological means, and only pharmacological treatments were available (Bentall, 2003). However, paranoia is now targeted in several cognitive interventions (Freeman & Garety, 2006).

1.3.7.1 CBT for psychosis. In 2009, NICE recommended that CBT for psychosis (CBTp) be offered to every person diagnosed with schizophrenia in the United Kingdom, and recently the Department of Health (DoH) set out a plan to expand provision of CBT for people with schizophrenia (DoH, 2011). Therefore, the continuing evaluation of the principles underlying CBTp, as well as the different forms this may take, are essential when considering the impact on clinical practice.

The CBTp approach focuses on both the content and process of paranoid thinking (e.g., Chadwick, Birchwood, & Trower, 1996; Freeman & Garety, 2006; Kingdon & Turkington, 2002, 2005). However, there remains a great need for further improvements in therapy for paranoia, and unfortunately, research focusing on paranoid symptoms is lacking (Garety, Bentall, & Freeman, 2008). Garety et al. (2008) reviewed a range of studies assessing the effectiveness of CBTp in patients with various psychotic diagnoses. They found that overall, studies tended to find that CBTp led to an improvement in positive symptoms (delusions and hallucinations), although the evidence is not clear on whether CBTp is more

effective than other psychological treatments. However, only Kuipers et al. (1997) specifically found an improvement in persecutory delusions with CBTp as other studies have failed to measure or report the effects on paranoia. In addition, Kuipers et al. (1997) found that only 50% of patients with medication-resistant psychosis responded to CBTp, thus indicating that further improvements to treatments are still necessary. Zimmerman, Favrod, Trieu, and Pomini (2005) suggested that future research could combine traditional CBT with training to address processing deficits.

1.3.7.2 Training on cognitive biases. Recent research has begun to test the effectiveness of training for a range of social and cognitive biases in patients with schizophrenia. These include cognitive remediation therapy (CRT) which attempts to remediate cognitive deficits such as executive functioning, attention, memory, social cognition and/or metacognition (Wykes & Spaulding, 2011); social cognition and interaction training (SCIT) which targets emotional perception, attributional style, and ToM (Roberts, Penn, & Combs, 2006); and metacognitive training (MCT) which focuses on attributional style, ToM, memory bias, JTC, and disconfirmation bias (Moritz & Woodward, 2007).

Whilst promising early findings suggested that CRT, SCIT, and MCT warrant further research (Freeman, 2011), all of these programmes have been designed and tested with patients diagnosed with schizophrenia who may or may not be paranoid, and might vary on many variables, and therefore their utility with persecutory delusions remains unclear. Steel (2008) suggested that such interventions which target specific psychological processes should be considered only as part of CBTp.

1.3.7.3 Summary. Exciting developments in cognitive interventions may offer new treatments for complex psychotic phenomena, as existing therapies remain limited in their effectiveness (Kuipers et al., 1997). This includes developments in CBTp, SCIT, and MCT which use explicit methods to effect changes, as well as more implicit training programmes like CRT and CBM.

1.4 The Current Study

1.4.1 Rationale

Paranoia is associated with biases in cognitive processing. It was proposed by Bentall and colleagues (Kaney & Bentall, 1989, 1992; Kinderman & Bentall, 1996a, 1997) that paranoid individuals have an extreme SSB and attribute negative events to the hostile intentions of others (external-personal attributions), over contextual or chance factors of the situation (external-situational attributions). However, paranoid individuals seem to vary a great deal in how they make attributions (Freeman, 2007), and whilst attribution biases are key to the Bentall et al. (1991, 2001) attribution – self-representation model of paranoia, the findings remain equivocal.

CBM was developed as a way to test the causal links between cognitive biases and emotions (Koster et al., 2009), and various protocols have been developed which train interpretation (Mathews, 2012) and attention biases (MacLeod & Holmes, 2012), as well as other cognitive biases (Hertel & Mathews, 2012; MacLeod, 2012). Training in more adaptive biases has been found to improve resilience to negative emotion when put under stress in non-clinical studies (e.g.,

Hirsch et al., 2007; Hoppitt et al., 2010b; Lester et al., 2011; Mackintosh et al., 2006; Salemink et al., 2007a; Wilson et al., 2006; Woud et al., 2012), analogue studies (e.g., Clerkin & Teachman, 2011; Hirsch et al., 2009; Lester et al., 2011; Murphy et al., 2007), and clinical studies (e.g., Beard et al., 2011; Hayes et al., 2010).

Given the equivocal research findings about attributional biases in paranoia (Freeman, 2007), the CBM-I methodology provides an interesting opportunity to test Bentall et al.'s (2001) theory that increased external-situational attributions (and decreased external-personal attributions) will relate to a less paranoid response. It also provides an opportunity to test whether attributional biases may induce an individual to move along the paranoia continuum, thus directly testing the vulnerability perspective of continuum. Furthermore, development of a successful CBM-I procedure to target the two different types of external attributions (personal and situational) considered relevant to paranoia could be useful as an adjunct to existing cognitive therapies which require further development (Freeman, 2011).

1.4.2 Proposal for Study Design

Therefore, the present study sought to extend the use of CBM-I to target different types of attribution: external-personal attributions associated with increased paranoia and external-situational attributions associated with decreased paranoia. The CBM-I used in the study was the methodology developed by Mathews and Mackintosh (2000), which has been commonly used to train interpretation biases.

The study tested non-clinical participants as research into these attributions has not been attempted using this paradigm before. This would allow for tests of how effective the new CBM-I materials are in training a bias, and the assumption that attributional biases relate to paranoia. This would be essential to establish

before any studies attempt to modify biases in paranoid individuals. The study used a mixed design, comparing two independent groups who either completed a positive/benign attribution training intervention, or a neutral placebo control intervention which was not expected to influence attributions. This was considered to be more ethical than negative training. The two groups were tested on a variety of measures known to be associated with paranoia (depression, anxiety, trait paranoia, social anxiety, and beliefs), in order to rule out any pre-existing group differences. They then completed the CBM-I training and were given a paranoia induction procedure (Ellett & Chadwick, 2007) as a stressor before assessment of the outcomes. Attributions were measured using a new version of the recognition task specific to external-personal and situational attributions, and emotion was measured using visual analogue scales and a questionnaire of state paranoia.

1.4.3 Experimental Hypotheses

Hypothesis 1. The positive CBM-I training will lead to a more positive interpretation bias with novel ambiguous situations compared to the neutral CBM-I. This will mean greater endorsement for the positive or benign external-situational attributions than for the paranoid external-personal attributions.

Hypothesis 2. Those in the neutral CBM-I group will show a more negative emotional response to the stressor (a greater increase in state paranoia, anxiety, depression) compared to those in the positive CBM-I training group.

Hypothesis 3. There will be a significant negative correlation between interpretation bias and state paranoia scores after the stressor, where a more positive interpretation bias will be related to lower paranoia.

Chapter 2

Methodology

2.1 Overview

This chapter is divided into five sections. Section 2.2 describes the design of the study and includes a flow diagram with an overview of the experimental procedure. Section 2.3 describes participant recruitment, inclusion and exclusion criteria, and sample size calculation. There follows an overview of the screening measures, baseline measures, and outcome measures in Section 2.4, including the rationale for their use and psychometric properties. Then Section 2.5 describes the experimental interventions for each condition, and the paranoia induction intervention. Section 2.6 then describes the experimental procedure in detail.

2.2 Design

The three hypotheses were tested using a mixed design. The between-subjects variable was the intervention group, whilst within-subjects variables were interpretation bias, and changes in state paranoia.

Participants were randomly allocated to two independent groups: one group received a neutral CBM-I control intervention, and one group received a positive CBM-I training intervention. Block randomisation was used to enable equal numbers per group, and was organised by the second supervisor using sealed envelopes to ensure the researcher remained blind to the experimental condition of each participant until the start of the appropriate CBM-I training programme when the envelope was opened. Shadish, Cook, and Campbell (2002) stated that random allocation to experimental groups is useful to create groups which are

"probabilistically similar" (p.13) before interventions, by distributing any potentially confounding variables equally between the groups and eliminating selection bias. Random allocation was used here to minimise such threats to internal validity, and reduce the chance of confounding variables affecting the groups differently and thus compromising the conclusions that could be drawn about the effect of the intervention (Shadish et al., 2002).

Whilst random assignment was assumed to lead to equivalent groups, it was possible that there were some differences at pre-test, and so pre-tests were conducted on a range of variables, as recommended by Field and Hole (2003). A number of baseline measures were used to assess variables hypothesised to influence cognitive bias, emotional responses to stress, and paranoid attributions. These variables included depression, anxiety, trait paranoia, social anxiety, core schemas about self and others, and state paranoia and other emotions. The scores on these measures for each group were compared to ensure equivalence, before further statistical analyses took place.

Following these baseline measures, participants completed the CBM-I training intervention (positive/neutral), and were then exposed to a stressor designed to activate cognitive biases and hence induce mild paranoia. At this point, the two dependent variables: interpretation biases and paranoid symptoms were measured. The recognition test (for cognitive interpretation bias) was not designed as a pre-post measure (Mathews & Mackintosh, 2000), and so post-test scores on this outcome are compared between the two groups. However, the measure of state paranoia was designed for use in experimental studies and so changes in state paranoia scores were compared from baseline to post-test.

2.3 Participants

Participants were taken from a non-clinical population of staff and students recruited from the University of East Anglia (UEA). The author attempted to recruit individuals through poster advertising on all eligible noticeboards on campus (see Appendix A), online advertising on a participant volunteering system used by psychology undergraduates (SONA), three email advertisements via an information bulletin sent to all UEA staff and students, and handing out flyers several days per week at a central location on the UEA campus. An incentive was offered where all participants were entered into a prize draw to win one of four £25 gift certificates for a popular online store. Entry to the prize-draw was offered to all who volunteered to take part, even if, upon meeting, they met exclusion criteria and did not take part. Sweets were also offered with the flyers to encourage people to talk to the researcher so they could hear about the study, and the researcher then requested email addresses of those who were interested in order to send them further information.

Participants were recruited during two periods; February to May 2012, and September to November 2012 after the initial recruitment period failed to yield enough participants. There was a break in recruitment over summer as the target population was only available during term time, and efforts to recruit a community sample over the summer period was not possible due to unforeseen circumstances. Despite significant efforts to maximise recruitment over an extended period of time, it was difficult to meet to the goal of the power calculation. The decision was taken to halt recruitment in November 2012 because the sample size was then over 30 (the minimum needed for the central limit theorem to apply; Field, 2009), and for practical limitations. Further details are provided in the Results section 3.2.

2.3.1 Initial Power Analysis

To ensure the study had sufficient power to detect differences between the two groups, Cohen's (1992) power primer was used to derive a sample size.

There have not been any previous studies using CBM-I for paranoid attributions before, therefore studies with a similar methodology (comparing positive to neutral rather than the more usual negative training) were employed to derive an estimated effect size. When comparing a single positive CBM-I to a neutral CBM-I on the recognition task in non-clinical adolescents, Salemink, and Wiers (2011) reported a small effect size for positive targets ($d = 0.4$) and a large effect size for negative targets ($d = 0.8$). In contrast, analogue studies using non-clinical participants high in anxiety have found larger effect sizes when comparing positive and neutral CBM-I groups on recognition task scores. For example, Murphy et al. (2007) reported means which equate to a large effect size for both positive ($d = 1.21$) and negative interpretations ($d = 1.17$). Steinman and Teachman (2010) reported slightly more modest effect sizes, with a medium-large effect for positive interpretations ($d = 0.76$) and a large effect for negative interpretations ($d = 0.88$).

Cohen (1992) indicated that when comparing two means in a *t*-test (as originally intended with the interpretation bias), with a significance level of $\alpha = .05$, a power of 0.8, and an anticipated large effect size ($d \geq 0.8$), 26 participants would be necessary for each group. Therefore, the aim was to recruit a total of 52 participants for this study. The sample size actually recruited was 35, with 18 in the positive CBM-I training group, and 17 in the neutral control CBM-I group.

2.3.2 Inclusion Criteria

Participants were aged 18 years or above, and were students or staff members working at UEA. As the CBM-I training tasks and outcome measures required fluent English skills and reading ability, participants were required to have a good standard of English. The use of students and staff allowed us to be reasonably sure of this, and this was also discussed with participants prior to starting the study.

2.3.3 Exclusion Criteria

Participants were excluded if they self-reported past experiences (in the previous 5 years) of major mental health problems such as anxiety, depression, paranoia or psychosis on the consent form or in preliminary discussions. Participants were also excluded if they displayed current high levels of anxiety, depression or paranoia on clinical measures at the screening stage before any further testing took place. Such individuals were excluded to minimise the chance that someone might become overly distressed by the paranoia analogue procedure, and also to ensure that the sample was representative of a non-clinical population.

The scores for exclusion were as follows. The Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001) was used to screen out clinical depression. Following the cut-off published by the authors, participants scoring over 15 (‘moderately severe’ depression) were excluded at screening stage (sensitivity of 68% and specificity of 95% for diagnosing major depression). The Generalised Anxiety Disorder scale (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006) was used to screen out clinically significant levels of anxiety. A score of 15 indicating a ‘severe’ level of anxiety (Spitzer et al., 2006) was used as a clinical cut-off for generalised anxiety disorder. The Green et al., Paranoid Thoughts Scale (GPTS,

Green et al., 2007) was used to screen out those who scored above 68 which would indicate a clinical level of paranoia (88% sensitivity, 90% specificity: Green, personal communication, October 7, 2010).

A non-clinical sample was chosen in line with previous CBM-I studies which have been developed to target a new cognitive bias (e.g., appraisals of depressive intrusions: Lang, Moulds, & Holmes, 2009; a range of cognitive errors: Lester et al., 2011; depressive attributions: Peters et al., 2011; perfectionism: Yiend, Savulich, Coughtrey, & Shafran, 2011). This allowed investigation of the effectiveness of these new materials for training this bias in attributions, and also for testing of the hypothesised link between attribution bias and paranoid experience.

2.3.4 Ethical Considerations

This study was approved by the Faculty of Health research ethics committee at the University of East Anglia (see Appendices B and C).

Consent was informed through either emailing participants a copy of the information sheet, or giving hard copies of the information sheet (Appendix D) prior to meeting for them to read in their own time. Upon meeting, the experimenter went through the information sheet and the participant was able to ask questions, to ensure that they were clear about what the study involved. The information sheet was designed to facilitate informed consent whilst maintaining the integrity of the study. If the participant agreed to take part, they then signed consent form (Appendix E). Their right to withdraw that consent at any time was made clear when introducing the study, continued consent was checked throughout, and during debriefing.

Attempts were made to minimise the possibility of participants experiencing high levels of distress. Those indicating a high level of current anxiety, depression

and paranoia at the screening stage were excluded from the study as they may have been more vulnerable to feeling distressed by the paranoid mood-induction. Such individuals were given a debriefing sheet (see Appendix F) which transparently indicated that their high scores meant they could not take part, and also included information on places to seek information and advice about anxiety, depression and/or paranoia. They were given hard-copies of self-help leaflets about the appropriate issue/s, and the experimenter offered to discuss these.

In addition, mood checks throughout the experiment allowed the researcher to check for distress during the procedure. Visual analogue scales (VAS) assessed anxiety, depression, and suspicion at four points in the study, and were checked by the researcher each time one was completed. Although the experience of doing an impossible task whilst apparently being filmed had the possibility to be mildly distressing, in a previous study using this method, none of the participants felt the need to leave the study (Ellett & Chadwick, 2007). As students are used to undergoing examinations and other assessments, the distress was not anticipated to be any higher than they might encounter in everyday life. However, participants who indicated high levels of anxiety, paranoia, or depression on the mood checks, who looked visibly distressed, or vocalised feeling distressed, were offered the opportunity to leave the study, to speak with the experimenter about their concerns, and given an information sheet with sources of further support. After the experiment was complete, every participant was debriefed and given a debriefing sheet to take away (Appendix G). The debriefing protocol described the true purpose of the study, with particular emphasis on explaining the nature of the paranoia induction to reassure participants that their performance could not have been improved.

Confidentiality of data was ensured by coding data whereby participants were assigned a participant number to ensure anonymity. The consent forms were stored separately to the coded data to prevent data being identifiable to individuals. Data protection was ensured through storing all coded questionnaires and other paper measures in a locked safe at the researcher's home during the study, and in a locked filing cabinet on UEA campus after the study was completed. All electronic files containing the anonymous experimental data were password protected. Only the primary researcher and supervisor had access to the data.

2.4 Measures

Within the study, three screening measures were used to assess eligibility to take part, three baseline measures were used to enable description of both groups, two outcome measures examined cognitive bias and paranoia, and four mood checks were used to check for levels of distress throughout the study and as a secondary measure of emotional reactions.

2.4.1 Screening Measures

Three self-report measures were used to assess current clinical variables. These were completed at the beginning of the session to verify if people met inclusion criteria.

2.4.1.1 Patient Health Questionnaire (PHQ-9). The PHQ-9 (Kroenke et al., 2001, Appendix H) is a self-report questionnaire comprising nine items asking

about the experience of depressive symptoms over the last two weeks. Symptom frequency is rated from 0 (‘not at all’) to 3 (‘nearly every day’), giving a total from 0 to 27.

Kroenke et al. (2001) demonstrated excellent internal consistency (Cronbach’s α = .89) and test-retest reliability over 48 hour period (intraclass correlation = 0.84). Cameron, Crawford, Lawton and Reid (2008) demonstrated good concurrent validity (r = .68 - .81, p < .01, with the depression subscale of the Hospital Anxiety and Depression Scale (HADS; Zigmund & Snaith, 1983) and good discriminant validity with the anxiety subscale of the HADS (r = .48 - .77, p < .01).

2.4.1.2 Generalised Anxiety Disorder scale (GAD-7). The GAD-7 (Spitzer et al., 2006; Appendix I) is a self-report questionnaire about anxiety symptoms over the last fortnight, comprising seven items which are scored in the same way as the PHQ-9, giving a total from 0 to 21.

Internal consistency is reported as excellent in the original validation study with primary care patients (Cronbach’s α = .92; Spitzer et al., 2006) and with the general population (α = .89; Löwe et al. 2008). Spitzer et al. (2006) also reported good test-retest reliability (intraclass correlation = .83) and good concurrent validity (r = .72) with the Beck Anxiety Inventory (Beck & Steer, 1993).

2.4.1.3 Green et al. Paranoid Thoughts Scale (GPTS). The GPTS (Green et al., 2007, Appendix J) is a self-report measure designed to measure paranoia across clinical and non-clinical populations. It comprises two 16-item scales which assess ideas of social reference and persecution, and incorporates consideration of conviction, distress and preoccupation. Symptom frequency is rated from 1 (‘not at

all) to 5 ('totally') for these 32 statements over the previous month. This measure yields scale scores for social reference and persecution (16 - 80), and a total score (32 - 160).

Green et al. (2007) reported excellent internal consistency (Cronbach's $\alpha = 0.90 - 0.95$) and test-retest reliability over 2 weeks (intraclass correlation coefficient = .87) in both clinical and non-clinical populations. The authors report good convergent validity with significant ($p < .01$) correlations with two widely used measures of paranoia. Spearman's ρ ranged from 0.71 to 0.81 with the Paranoia Scale (Fenigstein & Vanable, 1992), and from 0.43 to 0.39 with the Peters et al. Delusions Inventory (Peters, Joseph, & Garety, 1999). Criterion validity was good, with significantly higher mean scores for those in the clinical group compared to the non-clinical group on the total score (clinical group = 101.9, non-clinical group = 48.8, $p < .001$), the social reference score (clinical group = 46.4, non-clinical group = 26.8, $p < .001$) and the persecution score (clinical group = 55.4, non-clinical group = 22.1, $p < .001$).

2.4.2 Baseline Measures

In addition to the screening measures, two further measures were used to assess social anxiety and schemas about the self and other people. The mean scores for each group on these measures were compared to check that the two groups did not differ before the intervention.

2.4.2.1 Brief Fear of Negative Evaluation Scale (BFNE scale). There is a demonstrated relationship between paranoia and social anxiety (e.g., Gilbert, Boxal, Cheung, & Irons, 2005; Rietdiyk, van Os, de Graaf, Delespaul, & van der Gaag,

2009). Therefore, social anxiety was measured using the BFNE scale (Leary, 1983, Appendix K). This is a self-report scale assessing social anxiety fears, comprising 12 statements rated for likeness to the person from 1 ('not at all characteristic of me') to 5 ('extremely characteristic of me').

In students, Leary (1983) found a strong correlation (r = .96) with the full 30-item Fear of Negative Evaluation Scale (Watson & Friend, 1969), good test–retest reliability (r = .75) over four weeks, and excellent internal consistency (α =. 96) which has been confirmed in a clinical sample (α = .89 in Weeks et al., 2005). Weeks et al. (2005) also confirmed good convergent and divergent validity across clinical and non-clinical samples.

2.4.2.2 Brief Core Schema Scales (BCSS). Underlying schemas about the self and other people are key to cognitive models of paranoia, and could influence the attributions about social situations. The BCSS (Fowler et al., 2006; Appendix L) comprises 24 statements about positive and negatives views of the self and of others, and belief is rated from 0 ('do not believe at all') to 4 ('believe it totally'). This scale has good internal consistency for the self (α = .78 - .86) and other (α = .84 - .88) scales when tested with both psychotic and non-clinical participants.

2.4.2 Outcome Measures

There were two outcomes measured in the study: interpretation bias measured by the recognition task, and paranoid feelings measured by a self-report scale.

2.4.2.1 Recognition task. Attributional bias was measured using a modified recognition task (Appendix M) following procedures first used by Mathews and Mackintosh (2000), and often used in subsequent CBM-I studies (e.g., Murphy et al., 2007; Salemink et al., 2009). Salemink and van den Hout (2010b) found convergent validity for this method, as it successfully differentiated between those high and low in neuroticism, independent of mood induction. The recognition task is designed to be a post-test only measure, for comparing groups on interpretation bias.

The paper and pencil version was used here. The task is presented in two stages as a 'memory test.' In stage one, ten ambiguous social stories were presented in turn. Each story included a title and four lines of text, with the last word presented as a fragment, similar to the training scenarios, see Section 2.5.1. Participants were instructed to fill in the missing letters, and then turn the page to see the correct resolution, and answer a neutral yes/no comprehension question unrelated to the outcome of the scenario. The last word of each story left the outcome ambiguous and open to multiple interpretations. An example would be:

The bus stop

One evening, you decide to get the bus home.
When you arrive at the bus stop, you see a group of
young men hanging around. As you check the timetable,
one of them comes towards you with something in his
h a _ d
h a n d
Are you on your way out to work? Yes / No

In stage two, a separate booklet was given. Participants were cued with the title of each scenario, along with four possible descriptions to be rated for similarity to the original scenario. The scenarios were presented in the same order as in stage one. The instructions made it clear that several descriptions might be similar to the original story, although none would have the same wording exactly. These descriptions include a positive/benign (external situational) and a paranoid (external personal) target interpretation, which were possible interpretations of the scenario. This was the main test of the training. The two other descriptions were a positive/benign foil and a negative foil, which were impossible interpretations of the scenario, given the information provided in the story. All descriptions were rated as 1 ('very different'), 2 ('fairly different'), 3 ('fairly similar'), or 4 ('very similar'). The foils were used to assess whether a mere positive or negative *response* bias had been trained, or whether a specific *interpretation* bias had been trained (that is, to attribute potentially tricky scenarios to benign situational factors over malevolent intentions of others). The order of the four descriptions was random for each scenario. Example descriptions for the above scenario include:

1. The young man is holding out his bus pass. **(Positive/benign target)**
2. The young man threatens you with the knife. **(Paranoid target)**
3. The young man crosses the road to the opposite bus stop. **(Positive/benign foil)**
4. The young man shouts names at you. **(Negative foil)**

In addition, an interpretation bias score was calculated by subtracting the paranoid target ratings from the positive/benign target ratings, giving a score from -3

to +3, as used by Lang et al. (2009). A response bias was also calculated in a similar way with the foil ratings, by subtracting negative from positive foil ratings.

The scenarios and the interpretations were constructed and validated in a similar way to the CBM-I training materials, see below, Section 2.5.1. From an initial pool of 16 items, 10 were chosen on the basis of ratings of relevance to clinically paranoid experience by two professionals who work with young people with psychosis.

2.4.2.2 Paranoia and Depression Scale (PDS). The Paranoia and Depression Scale (PDS; Bodner & Mikulincer, 1998; Appendix N) was used to assess the current level of state paranoia before the CBM-I and after the paranoia induction. It was specifically designed for measuring paranoid and depressive ideation during experimental studies and therefore appropriate to measure change in this study.

The PDS comprises seven paranoid items and ten depression items which assess the current state only in the context of participating in an experimental study and performing a difficult task. Both paranoid and depressive items were presented to participants to reduce the likelihood that they would guess the purpose of the induction, but only the paranoid score was analysed. Participants rated the frequency with which they experienced these thoughts or feelings from 1 (‘not at all’) to 6 (‘very often’), giving a total paranoia score from 7 to 42. Ellett and Chadwick (2007) found the whole scale had high internal consistency ($\alpha = .84$).

2.4.3 Mood Ratings

Four 10cm VAS were used throughout the study to measure emotional experiences (Appendix O), similar to those used by Wilson et al. (2006) and Turner et al. (2011). They measured the extent to which participants endorsed feeling 'anxious', 'excited,' 'depressed' and 'suspicious.' The left-hand end was anchored with 'not at all,' and the right-hand end with 'extremely.' These emotions were selected to cover different emotions that the participants might experience during the procedure, and also to disguise the main focus of the study (paranoia) to prevent demand effects.

2.5 Materials

Materials used in the study included the CBM-I training intervention designed to target paranoid attributional style, and a stressor task designed to induce paranoid attributions, thoughts, and feelings.

2.5.1 CBM-I Training

One group completed a positive CBM-I training intervention, and one group completed a neutral CBM-I intervention. The positive CBM-I intervention was designed to train positive/benign external-situational bias, whilst the neutral intervention was not expected to change interpretations.

Both CBM-I tasks comprised a total of 100 training scenarios on a computer (using E-Prime 2.0 Professional). The scenarios were presented in ten blocks of ten

scenarios. Within each block, the scenarios were presented in a random order for each participant.

The scenarios included four lines of text, and the meaning was ambiguous until the final word. The final word was presented as a fragment with some letters missing, and resolved the scenario in a particular way depending upon the experimental condition (positive or neutral). The social scenarios were chosen to allow the intentions of other people to be interpreted in both a paranoid way (i.e., that another person wishes you ill) or as a circumstance of the situation (e.g., a coincidence, accident, or otherwise neutral explanation), until the resolution. An example is:

You are fast asleep in bed when you wake up suddenly.
You hear the garden gate creaking outside and
something being knocked onto the ground.
You sit up in bed and think to yourself it must be a
c - t (‘cat’ = **positive/benign resolution**)
p r - w l - r. (‘prowler’ = **paranoid resolution**)

In the positive/benign condition, the final word always resolved the scenario in a positive or benign way (i.e. with an external-situational resolution). In the neutral condition, half of the scenarios resolved in this way, and the other half were resolved in a paranoid way (i.e. with an external-personal resolution). The choice of the ending type for each scenario in the neutral condition was randomly selected. The equal contingency of positive and negative endings in the neutral condition was designed to have no training effects either way upon interpretation bias.

In the main instructions, participants were directed to form an image in their mind when reading each scenario. The aim of this was to maximise the effects of the training. The use of mental imagery has been shown to be important in enhancing the effects of CBM-I upon subsequent interpretations and mood by Holmes et al. (2006) who demonstrated that imagery was superior over verbal training alone.

Participants were required to press a key to advance to each new line until all four lines were displayed together. A further key press brought up the fragment on its own, and participants were then required to press a key when they knew the first missing letter of the fragment. They then pressed the key for the corresponding letter, and the full correct word was displayed.

Following this, a simple yes/no comprehension question was asked (e.g. "Do you feel scared about the noise?"), and feedback was given (correct or incorrect) to consolidate the appropriate interpretation of the scenario.

The scenarios included 12 used for previous research into social anxiety (which had been previously validated for a young sample with psychosis: Turner et al., 2011) and 25 used in a study involving physical threat (Hoppitt et al., 2010a), which were modified to ensure that they could resolve with both an external-situational and external-personal attribution. A further 91 scenarios were generated by the main author as variations on these, and inspired by service user accounts of clinical paranoia in the literature (e.g., Chadwick, 1995; Cockburn & Cockburn, 2011; Freeman & Freeman, 2008; Romme & Escher, 1993) and online ("Personal accounts of paranoia," 2011). The scenarios were chosen to be relevant to younger adults. To be consistent with current definitions of paranoia, the scenarios covered a number of themes relating to social, psychological, or physical harm from others (Freeman & Garety, 2000) including: being watched/followed,

threatened/intimidated, attacked/hurt/mugged, manipulated/conned, burgled/robbed, singled out, humiliated/laughed at, betrayed, lied to/cheated, discredited/fired, excluded/rejected, or driven crazy.

Of the 33 CBM-I studies reviewed, few detailed their material development process except to say that readability and relevance were evaluated. Therefore, after initial feedback regarding wording and readability, 128 scenarios were then rated for consistency with the attributes of clinically paranoid thinking from 0 (not at all consistent) to 10 (totally consistent) by two clinicians who work with young paranoid service users in an Early Intervention Service. The inter-rater reliability was calculated, and the intra-class correlation coefficient of $r = .20$ was significant (F (127) = 1.50, $p = .011$) indicating that the ratings were similar. Of these 128 items, 25 had a mean relevance rating less than 7/10 and as the weakest materials they were excluded. Twenty eight items had a mean relevance rating of 7/10 which was deemed to be acceptable by the raters and by experienced CBM-I researchers. These 28 items were individually inspected and three further items were eliminated (item 7 for being an unlikely scenario, item 38 for being very similar to item 36, and item 65 for not being clearly paranoid) to leave a total of 100 scenarios. See Appendix P for all training scenarios and ratings: those used in the study are highlighted.

2.4.2 Paranoia Induction

In a series of experiments with non-clinical students, Ellett and Chadwick (2007) found that priming of negative self-cognitions and high self-awareness during failure tasks led to increased paranoia. This was achieved by asking participants to write down ten negative characteristics about themselves, then showing a live video

of themself whilst doing an impossible task which included negative feedback about performance. This is in line with the cognitive model of paranoia by Bentall et al. (2001) described in the introduction, which included negative self-cognitions, high levels of self-awareness, stressful trigger experiences such as failure. This combination was explained by Ellett and Chadwick (2007) as inducing a self-standards discrepancy which then leads to self-serving paranoid attributions consistent with the Bentall and colleagues' 'delusion as defence' model of paranoia. Cognitive theories of emotions state that cognitive biases are only activated in response to situations which cause some kind of stress (e.g. Beck, 1976), and therefore CBM protocols often involve a stressor to activate cognitive biases in order to test whether training has influenced cognitive biases or not (e.g. Mackintosh et al., 2006; MacLeod, Rutherford, Campbell, Ebsworthy, & Holker, 2002; Wilson et al., 2006). Therefore, the procedure used by Ellet and Chadwick (2007) was used to induce paranoia in this non-clinical sample of students, in order to test whether there were differential effects of interpretation training upon the degree of paranoid feelings and attributions in the recognition task under stress.

At the start of this paranoia induction, a live digital display of the participant was shown on a computer monitor slightly to one side of the main computer, via a webcam placed in front of them, in order to further increase self-conscious processing. Consistent with Ellett and Chadwick (2007), this was not explained to the participant to allow them to construct their own ideas about the experimenter's intentions.

Participants were first required to generate ten negative personal characteristics in order to prime negative self-cognitions. Instructions on the main computer screen told participants to write down things they were unhappy about in

themselves, personal characteristics they wish they could improve upon, regrets about things they have or have not done, and critical comments people may have made of them.

Following this, participants then worked on an impossible task where attempts to answer were responded to with negative feedback. Ellett and Chadwick (2007) used insoluble geometric tasks in their experiments as a failure task, however, many CBM experiments use a difficult anagram task as a stressor, such as MacLeod et al. (2002), Peters et al. (2011), Salemink et al. (2007b), and Salemink et al. (2009). This anagram task was presented as an 'ability test' and being a familiar concept, participants might expect to do reasonably well, however, the negative feedback could then create a discrepancy between actual and expected performance which is hypothesised (Bentall et al., 2001) to lead to paranoid external-personal attributions (which were actually correct- that the experimenter is not giving you a fair chance to succeed). Participants had 10 minutes to attempt to solve as many anagrams as they could out of a possible 20. Anagrams were presented individually in lowercase in the centre of the computer screen for up to 30 seconds each. Up to twenty difficult anagrams were presented, ranging from 6 to 11 letters long (see Appendix Q). Participants were required to type their answer and then press the enter key, however, the feedback on screen was always negative so even when participants answered correctly they were shown: "you have failed to answer correctly." If 30 seconds elapsed without the participant making a response, they received the feedback: "you have failed to answer in time." If ten minutes elapsed for the whole task, the experimenter stopped the task.

2.6 Procedure

The procedure is detailed in Figure 2.1. Recruitment took place on campus at the UEA. The posters and information cards handed out contained the title of the study, the incentive, and an email address and mobile telephone number for more information. Those who expressed an interest were then emailed a copy of the information sheet along with details of inclusion criteria (no history of mental health problems, excellent English skills), and offered times to meet. Following initial agreement (by email or verbally) to take part, a meeting was arranged in a small testing room on the UEA campus. Participants were sent the three screening questionnaires (GAD-7, PHQ-9, GPTS) to fill in and bring to the session to save time, or complete with the researcher during the session.

The testing room was part of the psychology laboratory and contained a desk with a computer, two computer monitors side by side (one displaying instructions, the other turned off until the paranoia induction part), a keyboard with certain keys marked, a chair at the desk for the participant, and another chair at the back of the room for the experimenter. The camera was set back on the desk until the induction part. The researcher was seated slightly behind and to the side of the participant except during the training stage, when the researcher was sat outside the room to enable the participant to concentrate on the task, but was available if necessary.

At the session, the information sheet was re-read and discussed with the participant, and then the consent form was signed. Next, those volunteers who had not completed the screening measures beforehand completed these in the testing room. The PHQ-9, GAD-7 and GPTS were scored immediately by the experimenter so that those scoring over clinical cut-off (see the measures section)

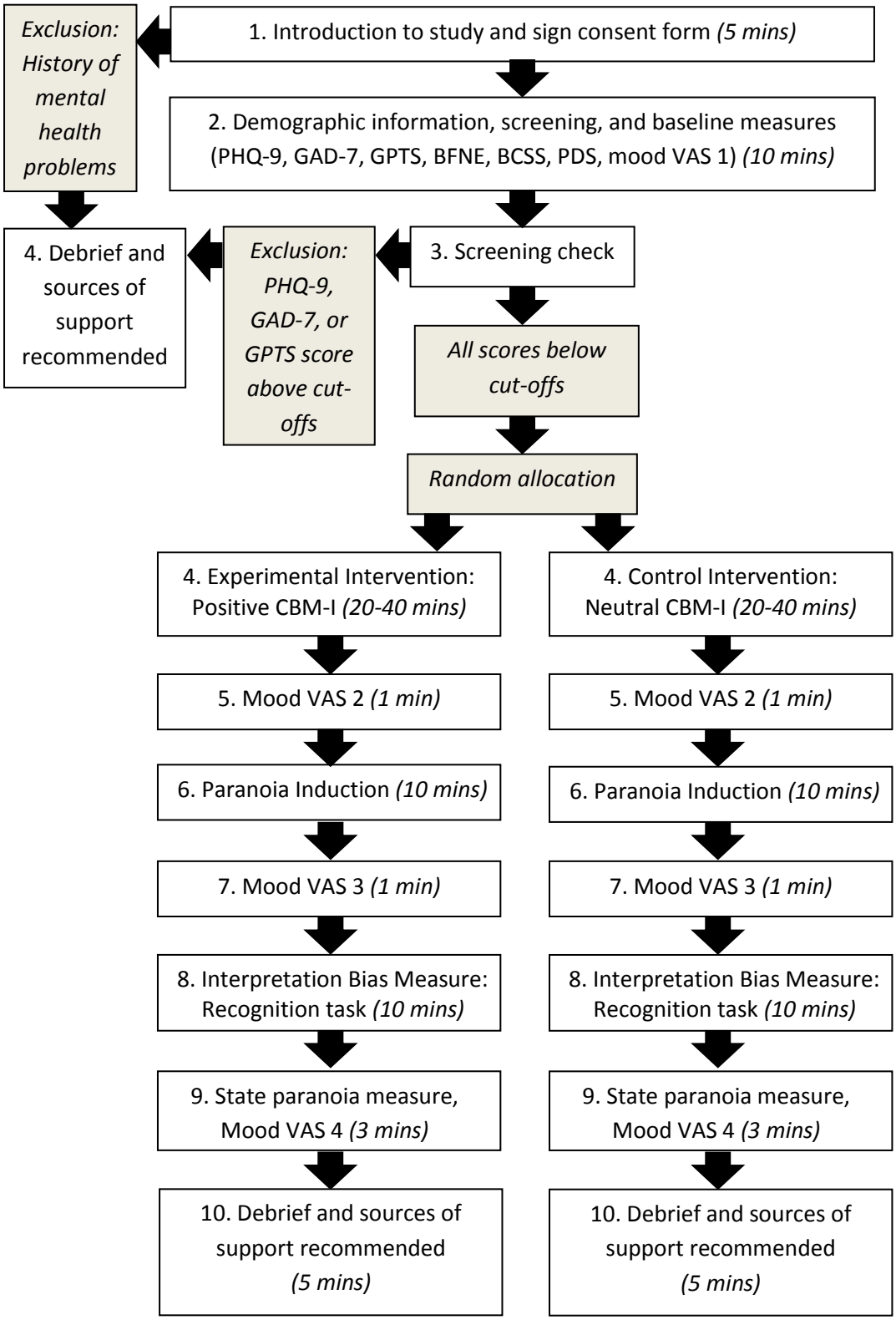


Figure 2.1. Procedure for the experimental (positive CBM-I) and control (neutral CBM-I) groups with approximate timings.

could be screened out to prevent potential distress. The experimenter offered to talk with any participant scoring above cut-off about these disorders, and recommended sources of information and support for these psychological issues. If their scores were below cut-off, demographic information on gender and age was then taken. Finally, the baseline questionnaires were completed (PDS, BFNE, BCSS, and Mood VAS 1).

Those eligible were then randomly allocated to either the positive training or control condition. The assignment envelope was opened at this stage by the researcher, a slip of paper inside indicated which condition the participant was assigned to. Those assigned to the positive condition were given an even number, and those in the control condition were given an odd number. The researcher opened the E-Prime 2 training file on the computer, entered the participant number, explained the instructions and stayed during two practice items, and then left the room to allow the participant to concentrate on the scenarios. The CBM-I training on the computer was followed by a mood check using the VAS on paper. The participant was prompted by the instruction to ask the researcher to come back in, who then set up the paranoia induction by turning on the second monitor showing the live camera image, giving the self-beliefs questionnaire, and starting the 'ability test' solving anagrams on the computer. Following the paranoia induction, a further VAS mood check was completed to assess the emotions elicited by this procedure and allow any excessive distress to be noted and checked by the researcher. The two monitors were then switched off.

Lastly, the outcome measures were then administered on paper: the recognition task (presented as a memory test in two parts) to test for bias, and the

state paranoia measure, the PDS. A final VAS mood check completed the experiment to check for any remaining emotional reactions.

The researcher then shared and explained the debriefing sheet, and participants were able to ask questions about the procedure and purpose of the study. Participants were asked if, in light of the debriefing information, they still gave consent for their data to be used, however no participants withdrew their consent at this stage. Participants were then thanked for their time. The whole experiment lasted approximately 65-90 minutes for the majority of participants, although a few took a little longer.

Following the study's completion, the prize draw was run by drawing numbers out of a bowl. All 43 participants who took part (including those who were excluded) were assigned consecutive numbers, and four were then selected randomly. Those four participants were then each emailed an invitation in December 2012 to meet the researcher to collect their £25 gift certificate and sign a receipt. Those who requested a summary of the study were emailed this in February 2013.

Chapter 3

Results

3.1 Overview of Results

The first section of the results chapter details the recruitment process, including how many people indicated interest in the study, how many volunteered to take part, how many passed screening and completed the study. The following section describes how the data were checked before further statistical comparisons between the groups were made. Section 3.4 describes the analyses conducted to ensure the groups were equivalent before the interventions, and hence the groups are compared on demographic variables, screening measure scores, and baseline measures. Following this, analysis of the two dependent variables are reported- interpretation biases and emotional reactions. Lastly, the relationship between interpretation bias and emotions are explored through correlational analyses.

3.2 Recruitment and Screening

A participant flow diagram (Figure 3.1) details how many people contacted the researcher for information, how many volunteered to take part, how many passed screening, and how many completed the study.

As detailed in section 2, participants were recruited through advertising on the UEA campus via posters, handing out flyers, an email bulletin, and through an online volunteering system (SONA). In total, 146 participants expressed an interest in the study by asking for more information. Most people (75) requested information by email, a further 53 asked for more information when approached with flyers, 13 sent a mobile text message to enquire about the study, and five booked a

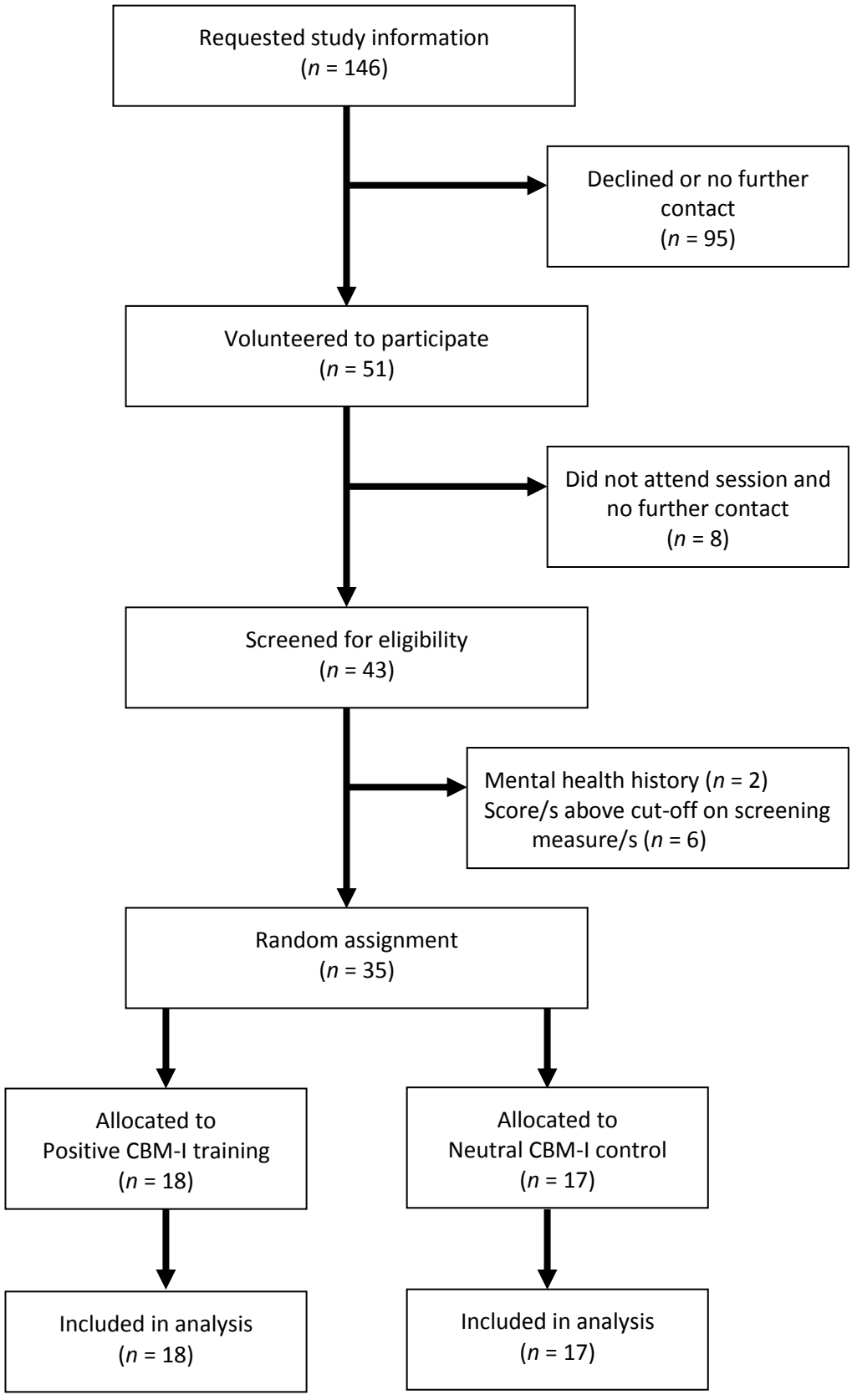


Figure 3.1. Participant flow diagram.

session through the online SONA system. About a third of those who asked for information then volunteered to take part and arranged to meet for a testing session. Of these 51 volunteers, eight did not attend the session and did not respond to further attempts to contact them, resulting in a total of 43 attending the testing session. At the screening stage, two participants revealed a recent history of mental health difficulties, and six people scored above cut-off on at least one screening measure (PHQ-9, GAD-7, GPTS). Therefore, these eight people were excluded at screening, leaving a total of 35 participants who took part in the full experiment.

The 35 participants were randomly assigned to the two training conditions; 18 to the positive CBM-I training condition, and 17 to the neutral control condition. All 35 participants completed the study. One participant from each group rated feeling 'suspicious' on the VAS over 8 out of 10 (one at time 3, one at times 2 and 3), whilst none rated anxiety or depression above this level at any time. In accordance with the ethical protocol to ensure participants were not distressed by the study, the researcher enquired whether these two participants were happy to continue, given their reporting high levels of negative affect. Both participants indicated they were. Following completion of the study, all participants consented to their data being used, so all 35 participants were included in the analysis.

3.3 Data Checks and Analysis Plan

All data were checked for completeness and accuracy. There were no missing data, and data entry appeared to be accurate on inspection of descriptive statistics for each group.

The data for each group were then examined to assess whether they met assumptions for parametric statistical analyses: a normal distribution and homogenous variance. Normal distribution was assessed through inspection of skewness and kurtosis values for each group, and calculation of z-scores (skewness or kurtosis value/standard error of skewness or kurtosis value). Z-scores above 1.96 are considered to indicate that the data is not normally distributed (Field, 2009), and the Kolmogorov-Smirnov test was computed to confirm this. Levene's test was used to assess homogeneity of variance between groups, a significant result (with alpha $\leq$ .05) indicating the groups had significantly different variances. Where assumptions of normal distribution and/or homogenous variance were violated, attempts were made to correct these issues through log transformations, or square root transformations (Field, 2009). If these transformations failed to correct the variance and distribution, then non-parametric tests were used to compare the groups.

Chi-squared tests or *t*-tests were used to compare groups on the demographic variables (age, gender), screening variables (depression, anxiety, trait paranoia) and baseline variables (social anxiety, core schemas, state paranoia, mood), and data that could not be transformed to meet parametric assumptions were analysed using Mann Whitney *U* tests. Mixed ANOVAs were used to assess the impact of training on outcome measures of interpretation bias (condition x target), state paranoia (condition x time), and other emotions (condition x time). The central limit theorem states that when $n > 30$, the ANOVA is robust against violations of parametric assumptions (Field, 2009), and so transformations were not made for these analyses. Finally, Pearson's correlations were calculated for interpretation bias and state paranoia, except when data could not be transformed to meet parametric assumptions, in which case, Spearman's rho was derived.

Where multiple contrasts were used, the statistical requirement for significance was subjected to a Bonferroni correction. The usual value of $p < .05$ was divided by the number of comparisons made, to reduce the risk of Type I errors (incorrectly rejecting the null hypothesis). This adjustment was used when contrasting changes in VAS ratings of emotions over the four time points in the study. Three contrasts were used for each emotion: time 1 vs. time 2 to test the impact of CBM-I training, time 2 vs. time 3 to test the impact of the paranoia induction, and time 1 vs. time 4 to assess whether emotions returned to baseline at the end of the experiment. Therefore, these comparisons were subjected to a significance criterion of $p < .017$

3.4 Participant Demographics and Randomisation Checks

3.4.1 Demographic and Screening Variables

Table 3.1 shows the means and standard deviations for the demographic variables of gender and age, and the screening variables of depression (PHQ-9 score), anxiety (GAD-7 score), and trait paranoia (GPTS scores).

A Chi-square test found no significant differences between groups regarding gender, $\chi^2 (1) = 0.24$, $p = .625$. Due to significant positive skew in age for both groups, and different variances, attempts were made to transform the data to correct the distribution. However, both a log transformation, and a square root transformation failed to produce a normal distribution or equal variances, so a non-parametric test was used to compare age. A Mann-Whitney *U* test confirmed that there was no significant difference in age, $U = 127.0$, $z = -0.87$, $p = .384$.

Table 3.1

Means (and standard deviations) for demographic and screening variables.

Measure	Positive Training Group (n = 18)		Neutral Control Group (n = 17)	
	n	(%)	*n*	(%)
Gender				
Male	7	(38.9)	8	(47.1)
Female	11	(61.1)	9	(52.9)
	M	*(SD)*	*M*	*(SD)*
Age	26.44	(11.18)	22.29	(7.70)
PHQ-9	5.39	(3.35)	4.18	(3.49)
GAD-7	4.50	(2.98)	3.65	(3.14)
GPTS				
Total	38.22	(5.48)	39.53	(4.96)
Social Reference	21.11	(4.70)	21.47	(4.08)
Persecution	17.11	(1.78)	18.18	(1.85)

Note. PHQ-9 = Patient Health Questionnaire-9; GAD-7 = Generalised Anxiety Disorder scale-7; GPTS = Green et al. Paranoid Thoughts Scale.

Due to significant skew and kurtosis within the control group for PHQ-9 and GAD-7 scores, these data were log-transformed to produce a normal distribution. A *t*-test found no significant difference between the groups in PHQ-9 scores, t (33) = 1.18, p = .247, or in GAD-7 scores, t (33) = 0.93, p = .362.

Means for the GPTS total score and social reference subscale were normally distributed and equal in variance and so *t*-test comparisons were used. There were no significant differences for trait paranoia in the total score on the GPTS (t (33) = -0.74, p = .466) or the social reference subscale (t (33) = -0.24, p = .811). The data for the persecution subscale were positively skewed in the positive training

group, and neither log transformation or square root transformation were able to produce a normal distribution in the positive group, so the non-parametric Mann-Whitney *U* test was used. This result approached significance ($U = 206.0$, $z = 1.83$, $p = .067$), with the neutral group having a slightly (but not significantly) elevated mean persecution score. Green et al. (2007) reported that their 353 non-clinical participants had a mean score on the GPTS persecution subscale of 22.1 ($SD = 9.2$), whilst their 50 clinical participants had a mean score of 55.4 ($SD = 15.7$). Therefore, the mean score of 18.18 here from a possible range of 16 to 80 is still very low even for a non-clinical group, and does not indicate a clinical level of paranoid ideation.

3.4.2 Baseline Variables

Table 3.2 shows the means and standard deviations for the other baseline variables of social anxiety (BFNE score), core schemas (BCSS scores), state paranoia (PDS score), and state mood and arousal (time 1 VAS scores).

As the BFNE scores had a normal distribution and homogenous variances, a *t*-test was used to compare the groups. This indicated no significant differences between the groups, $t(33) = -0.06$, $p = .953$. The mean scores on the self-positive schema scale of the BCSS met assumptions of parametric analysis, allowing *t*-tests to be used to compare the groups. This found no significant differences between the groups, $t(33) = 0.66$, $p = .514$. However, several parametric assumptions were violated by the other three schema scales. The means on the self-negative scale were positively skewed within both groups, the means on the other-negative scale were not equal in variance and were skewed within the positive group, and the means on the other-positive scale were negatively skewed in the control group. Both log and square root transformations failed to create normal distributions in the self-negative,

Table 3.2

Means (and standard deviations) of baseline variables.

Measure	Positive Training Group (n = 18)		Neutral Control Group (n = 17)	
	M	*(SD)*	*M*	*(SD)*
BFNE	30.83	(7.19)	31.00	(9.45)
BCSS				
Self-Negative	1.81	(2.04)	1.06	(1.44)
Self-Positive	13.06	(5.93)	11.88	(4.44)
Other-Negative	3.39	(4.75)	2.47	(2.24)
Other-Positive	13.31	(5.09)	13.00	(3.84)
PDS Paranoia	9.56	(4.23)	10.59	(3.92)
VAS 1				
Suspicious	1.08	(1.74)	1.49	(2.53)
Anxious	1.35	(1.16)	1.33	(1.60)
Depressed	1.00	(1.25)	0.80	(1.55)
Excited	4.28	(2.51)	3.74	(2.03)

Note. BFNE = Brief Fear of Negative Evaluation Scale; BCSS = Brief Core Schema Scales; PDS = Depression and Paranoia Scale; VAS 1 = visual analogue scale- Time 1.

other-negative scales, and other-positive scales, so Mann-Whitney *U* tests were used. There were no significant group differences on any of the BCSS scales: self-negative schema (U = 119.0, z = -1.18, p = .240), other-negative schema (U = 164.5, z = 0.39, p = .699), or other-positive schema (U = 151.5, z = -0.05, p = .960).

On the measures of emotional state, there were also no significant group differences. Firstly, the PDS state paranoia scores for both groups showed significant positive skew, however, both log and square root transformations were unable to produce a normal distribution. Therefore, a Mann-Whitney *U* test was used to compare the two groups, and confirmed no significant difference between

groups prior to intervention, $U = 188.0$, $z = 1.18$, $p = .237$. Secondly, the VAS mean scores for the negative emotions of feeling 'suspicious,' 'anxious,' or depressed,' showed positive skew and kurtosis in either the control group or both groups, and whilst the mean scores for feeling 'excited' did not show significant skew or kurtosis, they did produce a significant result on the Kolmogorov-Smirnov test suggesting a non-normal distribution. Log transformation produced a normal distribution for 'excited' scores, and a *t*-test found no significant group differences between the log-transformed means, $t\ (33) = 0.43$, $p = .668$. However, both log transformations and square root transformations did not produce normal distributions for the other VAS measures, therefore non-parametric Mann-Whitney *U* tests were employed to compare the groups. Mean scores for feeling 'suspicious' were not significantly different between groups, $U = 127.0$, $z = -0.86$, $p = .387$, and neither were scores for feeling 'anxious,' $U = 143.5$, $z = -0.31$, $p = .753$. A difference in mean scores for feeling 'depressed' approached significance, $U = 98.0$, $z = -1.83$, $p = .067$, with the positive group reporting slightly higher depressed mood than the neutral group. However, it must be noted that the score remained very low (1.00 out of 10.00), and no significant difference was found in the validated measure of depressed mood used in screening, the PHQ-9 (see above).

3.4.3 Summary of Randomisation Checks

In summary, group comparisons on all demographic, screening and baseline variables measured before the intervention revealed no significant differences between groups, and therefore random assignment appeared to have been successful in creating two equivalent groups. Ergo, any significant group differences measured

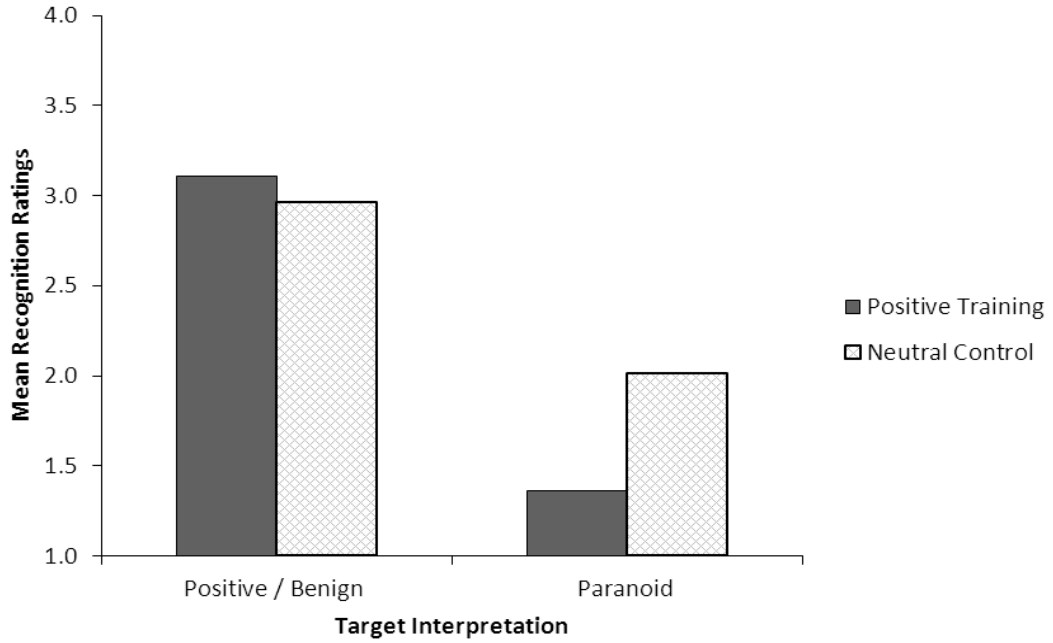
after the interventions were likely to be caused by the CBM-I rather than any pre-existing differences.

3.5 Outcome Measures

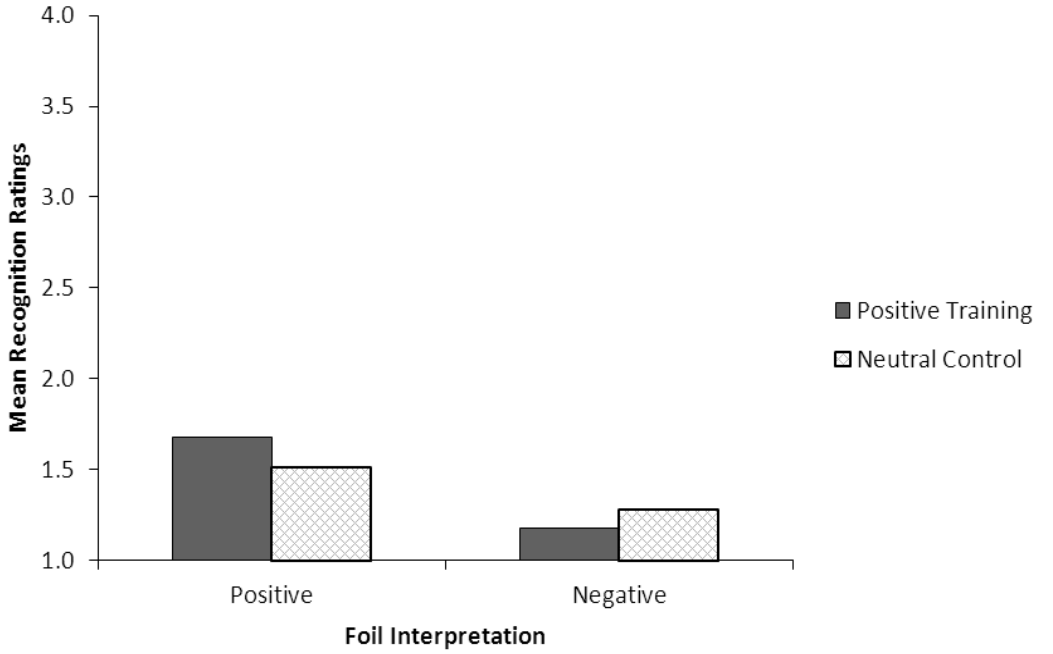
3.5.1 Hypothesis 1: Interpretation Bias

Hypothesis one stated that the positive CBM-I training would lead to a more positive interpretation bias with novel ambiguous situations compared to the neutral CBM-I, with greater endorsement for the positive or benign external-situational attributions over the paranoid external-personal attributions.

In order to test whether the CBM-I training had differential effects upon interpretation biases, data from the recognition task were analysed. The groups were compared in their recognition ratings of the targets (possible interpretations) and foils (impossible interpretations), which are displayed in Figure 3.2. The top part of this figure shows mean recognition ratings (scores could range from 1 to 4) for the targets which suggested either a benign/positive interpretation (using external-situational attributions), or a paranoid interpretation (using external-personal attributions) of ambiguous stories. The lower part of the figure shows recognition ratings for the foils which suggested a general positive or negative response bias as these were impossible interpretations of the ambiguous stories. An interpretation bias was calculated from the target ratings, and a response bias was calculated from the foil ratings, as detailed in section 2.4.2, and the means (from a possible range of -3 to + 3) are displayed in Figure 3.3.



(a) Recognition ratings for targets.



(b) Recognition ratings for foils.

Figure 3.2. Mean recognition ratings for (a) target interpretations and (b) foil interpretations on the recognition task for the positive training group (n = 18) and neutral control group (n =17).

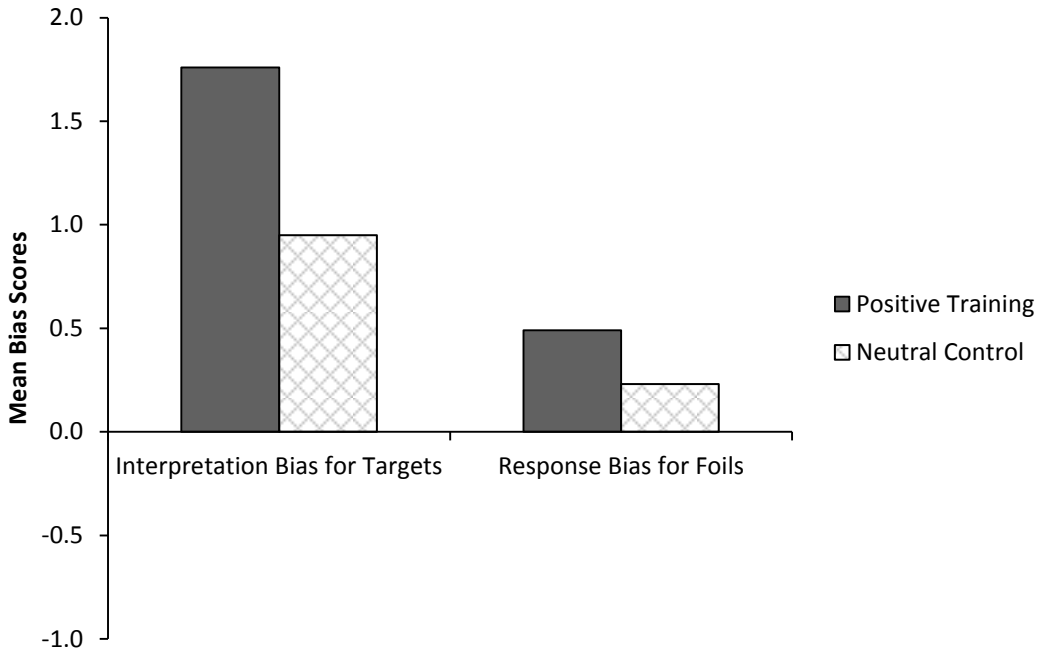


Figure 3.3. Mean interpretation bias for targets and response bias for foils for the positive training (n = 18) and control groups (n =17).

Figure 3.3 suggests that both groups displayed an overall positive bias for both targets and foils. A mixed ANOVA with training condition as the between-subjects factor (positive vs. neutral control), and target (possible target or impossible foil) as the within-subjects variable, revealed significant main effects of target, $F(1,33) = 73.20$, $p < .001$, $d = 2.98$, and of condition, $F(1,33) = 16.94$, $p < .001$, $d = 1.43$, as well as the crucial interaction of target X condition, $F(1,33) = 5.45$, $p = .026$, $d = 0.81$. This indicates that the recognition ratings for the targets were significantly greater than for the foils, and that those in the positive training condition had a significantly more positive bias overall than those in the neutral control condition. It also shows that the groups differed in how they rated targets and foils: the positive training group had a much larger difference in ratings for targets and foils, and there was a larger difference between groups in target than foil

ratings. Therefore, the significant difference between targets and foils suggests that the results are not merely the result of a general response bias, but attributional style has been modified.

Separate ratings for the positive/benign targets and negative paranoid targets are shown at the top of Figure 3.2, and these were analysed further to assess whether the more positive interpretation bias demonstrated in the positive training group was due to greater positive attributions, less paranoid attributions, or both. The mean ratings for paranoid targets were not normally distributed. Neither log or square-root transformations produced a normal distribution for either group so non-parametric tests were used for the paranoid targets. The mean recognition ratings for the positive/benign target interpretations were no different for the positive training group (M = 3.11, SD = 0.46) and the neutral control group (M = 2.96, SD = 0.43), t (33) = 1.01, p = .321. However, the neutral control group reported significantly higher ratings for the paranoid interpretations (M = 2.01, SD = 0.33) compared to the positive training group (M = 1.36, SD = 0.33), U = 280.5, z = 4.22, p < .001, with a large effect size, d = 1.97. This suggests that the increased positive interpretation bias found in the positive training group was due to less endorsement of paranoid interpretations, rather than greater endorsement of positive interpretations.

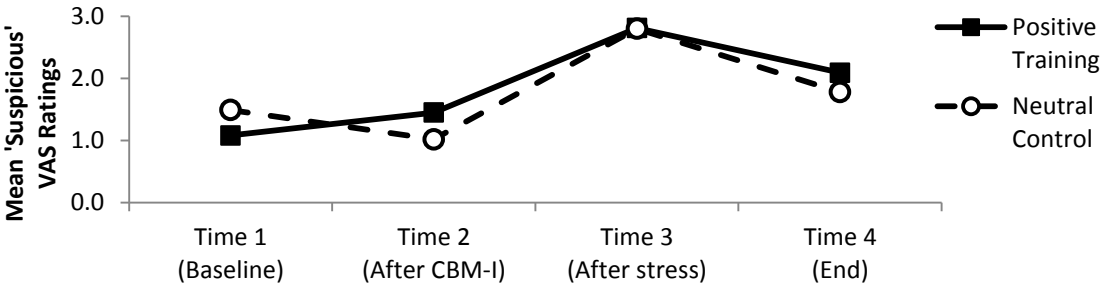
As a further check of the effects of the training, mood scores as measured by the VAS were examined to assess whether changes in mood might be able to account for the interpretation biases which were found. Table 3.3 and Figure 3.4 display all VAS mood ratings for the four time points in the study; time 1 (baseline: before CBM-I training), time 2 (after the CBM-I training, before paranoia induction), time 3 (after paranoia induction), and time 4 (end of the study). Inspection of Figure 3.4 suggests that the positive CBM-I training had positive emotional effects by

Table 3.3

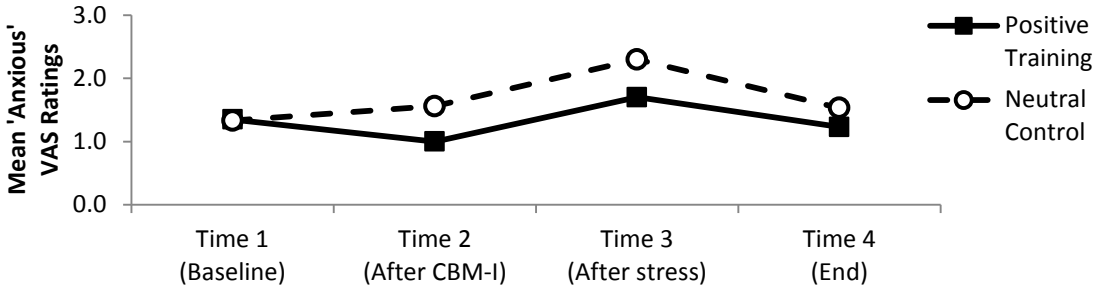
Means (and standard deviations) for state emotions ratings across four time-points for feeling paranoid, suspicious, anxious, depressed, and excited.

State emotion	Positive Training Group (n = 18)		Neutral Control Group (n = 17)	
	M	*(SD)*	*M*	*(SD)*
Time 1: baseline				
PDS Paranoia	9.56	(4.23)	10.59	(3.92)
VAS Suspicious	1.08	(1.74)	1.49	(2.53)
VAS Anxious	1.35	(1.16)	1.33	(1.60)
VAS Depressed	1.00	(1.25)	0.80	(1.55)
VAS Excited	4.28	(2.51)	3.74	(2.03)
Time 2: after CBM-I training				
VAS Suspicious	1.45	(1.88)	1.02	(2.04)
VAS Anxious	1.00	(0.98)	1.56	(1.97)
VAS Depressed	0.83	(1.17)	1.19	(1.75)
VAS Excited	2.63	(1.79)	2.54	(2.49)
Time 3: after stressful paranoia induction.				
PDS Paranoia	12.39	(3.68)	12.35	(4.15)
VAS Suspicious	2.81	(2.14)	2.80	(2.76)
VAS Anxious	1.70	(1.21)	2.30	(2.23)
VAS Depressed	1.70	(1.79)	1.40	(1.88)
VAS Excited	2.17	(1.84)	1.41	(1.55)
Time 4: end.				
VAS Suspicious	2.09	(2.16)	1.78	(2.55)
VAS Anxious	1.23	(1.23)	1.53	(1.65)
VAS Depressed	0.91	(1.10)	0.77	(1.23)
VAS Excited	2.18	(1.78)	2.15	(2.06)

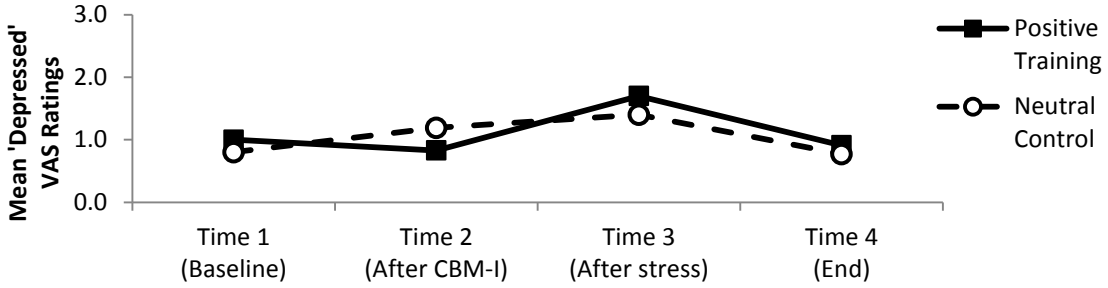
Note. PDS = Depression and Paranoia Scale; VAS = visual analogue scale.



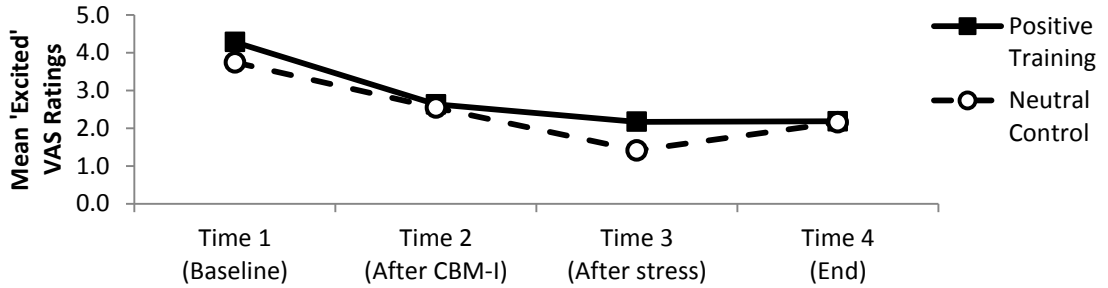
(a) Mean VAS ratings for feeling 'suspicious.'



(b) Mean VAS ratings for feeling 'anxious.'



(c) Mean VAS ratings for feeling 'depressed.'



(d) Mean VAS ratings for feeling 'excited.'

Figure 3.4. Mean VAS scores for feeling (a) suspicious, (b) anxious, (c), depressed and (d) excited, at Time 1 (baseline), Time 2 (after CBM-I), Time 3 (after stressor), and Time 4 (End) for the positive training (n = 18) and control (n = 17) groups.

decreasing anxiety and depression, and negative effects by increasing suspicion and decreasing excitement. In contrast, it appears that the neutral control condition increased anxiety and depression and decreased suspicion, although it had a similar effect of decreasing excitement.

These observations were tested using four (each emotion separately: suspiciousness, anxiety, depression, excitement) mixed ANOVAs with condition as the between-subjects variable (positive training vs. neutral control), time as a within-subjects variable (time 1 vs. time 2 vs. time 3 vs. time 4). There were main effects of time across the study upon suspiciousness, $F(2.09, 68.90) = 10.75$, $p < .001$, on anxiety, $F(3,99) = 3.64$, $p = .015$, on depression, $F(1.88, 62.09) = 3.81$, $p = .030$, and on excitement, $F(2.03, 67.07) = 22.11$, $p < .001$. However, there were no main effects of condition, nor interactions of time X condition on any emotion (all $F < 1$, $p > .4$).

To examine the effects of CBM-I training on emotions, times 1 and 2 were contrasted. To reduce Type I error, a Bonferroni corrected value of $p < .017$ was required for statistical significance. The only significant Bonferroni-corrected contrast was a large effect of time on excitement, $F(1,33) = 18.45$, $p < .001$, $d = 1.50$ ($F < 1$, $p > .4$ for all other emotions) showing that across the sample excitement reduced significantly after CBM-I training. However, Bonferroni-corrected contrasts of the interaction of time X condition were not significant for any emotion between time 1 and 2: feeling suspicious, $F(1,33) = 1.85$, $p = .183$, feeling anxious, $F(1,33) = 2.19$, $p = .149$, feeling depressed, $F(1,33) = 5.00$, $p = .032$, or feeling excited, $F(1,33) = 0.45$, $p = .506$. Therefore, whilst the CBM-I training led to reduced excitement across the whole sample, the training did not appear to have

immediate differential effects upon suspicion, arousal (excitement), depression, or anxiety for either group.

In summary, the scores on the recognition task indicated that positive CBM-I training led to a significantly greater positive interpretation bias than the neutral control condition, which is attributable to a significantly reduced endorsement of paranoid interpretations. There was a greater interpretation bias than a response bias, indicating that the training was targeting interpretations rather than a tendency to respond to valenced information in a similar way. The limited emotional changes (only a significant decrease in excitement) on the VAS directly after the training indicated that the groups did not differ in their reactions to the training in suspicion, anxiety, or depression. These findings therefore partially supported hypothesis one; that positive CBM-I training would lead to a positive interpretation bias, specifically less paranoid attributions, independent of mood changes. However, the lack of a difference for positive/benign target interpretations does not support the hypothesis.

3.5.2 Hypothesis 2 - Emotional Responses to Induction

Hypothesis two stated that participants in the positive CBM-I training group would report an attenuated emotional response to the stressor in comparison to those in the neutral control group. Figure 3.5 shows the mean paranoia scores on the PDS for both groups at baseline and after the paranoia induction. Inspection of Figure 3.5 and Table 3.3 suggests that both groups showed a similar increase in paranoia following the stressful paranoia induction procedure.

A 2-way mixed ANOVA with condition as the between-subjects factor (positive training vs. neutral control) and time as the within-subjects factor (baseline vs. after the induction) confirmed that there was a large significant main effect of

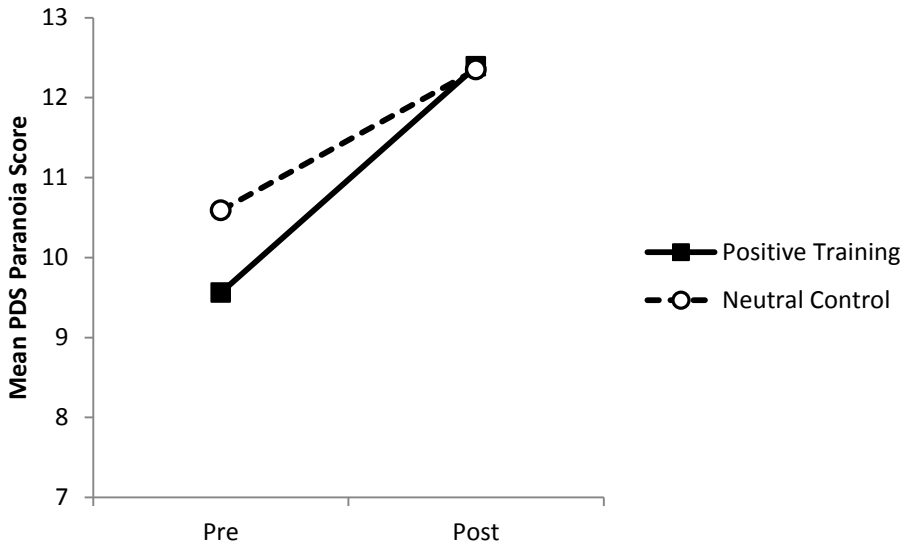


Figure 3.5. Mean paranoia scores on the PDS measured at baseline (pre) and after a paranoia induction (post) for the positive CBM-I training group (n = 18) and the neutral control group (n =17).

time, $F(1,33) = 14.13$, $p < .001$, $d = 1.31$. However, there was no main effect of condition, $F(1,33) = 0.17$, $p = .682$, nor a significant interaction of time X condition, $F(1,33) = 0.76$, $p = .389$. Therefore, whilst state paranoia significantly increased from baseline to after the induction, training condition did not have any effect upon state paranoia, and so hypothesis two is not supported.

Given this null result, the VAS results were also analysed for possible impacts of CBM-I training upon paranoid and other emotional reactions to the stressful induction. Inspection of Table 3.3 and Figure 3.4 suggests that emotional changes were similar in both groups, and that there was a larger increase in suspiciousness than anxiety or depression.

As reported above in section 3.5.1, mixed ANOVAs with condition as the between-subjects variable (positive training vs. neutral control), time as a within-

subjects variable (time 1 vs. time 2 vs. time 3 vs. time 4) showed there was a main effect of time upon VAS ratings of all four emotions. To examine the specific effects of the stressor on emotions, times 2 and 3 were contrasted. Bonferroni correction was applied on contrasts to reduce Type I error, so a $p < .017$ was required for statistical significance. Bonferroni-corrected contrasts revealed large significant effects of time upon feeling suspicious, $F(1,33) = 22.74$, $p < .001$, $d = 1.66$, and on feeling excited, $F(1,33) = 34.16$, $p < .001$, $d = 2.04$, whilst the contrast approached significance for feeling anxious, $F(1,33) = 6.14$, $p = .018$, $d = 0.86$, but was not significant for feeling depressed, $F(1,33) = 4.62$, $p = .039$, $d = 0.75$. However, none of the contrasts for interactions of time X condition were significant (all $F < 1$, $p > .3$). Therefore, whilst reports of suspiciousness increased and excitement decreased across the sample after the stressful paranoia induction, there were no differences in how the two groups reported their emotions.

To check for residual effects at the end of the study, contrasts of times 1 and 4 were also done. Inspection of Table 3.3 and Figure 3.4 suggests that most time 4 VAS ratings moved back toward baseline (time 1) ratings. Contrasts were subjected to a Bonferroni correction where $p < .017$ was required for statistical significance. This revealed a significant difference in feelings of excitement between times 1 and 4, $F(1,33) = 25.33$, $p < .001$, $d = 1.75$, but no effects on other emotions were significant: suspiciousness, $F(1,33) = 3.13$, $p = .086$; anxiety, $F(1,33) = 0.03$, $p = .865$; or depression, $F(1,33) = 0.06$, $p = .806$. All contrasts of interactions of time X condition were also non-significant (all $F < 1$, $p > .3$). This shows that whilst excitement was lower at the end of the study than at baseline, the other three negative emotions returned to baseline levels across both groups.

Therefore, the VAS results confirmed the findings from the PDS paranoia scores; that the type of CBM-I training received did not appear to affect emotional responses to the paranoia induction. So, whilst both groups reported a significant increase in state paranoia and suspiciousness and a decrease in excitement after the stressor, the type of CBM-I training received had no effect on any measures of emotional reactions to stress. Furthermore, the effects of the experimental inductions dissipated by the end of the study, except for the decrease in excitement.

3.5.3 Hypothesis 3- Relationship between Interpretation Bias and Paranoia

Whilst group comparisons found no relationship between type of CBM-I training and state paranoia, it remained possible that paranoia might be related to interpretation bias. Hypothesis three predicted that a more positive interpretation bias would be negatively correlated with state paranoia. Therefore, correlational analyses were performed with interpretation bias, and state paranoia as measured by the PDS paranoia scores and VAS suspiciousness ratings after the induction (time 3). Due to the non-normal distributions of both the PDS and VAS scores, the non-parametric Spearman's rho was calculated. There were no significant correlations between interpretation bias and PDS paranoia score, r_s = -.21, p = .109 (one-tailed), or time 3 VAS suspiciousness, r_s = -.01, p = .383 (one-tailed). Therefore, hypothesis three was not supported as there appeared to be no relationship between interpretation bias and either measure of state paranoia.

Whilst this hypothesis originally related to state paranoia, it was decided to test if there was a relationship between trait paranoia at baseline, and later interpretation bias and state paranoia across the sample. Yiend et al. (2005) found that positive CBM-I training had the strongest effects on state anxiety in participants

with higher pre-existing trait anxiety, and similarly, Salemink and Wiers (2011) found that positive CBM-I had particularly strong effects on interpretive bias in those who had a pre-existing negative interpretative bias. Therefore, it is possible that underlying trait variables may affect how people respond to positive CBM-I training. Consequently, the possible influence of trait paranoia (which covers recent paranoid interpretations and feelings) was explored in an attempt to offer some insight into the inconsistent and limited findings presented so far. There was a significant correlation between the baseline GPTS Total (trait paranoia) and later interpretation bias, r = -.34, p = .022 (one-tailed). There were also significant correlations between baseline GPTS Total scores and later PDS state paranoia, r_s = .35, p = .019 (one-tailed), and VAS suspiciousness, r_s = .49, p = .002 (one-tailed). Therefore, it appears that whilst there were no significant differences in trait paranoia between groups before the CBM-I intervention (see section 3.4.1), higher existing levels of trait paranoia were correlated with less positive interpretation biases and increased state paranoia following the stressful paranoia induction.

3.6 Summary of Results

From an initial pool of 146 people who were interested in participating in the study, 51 agreed to take part, however, only 43 attended their testing session. At the screening stage, eight people were excluded for not meeting inclusion criteria. Therefore, 35 people were randomly assigned to the two conditions: 18 to the positive CBM-I training, and 17 to the neutral control condition. All 35 participants completed the study and were included in analyses of the resulting data.

The groups were first compared on all demographic, screening, and other baseline variables to check that the groups were not significantly different before the intervention. There were no significant differences between the groups on the demographic variables of age or gender, on the screening measures of depression, anxiety, or trait paranoia; nor on the baseline measures of social anxiety, core schemas, state paranoia, or other emotions. It appeared, therefore, that random assignment had successfully created two independent groups which were equivalent on these variables before the intervention.

Hypothesis one suggested that the positive CBM-I training would lead to a more positive interpretation bias compared to the neutral CBM-I, with greater endorsement for the positive or benign interpretations (external-situational attributions) over paranoid interpretations (external-personal attributions). Hypothesis one was partially supported as those participants in the positive CBM-I training group displayed a more positive interpretation bias than the neutral control group. Those in the positive CBM-I training group were also significantly less likely to endorse the negative paranoid interpretations than those in the neutral control group. The findings for ratings of positive interpretations did not support the hypothesis, however, as there was no difference between groups in ratings for positive interpretations.

This effect did not appear to be part of a generalised positive bias as the ratings for foil interpretations were significantly lower than for the target interpretations. In addition, the lack of difference between the groups in terms of feeling suspicious, anxious, depressed, or excited immediately after the CBM-I intervention ruled out these emotions as influences on the interpretations.

Hypothesis two suggested that the type of CBM-I training received would influence emotional reactions to a stressful paranoia induction procedure in different ways. It was predicted that those in the positive training group would report a less negative response compared to the neutral group. Both groups reported a significant increase in negative emotions (state paranoia on the PDS, suspiciousness on the VAS), and a decrease in positive emotion (excitement on the VAS) after the stressor. However, hypothesis two was not supported, as the participants who received positive CBM-I training reported emotional reactions which were no different to the control group. Therefore, it seems that the modified interpretation bias did not influence emotional reactions to the stressor.

Finally, hypothesis three predicted that a more positive interpretation bias would be associated with lower levels of paranoia after the paranoia induction. This was not supported as the correlations of interpretation bias with state paranoia (as measured on the PDS or suspicious item on the VAS) were not significant. However, pre-existing trait paranoia was found to be negatively correlated with interpretation bias; those who had higher trait paranoia scores (GPTS Total) had a less positive interpretation bias. In addition, higher trait paranoia was also related to higher state paranoia after the stressor.

Chapter 4

Discussion

4.1 Overview of Discussion

This final chapter begins by summarising the results found in the study for each of the experimental hypotheses. These findings are compared to those in the published literature, and various possible influences on the results are discussed. Following this, a critique of the strengths and weakness of the methodology is presented. A brief consideration is then given to how the results may relate to cognitive assumptions and theories of paranoia, and clinical practice in working with paranoia. In light of these considerations, some ideas for possible future research are put forward. Finally, conclusions about the study draw the thesis to a close.

4.2 Summary of Findings

The cognitive model of paranoia by Bentall et al. (1991, 2001) suggested that a number of factors may contribute to an external-personal attribution bias for negative events which can lead to the development of paranoid beliefs when an individual is put under stress. In reviewing the paradigm of CBM, MacLeod (2012) concluded that it is possible to train a positive or negative interpretation bias in non-clinical participants using CBM-I, which leads to interpretation of new material in line with the valence of the training. This current study, therefore, adapted the CBM-I training protocol of Mathews and Mackintosh (2000) to test whether it is possible to train a positive attribution bias (making benign external-situational attributions over paranoid external-personal attributions) using CBM-I. Furthermore, this study tested whether positive CBM-I training could protect an

individual from feeling paranoid when attempting to do a task designed to provoke stressful paranoid thoughts and feelings.

4.2.1 Hypothesis 1 -CBM-I Training Effects upon Interpretations

Hypothesis one stated that the positive CBM-I training would lead to a more positive interpretation bias (greater endorsement of benign/positive external-situational attributions over paranoid external-personal attributions) compared to the neutral CBM-I. This hypothesis was partially supported with results from the recognition task which showed that CBM-I training had a large effect upon overall interpretation bias (d = 0.81), and on ratings of paranoid target interpretations particularly (d = 1.97). The participants in the positive CBM-I training group displayed a more positive interpretation bias overall than those in the neutral control group. Those in the positive training group endorsed significantly less paranoid external-personal attributions than participants in the neutral control group. However, there was no difference between groups in the endorsement of positive/benign target interpretations. There was only a decrease in excitement (and no significant increases in negative emotions) immediately after the training, which did not differ between groups, and this implies that the cognitive effects of the training were not caused through emotion.

The finding here of training a positive interpretation bias using repeated presentation of social stories replicates previous findings by a number of researchers, such as Mathews and Mackintosh (2000), Yiend et al. (2005), Salemink et al. (2007b), and Salemink and van den Hout (2010). This finding is consistent with the aim of the new paranoid attribution training materials to modify interpretation bias as intended. The studies mentioned above all compared positive with negative CBM-I

training in non-clinical samples as a test of the effect of training cognitive biases, and so the finding here of a significantly different interpretation bias with a neutral CBM-I condition is all the more interesting. Few researchers have used a neutral placebo CBM-I condition with non-clinical participants, although Salemink and Wiers (2011) did compare a positive and a placebo CBM-I condition in non-clinical adolescents, and found that the positive training had a medium effect in increasing positive interpretations, and a large effect in decreasing negative interpretations. Therefore, our findings, along with those of Salemink and Wiers, tentatively indicate that it may not be necessary to compare negative training to positive training to produce significant effects upon interpretation bias.

The lack of a difference in ratings of positive targets is perhaps unsurprising, as the sample was selected to have low levels of existing negative cognitive bias by excluding those with a history of mental health problems, or high levels of anxiety, depression, or trait paranoia. People from a non-clinical population tend to naturally show a positive interpretive bias (e.g., Calvo, Eyesenck, & Estevez, 1994; Experiment 4, Grey & Mathews, 2000; Hirsch & Mathews, 2000; Experiment 3, Mathews & Mackintosh, 2000), and the placebo control condition used in the present study was not expected to have a significant impact on existing interpretations (the training presented positive/benign and paranoid resolutions with equal frequency). Therefore, we would expect the existing interpretation bias to be quite positive across the sample, making it a challenge to train even greater endorsements of positive views (Hoppitt et al., 2010b). Salemink and Wiers (2011) found that positive CBM-I training was only effective in changing interpretive bias in those who had an existing negative interpretation bias before training. Therefore, it would

be useful to measure interpretation bias before as well as after CBM so that changes in bias can be calculated, or the pre-existing bias used in mediation analyses.

Finally, the lack of a difference with positive interpretations fits with the findings of Mathews and Mackintosh (2000) in their third experiment, who concluded that positive and negative CBM-I decreased non-congruent interpretations, rather than increased congruent interpretations. Similarly, an investigation by Heeren, Lievens, and Phillipott (2011) using CBM-A concluded that whilst training away from threat reduced anxiety, training toward non-threat did not have any beneficial effects. Taken together, it could be that the positive CBM training in this study reduced non-congruent paranoid interpretations, but did not significantly increase positive interpretations among the healthy and naturally positive non-clinical participants.

Grey and Mathews (2000) and Hoppitt et al. (2010b) suggested that a non-threat category for training materials which contains emotionally benign and positive meanings (such as that used here) is less cohesive than a negative category, and hence may be harder to train in a generalised way, weakening training effects. However, Murphy et al. (2007) did not find any difference in the effects of positive or non-negative CBM-I training on recognition ratings. Therefore, it remains to be seen if mixing positive and benign outcomes is important in training interpretation biases, but it might be a factor in the lack of training effects upon the positive interpretations observed here.

The CBM-I training procedure itself did not have any significant emotional effects as measured by the VAS, except for a decrease in excitement across the whole sample. This decrease in excitement might be expected after repeating 100 trials of any task, for example, feedback reported by Beard, Weisberg, and Primack

(2012) suggested that participants found the repetition of CBM tasks boring. The lack of other emotional effects is in line with many other CBM-I studies which failed to detect emotional changes immediately after training, despite interpretation biases being modified as expected (e.g., Hertel et al., 2003; Experiment 1- Mackintosh et al., 2006; Salemink & Wiers, 2011; Yiend et al., 2005, 2011). The lack of a difference in emotions after the two types of CBM-I has been suggested to be an important indicator that CBM is not having its effect on interpretations by altering mood, but is in fact leading to an 'implicit production rule' when later faced with ambiguous stimuli (Hoppitt et al., 2010b). Analyses by Standage et al. (2010) showed that whilst mood can be directly affected by CBM-I, that mood change did not explain later interpretation bias. Salemink and van den Hout (2010a) reported that interpretation biases trained by CBM-I were not affected by subsequent mood inductions. Finally, in mediation analyses, Salemink et al. (2010b) reported that CBM-I had a direct effect on interpretation bias, which in turn affected trait (not state) anxiety. Therefore, in the few studies which have assessed the mechanisms of change in CBM-I, it appears that the training mainly affects emotions through the interpretation bias rather than the other way around. In summary, the current findings converge with other studies that the CBM-I training alone did not impact on key negative emotions of anxiety, depression, or suspicion. Therefore, this is consistent with the proposal that interpretation biases were directly trained by the procedure rather than via the effects of mood.

In conclusion, the analysis suggests that the positive CBM-I had the expected effect in reducing paranoid interpretations relative to a control condition, although there were no differences in positive interpretations. This did not appear to be due to mood changes during training, as none of significance were noted. The latter null

result might have been due to a natural positive interpretation bias within the non-clinical sample, and the use of a neutral comparison to the positive training limiting the size of group differences, which could be harder to detect in this small sample size which was underpowered. Alternatively, positive training may work by reducing negative bias rather than increasing positive bias, or be more difficult to accomplish when positive interpretations are mixed with benign or non-negative meanings.

4.2.2 Hypothesis 2 - Training Effects upon Emotional Responses to a Stressor

Hypothesis two predicted that the participants in the positive CBM-I training group would report an attenuated emotional response after the stressor compared to those in the control group. After the stressful paranoia induction, both groups reported a large and significant increase in state paranoia (d = 1.31) and feeling suspicious (d = 1.66), and a further decrease in excitement (d = 2.04). This suggests that the stressor was effective in its intended aim to induce paranoia in both groups. However, there was no significant difference in emotional reactions between the two groups, and so these findings did not support hypothesis two.

At first, this finding appears at odds with the differential impact of CBM-I training upon interpretation bias, however, several CBM-I studies have also found interpretation biases can be modified without corresponding changes to emotions. For example, when comparing positive/benign and neutral CBM-I training in analogue samples, Clerkin and Teachman (2011), Lester et al. (2011), Murphy et al. (2007), Salemink et al. (2009), and Steinman and Teachman (2010) also found no effects upon emotional reactions to a stressor, despite training leading to differences in interpretation bias.

Some researchers have considered the conditions necessary for interpretation bias to translate into emotional changes. For example, Hoppitt et al. (2010a, 2010b) found that changes in emotions were only present with active rather than passive CBM-I training. The importance of imagery during training in increasing emotional effects was demonstrated by Holmes and colleagues (Holmes et al., 2006, 2009). Furthermore, many studies use an emotional stressor to assess the impact of a trained cognitive bias on emotional reactivity to events (such as Mackintosh et al., 2006; MacLeod et al., 2002; Tran et al., 2011; Wilson et al., 2006). This draws on the central cognitive tenet that negative emotions stem from negative interpretations of events (Beck et al., 1979).

In light of these findings, the current study used the more active version of the CBM-I training, the instructions included directions to imagine themselves in the training and recognition scenarios, and a stressor was used to activate cognitive processing biases and emotional responses. Therefore, the lack of emotional differences between groups seems unlikely to be due to these factors. However, this study used visual displays of the stories whereas auditory presentations were utilised by Holmes and colleagues (Holmes & Mathews, 2005; Holmes et al., 2006, 2009). Unfortunately, those studies did not compare auditory with visual presentation and so it is unclear whether auditory presentation is necessary for facilitating imagery and subsequent cognitive and emotional effects. It, therefore, remains possible that the lack of emotional differences between conditions was due to a limited use of imagery, but this would need testing in its own right. Holmes and colleagues included a rating on the use of imagery in their studies, and this could have been a useful addition to check adherence to the methodology.

Another possible issue may be the capacity of the paranoid induction to provoke the level of stress which might activate cognitive biases and emotional reactions. The stressor was based on procedures which have been successfully used by Bodner and Mikulincer (1998) and Ellett and Chadwick (2007) to induce paranoia in non-clinical populations. The conditions of the stressor were chosen on the basis of the cognitive theory of paranoia by Bentall et al. (1991, 2001) which emphasised the importance of an event activating beliefs about the self, anomalous experiences which require explanation (i.e., having no success on a familiar task), anxiety, and hence a range of cognitive biases (such as interpretation or attribution biases).

However, Bodner and Mikulincer (1998), Ellett and Chadwick (2007), and the current study appear to have found different effects of the stressor upon paranoia. The mean total paranoia ratings on the PDS found in the current study were lower in both groups (positive: 12.39; control: 12.35) than those found by Ellett and Chadwick (2007) in Experiment 3 (20.8) which had similar conditions to the paranoia induction used here. Bodner and Mikulincer (1998) reported their results differently in terms of mean score per item, however, in a similar condition their participants reported lower paranoia (1.30) than we found in the current study (positive: 1.77; control: 1.76). Depending on which study we compare our results to, it may be hypothesised that either our stressor was too weak to provoke large differences in state paranoia, or that it was too strong in producing state paranoia that overrode cognitive attributional effects of the training. Given the large and significant increases in state paranoia, as measured by both the PDS and the VAS, the latter may be more likely. The group difference in external-personal attribution bias was measured after the VAS and before the PDS, and so it seems unlikely that state paranoia changed over this short time as the VAS and PDS both showed an

increase in suspicion across the sample. This either suggests that the external-personal attribution bias may not be necessary for paranoia to occur under stress, or that the trained bias was not of a sufficient nature/degree to affect personal paranoid responses to a potent stressor. The hypothetical nature of the recognition task may have limited participants' personal emotional engagement with that material, whereas the stressor and state measures were more personal, and thus may have facilitated a stronger reaction. Personal relevance has been noted as an important factor sometimes lacking in questionnaire measures of attributions (Freeman, 2007).

In addition, the conditions to produce paranoia varied between these studies. Bodner and Mikulincer (1998) found that focus on the experimenter (rather than the self) produced higher paranoia than in our study, although Ellett and Chadwick (2007) found the opposite. Given these mixed findings, the current study deviated from these two studies by combining self-awareness and other-to-self awareness. While the camera showed a live image of the participant on the monitor, the experimenter remained in the room (sat behind the participant). However, in the previous two studies, the experimenter was absent during the self-focus conditions using a camera. Paranoia is an interpersonal process, therefore the presence of the experimenter was deemed necessary by providing someone to make external-personal attributions about. This meant that feeling watched was a valid thought, as was the attribution of being tricked by the anagram task, because this was also true as it was impossible to get positive feedback. It is possible that some people may have realised this, in which case the situation was no longer ambiguous, the search for meaning was complete, the self-image discrepancy was resolved ('it's not me after all') and perhaps the negative emotions dissipated. Without asking participants

if they guessed the nature of the anagram task, however, this remains only a hypothesis.

Next, it is possible that the measures for assessing emotional change were not sufficiently sensitive. The PDS was designed for use in simple experimental studies as other paranoia measures (such as the PS) were inadequate due to assessing trait rather than state paranoia (Bodner & Mikulincer, 1998). However, in Experiment 1 by Ellett and Chadwick (2007), the PDS failed to confirm a difference in paranoia which had been found using the PS, so this may indicate that the PDS is less sensitive or less reliable. However, the large and significant change on the PDS reported here does not appear to lend support to this as an explanation for lack of differential group effects, but it must be borne in mind that the PDS has not been commonly used and so this remains a possibility.

In addition, the VAS used here only assessed four feelings, and the use of the word 'suspicious' could have been interpreted in many ways. The precise emotional response to paranoid ideas could vary between individuals, as suggested by the distinction Trower and Chadwick (1995) made between those who thought persecution was deserved and felt depressed and/or anxious ('bad me'), and those who thought it was undeserved and felt angry and/or anxious ('poor me'). The Bentall et al. model (1991, 2001) suggested that paranoid attributions serve a function of attempting (not always successfully) to alleviate negative emotions by transferring negative cognitions about the self onto other people, thus preserving the self-concept as positive, and maintaining self-esteem. The heterogeneity in emotional responses in people who make paranoid attributions may therefore explain why clear group distinctions were not found in this study. Larger studies which

could assess a range of emotions (such as fear, anger, sadness) may be necessary to detect sub-groups through factor analysis.

An alternative hypothesis could be that measures of state emotions may not be vulnerable to the influence of biased interpretations. Salemink et al. (2010b) re-analysed data from their (2007b) study using meditational path analysis and found that CBM-I appeared to produce changes in trait anxiety through the modification of interpretive bias, although state anxiety changes were caused by exposure to valenced material. This was hypothesised to be due to the requirement to use more elaborative processes when considering trait anxiety over time (compared to simple responses about the present state), which might allow cognitive biases to come 'on line.' The authors concluded that state anxiety is "not a valid indicator of a causal relationship" (p. 65) with interpretive bias. This could have implications for the current study. For example, the interpretative bias which was trained may not have influenced emotional state as the VAS and PDS did not require the elaborative processing which Salemink et al. (2010b) hypothesised to be important for allowing biases to influence emotion. A measure of trait anxiety or paranoia may have been useful after the intervention to see if there were differences in how people reflected back on their emotional experiences.

In summary, whilst it appears that the CBM-I for paranoid attributions can train a less negative interpretation bias, and the paranoia induction successfully increased state paranoia, the type of CBM-I training received did not affect the degree of emotional reactivity. This may be due to a limited use of imagery, the alteration to the stressor (combining other-to-self awareness and self-awareness) overly weakening or strengthening the effect, the range of emotional reactions possible when making paranoid attributions obscuring group effects, or the measures

of state emotion either being insensitive or not allowing enough elaboration for cognitive bias to come online compared to trait measures.

4.2.3 Hypothesis 3- Relationship between Interpretation Bias and State Paranoia

Hypothesis three predicted that a positive (external-situational) attribution bias would be correlated with lower state paranoia scores across the whole sample. This was important to assess whether the degree of bias co-varied with paranoia, which might be expected according to the phenomenological continuum hypothesis of the variance of paranoia across non-clinical populations (Costello, 1994; Strauss, 1969; Freeman, Garety, Bebbington, Smith, et al., 2005). The data were not able to support this hypothesis, as there was no significant relationship between interpretation bias and either measure of state paranoia after the paranoia induction. Given the lack of group effects relating to emotional reactions, and the limited effect of the CBM-I on interpretations (differences only being apparent for negative paranoid interpretations, and not positive ones), this is not unexpected.

However, further to the limited findings for hypotheses one and two, it also calls into question the direct relationship between an external-personal attribution bias and paranoid interpretations which is central in the Bentall model of paranoia (Bentall et al., 1991, 2001). The fact that manipulation of negative external-personal attributions had little effect upon state paranoia suggests that other factors may be necessary for someone to experience paranoid thoughts and feelings. The threat-anticipatory model of Freeman and colleagues (Freeman, 2007; Freeman & Garety, 2004; Freeman et al., 2002) contains a number of other variables which could have protected against or facilitated paranoia. These include the influence of on-going

internal experiences such as anomalous sensations or emotions (anxiety, anger, depression), schemata (core beliefs, rules, and assumptions), cognitive processing biases (attention to threat, jumping to conclusions, worry or rumination, catastrophising, memory bias), and safety behaviours (avoidance, isolation, hostility). The paranoid induction tapped into several of these (negative core beliefs, stress, an anomalous experience of being wrong), however, exploration of all of these factors was beyond the scope of the current study.

Possible reasons for the lack of a correlation between interpretation bias and state paranoia (insufficient training of the interpretation bias, poor measurement of either construct, strong/weak effects of the induction, differences in personal relevance of the assessments, or no relation between interpretation bias and state paranoia) are discussed above in relation to hypothesis two, but it is also important to note that few studies have tested relationships between stressful situations, attributions, and paranoia- none of which have used state measures of paranoia. Whilst Bentall and Kaney (2005) and Moritz, Burnette, et al. (2011) found that paranoia was associated with changes in attributions (albeit in opposite directions: reduced SSB and increased SSB respectively) in paranoid patients under stress, Lincoln, Peter, et al. (2010) found no changes in attributions under stress despite increases in paranoia (and a trend toward lower JTC) in a non-clinical sample. The null findings from the present non-clinical study are consistent with the proposal by Lincoln, Peter, et al. (2010) that in healthy samples, stress may decrease JTC thus leading to more cautious decisions which may counteract attruibutional biases. In contrast, it was suggested that people with specific vulnerabilities, or under particular types of stress, may JTC which then leads to the attribution bias and acute

paranoid state. They suggested this would lead to a curvilinear relationship between attribution bias and delusion proneness, which might be missed in linear analyses.

4.2.4 Relationship between Interpretation Bias and Trait Paranoia

Further exploratory analyses discovered that across the sample, pre-existing levels of trait paranoia were negatively correlated with later measurement of interpretation bias and state paranoia after undergoing the paranoia induction. Those participants with a higher level of trait paranoia showed a less positive interpretation bias and a higher level of state paranoia under stress. This finding is in line with just a few studies which have linked trait paranoia to negative interpretation biases in non-clinical samples, such as Kinderman and Bentall (1996a), Combs, Penn, Chadwick, et al. (2007), and Fornells-Ambrojo and Garety (2009a).

This could be an interesting finding, as the etiological basis of many cognitive biases in paranoia remains untested (Bentall et al., 2007), especially in non-clinical samples, and there has been a great deal of debate over whether attribution biases constitute a trait vulnerability for paranoia or are simply part of the paranoid state. The literature review in section 1.3.6.3 found the current evidence base very mixed on this matter (i.e., when comparing acutely paranoid patients with other delusional patients or remitted patients or those at high risk of psychosis: Bentall et al., 2001, Freeman, 2007). Comparison of clinical and non-clinical studies is also made difficult by the use of different types of measures of paranoia: clinical studies often define groups by presence of paranoid delusion on a clinical tool, but non-clinical studies use scores on trait measures. These weaknesses makes it difficult to make comparisons with the present findings, but the use of tools like the

GPTS may lead to more conclusive evidence as it yields a paranoia level and is suitable across both populations

Unfortunately, neglecting to measure interpretation bias at baseline here limits the interpretation of this association, so it remains to be seen whether trait paranoia represents or causes a general interpretation bias, or whether the attributional bias is only apparent when activated by an induced state of paranoia or other variables. Whilst GPTS trait paranoia scores (see section 2.4.1.3, and Appendix J) could be seen as an indicator of normal attributional style (i.e., whether experiences in the past month have been interpreted in negative external-personal terms), an attribution measure at baseline (such as an alternate version of the recognition test to avoid practice effects, or a measure like the IPSAQ or AIHQ) would have been useful to test the link between existing attributional style and trait paranoia, and elucidate whether these correspond to later state paranoia and/or attributional changes under stress. Clinically it might also be useful to see how people with differing levels of existing trait paranoia respond to CBM-I. As it stands, it is unfortunately impossible to make definitive conclusions about the causal relationships between attribution bias, state and trait paranoia in this study.

Additionally, it should be noted that all of the GPTS scores were very low in the current study (positive CBM-I group: M = 38.2, SD = 5.5; neutral control: M = 39.5, SD = *5.0*), even lower than the non-clinical sample in the original validation study (M = 48.8, SD = 18.7: Green et al., 2007), and hence the apparent links to a positive interpretation bias and lower state paranoia may only apply to low levels of trait paranoia in non-clinical samples, as it remains to be seen if higher levels of trait paranoia (e.g., in an analogue or clinical sample) might conversely be associated with more negative interpretations and paranoid reactions. This exclusive

use of healthy non-clinical participants therefore does not allow speculation about a phenomenological continuum of paranoia across the population.

To summarise, whilst the association of lower trait paranoia with a more positive interpretation bias and lower state paranoia appeared to suggest that existing biases overrode any CBM-I effects, the lack of interpretation bias measures at baseline limit the conclusions that can be drawn.

4.3 Critique of Methodology

The discussion above implicates several considerations of the methodology, and a critique of the study's strengths and weaknesses is presented in this section.

4.3.1 Design

The mixed design is the most commonly used in non-clinical CBM research (Hallion & Ruscio, 2011), and random allocation to groups is lauded as the gold-standard method to create groups which are equivalent and free of allocation bias (Shadish et al., 2002). The comparison of positive CBM-I with neutral CBM-I is not common with non-clinical groups (although see Salemink & Wiers, 2011, for an exception), but represents a less distressing experience for participants.

However, this may have increased the likelihood of a type II error (failing to detect a difference where one exists) by reducing the size of a difference in scores between groups. As non-clinical participants tend to naturally show a positive interpretation bias (e.g., Hirsch & Mathews, 2000) which we did not intend to alter in the neutral placebo control condition, the magnitude of the difference in biases

with the positive training group was likely to be smaller than when a negative training comparison is used.

Given that one of the aims of this study was to test whether attribution biases have a direct influence on vulnerability to paranoia, including a negative training procedure would have been appropriate as a first step in evaluating the causal link between attribution bias and state paranoia. Many early CBM studies explored the causal link between cognitive bias and anxiety (Grey & Mathews, 2000; Hertel et al., 2003; Mathews & Mackintosh, 2000; Mathews & MacLeod, 2002; Wilson et al., 2006), whilst later ones explored the causal basis of cognitive bias upon other emotional experiences such as depression (Lang et al., 2009; Peters et al., 2011), or other symptoms such as perfectionism (Yiend et al., 2011) or intrusive memories (Woud et al., 2012). Therefore, using a negative training condition might have been useful to clarify the assumed but "unconvincing" (Freeman, 2007, p.440) role of a negative attributional style (making external-personal attributions of hostile intent) in the experience of paranoia when under stress.

However, the neutral placebo control was used in order to minimise the potential distress that negative training could cause to participants, and to isolate the particular effects of positive training over mere exposure to highly positive or negative materials. Shadish et al. (2002) stated that "the control should include everything [that the intervention does] but that part [under investigation]" (pp.259). The control used here only differed from the positive CBM-I in the final word of each scenario making half of the situations negative. This controlled for the effects of mere exposure to highly valenced training material (all negative or all positive) as Salemink et al. (2010b) found that this alone could affect state anxiety which might obscure our investigation of emotional reactions to the stressor. More importantly,

Mathews (2012) suggested it might lead to semantic priming of a category of emotional meanings, whereas the aim was to train participants to actively seek and/or choose positive interpretations (and reject negative ones) as active generation has been shown to be most important in later resilience to stressful events (e.g., Hoppitt et al., 2010b).

4.3.2 Participants

The sample size of 35 was one third smaller than originally intended and therefore the power to detect differences was reduced. Previous studies using CBM-I have found medium to large effect sizes upon interpretations, but smaller effects upon emotions (Hallion & Ruscio, 2011). Therefore, whilst the current study appeared to be sufficient to detect the large effect of the interpretation bias, the small sample size may have had insufficient power to detect a significant difference in emotional reactions. However, many early studies comparing two CBM-I conditions also used small non-clinical samples between 20 and 40 participants and produced significant results (e.g. Grey & Mathews, 2000; Hertel et al., 2003; Hirsch et al., 2007; Mathews & Mackintosh, 2000; Standage et al., 2010; Yiend et al., 2005). Therefore, as an initial exploration of paranoid interpretations, this study's sample size is broadly in line with published studies. However, the failure to produce different emotional reactions could represent the limited power of the study, rather than the absence of an effect, and therefore conclusions about emotional changes must be viewed as inconclusive.

The use of an opportunistic sample from volunteers at the university reduces the generalizability of the findings, however, paranoia often emerges in young

adulthood (Freeman & Garety, 2004), so in this sense, the young age group was clinically valid.

It appeared that despite giving assurances of good English skills, some participants struggled to understand the double negatives of the BFNE, and the language of the CBM-I (which was sometimes convoluted in order to remain ambiguous until the final word, see Appendix P). A more stringent test of reading ability might have been useful to confirm that people could fully understand the intended meaning, or the use of only native speakers may have avoided this (as used by Mathews & Mackintosh, 2000, for example).

4.3.3 CBM-I Training

The CBM-I training materials used here were newly designed to target paranoid attributions, and this study acted as a pilot test for the efficacy of these new materials. MacLeod, Koster, and Fox (2009) suggested that CBM-I research needed to expand the range of cognitive biases that are targeted, and this study appears to be the first to target external attributions differing in location (personal or situational) as relevant to paranoia, thus expanding the uses of CBM-I into new areas.

The training used here was based on the CBM-I procedure used successfully in the pioneering work of Mathews and Mackintosh (2000) and many other CBM-I researchers since in both clinical (e.g., Blackwell & Holmes, 2010; Hayes et al., 2010; Lang et al., 2012) and non-clinical populations (e.g., Lange et al., 2010; Lau et al., 2011; Lothmann et al., 2011; Mackintosh et al., 2006; Salemink & van den Hout, 2010a; Salemink et al., 2007a, 2007b, 2010a, 2010b; Yiend et al., 2005).

The new materials were designed with the assistance of experienced researchers who have used this type of CBM-I before, to increase reliability and

allow this study to be compared to other CBM-I studies using the same methodology. Clinicians with expertise in the psychological understanding of paranoia in young people validated the relevance of the situations and attributions in the training and recognition task. The positive effects of the CBM-I training in reducing endorsements of paranoid interpretations (relative to the control condition) suggest that the new training materials were successful, although further testing will be needed to establish the efficacy in more vulnerable groups rather than healthy non-clinical participants, to evaluate if endorsements of positive interpretations might also be influenced by training.

4.3.4 Paranoia Induction

The current study used a protocol for inducing paranoid stress designed by Ellett and Chadwick (2007). This protocol was developed from Bentall's research (e.g., Bentall et al., 1991, 1994, 2001; Kinderman & Bentall, 1996b) which suggested that self-serving biases are activated under conditions of threat to self-image (Campbell & Sedikedes, 1999), and specifically, a mismatch between how one sees oneself and how one is actually performing, with the function of preserving fragile negative self-beliefs. The small changes made to the protocol, such as keeping the experimenter in the room, were chosen to increase other-to-self processing and activate beliefs about the self and others which are important factors in the 'delusion as defence' model (Bentall et al., 1991, 2001), and have been corroborated in research by Gracie et al. (2007) and Fowler et al. (2012). Keeping the experimenter in the room also made the situation more interpersonal, crucial when considering paranoid thinking as being attributions of others' behaviour. The change of using difficult anagrams rather than impossible geometric pattern

recognition was based on the common use of anagrams as a stressor in CBM studies such as MacLeod et al. (2002), Salemink et al. (2007a), and Peters et al. (2011).

However, whilst these changes were based on theory and evidence, they could have warranted a pilot to test the impact of the altered procedure upon a range of emotions. This may have provided information that could be useful in understanding the lack of a differential impact of the CBM-I training upon emotional reactions. As it is, the efficacy of the paranoia induction remains to be seen. Positively, the ratings of feeling suspicious were highest across participants compared to other emotions measured on the VAS, and were higher than when the study started. However, it is possible that these emotional effects were not large enough to distinguish between the two groups, or conversely overwhelmed other cognitive biases, like attributions.

It also remains possible that the inclusion of negative self-cognitions prior to the anagram stressor may have led to a more depressive than paranoid reaction by priming negative core self-beliefs. Negative self-cognitions were used here because Ellet and Chadwick (2007) found that there was a small increase in mean PDS paranoia score (18.9 to 20.8) with the addition of negative self-cognitions in Experiment 3 compared to Experiment 1 which used no priming (although a *t*-test finds this difference is not significant, $t(23) = 0.83$, $p = .416$). The possibility that depression may have increased by priming negative self-cognition makes theoretical sense (e.g., Beck, 1967), however, Ellett and Chadwick (2007) reported mean Beck Depression Inventory (Beck, Steer, & Brown, 1996) scores in Experiment 3 (12.7) compared to Experiment 1 (17.8), which were not significantly different, $t(23) = 1.43$, $p = .171$. However, they failed to report PDS depression scores in Experiment 3 preventing comparison of this data. In the current study, whilst there was a main

effect of time on depression, Bonferroni-corrected contrasts did not find a significant increase in depression after the induction, despite the significant increase in suspiciousness. These findings suggest that the addition of negative self-cognitions may not have overly increased depression, either in the current study or the Ellett and Chadwick (2007) study. Therefore, we can be reasonably reassured that the induction had the desired specific effect upon paranoia and not depression.

4.3.5 Outcome Measures

The measurement of interpretation bias using the recognition task here was useful in allowing comparison with many other CBM-I studies (e.g., Lange et al., 2010; Mackintosh et al., 2006; Mathews & Mackintosh, 2000; Salemink et al., 2007a,b; Turner et al., 2011; Yiend et al., 2005).

However, the recognition task has been questioned by some researchers for a number of reasons. Firstly, Salemink et al. (2007b, 2010a) suggested that the recognition task is merely measuring a 'task specific' response bias rather than a genuine generalisation of an altered interpretation bias, and this was confirmed when interpretation bias found on the recognition task was not found using an implicit measure (Extrinsic Affective Simon Task; Salemink et al., 2007b) and free-response measures (Ambiguous Social Situations Interpretation Questionnaire; Salemink et al., 2007b; ambiguous social vignette, and rating emotional reactions to ambiguous video clips, Salemink et al., 2010a). Secondly, it is an explicit measure of 'off-line' interpretation and thus is vulnerable to demand effects, however, Mathews (2012) pointed out that many studies have found participants were not aware of the purpose of CBM-I procedures or how their responses may have been affected, thus weakening the likelihood that demand effects were in play. If this had been assessed

in the current study, any possible effect of demands of the experiment could be ruled out for these new materials too. Third, as Salemink et al. (2007b) highlighted, the recognition task uses forced-choice response options provided by the experimenter, and is unable to capture whether participants would construct biased interpretations themselves. Spontaneous interpretations are most relevant to assess if CBM-I can produce an "implicit trained production rule to generate and select emotional meaning" (p.324, Hoppitt et al., 2010b), and would be an interesting addition to test generalisation of interpretation biases. Finally, the recognition task used here incorporated new scenarios and interpretations for paranoia which had not been used before. Whilst they were validated for relevance to paranoia in the same way as the CBM-I training materials, piloting of the recognition task to allow analyses of reliability and validity would increase the confidence we could have in the findings.

The PDS was specifically designed by Bodner and Mikulincer (1998) for measuring sub-clinical paranoia in experimental situations, and as such was chosen for its validity in the experimental setting of this study. However, some of the items were unlikely to be endorsed, such as, "I feel that people are hostile to me," and perhaps were redundant in this particular scenario. In addition, the inclusion of feeling "suspicious" on the visual analogue scales could be interpreted in many ways (as mentioned above), as this does not represent an emotion but rather a thought that something is not all it seems, and might provoke a range of very different emotions. Therefore, this may not be a reliable measure across participants.

In addition, paranoia is defined in terms of suspicious beliefs which are unfounded (Freeman & Garety, 2004), however, in this experiment, any suspicious thoughts participants had were valid if they worked out the trick regarding the false negative feedback. Those who participate in experiments are aware that the

experimenter does not reveal their true intentions until the debriefing at the end, and so they are likely to be at least curious about the tasks. A certain amount of suspicion can be seen as adaptive and appropriate, both in this experimental scenario, and in real life (e.g., Green & Phillips, 2004). This is a problematic issue to overcome in paranoia research, as inducing paranoia in a laboratory experiment may differ qualitatively and quantitatively with clinical paranoia in real life.

The timing of the outcome measures may also have had an impact on the findings reported here. Firstly, repeated administration of the VAS (four times) and the PDS (twice) over the short duration (approximately 90 minutes) of the study may have led to reactivity to the experimental situation or 'demand' effects, such as the participants guessing the aims of the experiment and modifying their responses on these self-report measures accordingly (Orne, 1962, 1969), thereby threatening construct validity. Whilst deception (withholding the full purpose of the study) and a range of baseline measures were used to disguise the true purpose of the study and reduce demand effects, the state emotion measures were needed to allow changes over each stage of the study to be evaluated. Rosenthal and Rosnow (1991) recommended deception, avoiding pre-tests and early measurements to reduce reactivity, yet these strategies run the risk of limiting the conclusions that can be drawn from the findings (Shadish et al., 2002).

In this study, the lack of pre-test measurement of interpretation bias did not allow for the testing of whether any pre-existing group differences existed, or to factor this into analyses as a covariate. This would have been useful to tease out the causal effects of pre-existing interpretation bias upon the efficacy of the CBM-I training on later attributional and emotional reactions, and could have illuminated how CBM-I might be utilised clinically. Also, as the PDS was only used at baseline

and after the recognition task, it remains difficult to assess the impact of the CBM-I training itself upon state paranoia, or the impact of the induction procedure, as the completion of the recognition task itself beforehand may have altered such feelings. Similarly, if levels of state paranoia were measured before interpretation bias, awareness of paranoid feelings being assessed may also have affected interpretation bias, perhaps by increasing awareness of the study's interest in the paranoid targets and triggering demand effects. Therefore, the inability to specify changes in state paranoia at each stage in the study means that conclusions about the effects of the CBM-I training, and the paranoia induction, is limited to the VAS measurements only.

4.4 Implications for Cognitive Theories of Paranoia

4.4.1 Attribution – Self-Representation Model

The lack of transfer from training an attribution bias to the experience of state paranoia found here is not able to lend support to the Bentall et al. (1991, 2001) attribution – self-representation model of paranoia which places attribution biases at the centre of the experience of paranoia. The contradictory evidence reviewed in section 1.3.5.3 regarding the hypothesised relationship between paranoia and an externalising or personalising attribution bias may render this conclusion unsurprising. However, it must be remembered that this study's positive CBM-I training was only successful in reducing paranoid attributions, not of increasing positive attributions, in a small underpowered non-clinical study with limited measurement of state paranoia. Therefore, the lack of support for the causal status of

an attribution bias in the development or maintenance of non-clinical state paranoia may be due to significant methodological limitations, and the role of attributions requires further testing. A future comparison of a negative CBM-I training procedure with the neutral or positive training used here might allow further testing of the role of attribution biases in paranoia as proposed by this model.

4.4.2 Continuum Models

The findings here may also have implications for the continuum hypothesis of paranoia first posited by Strauss (1969) and several researchers since (e.g., Chapman & Chapman, 1980; Freeman, Garety, Bebbington, Smith, et al., 2005b; Oltmanns & Maher, 1988). Most research has assessed the 'phenomenological perspective' (Costello, 1994) by assessing whether attribution biases present in clinical paranoia are also present to varying degrees in other groups (e.g., those who have recovered from past paranoia, those who are at risk of developing psychosis, those who have other psychotic disorders, and the general population). In the introductory chapter, it was noted that whilst there is evidence for attribution biases (SSB, EB, PB) in acutely paranoid patients (e.g., Aakre et al., 2009; Craig et al., 2004; Lee et al., 2004; Kinderman et al., 1992, Lyon et al., 1994; Randall et al., 2003; Sharp et al., 1997), attribution biases are also sometimes present in psychotic patients with other delusions (e.g., Fear et al., 1996; Martin & Penn, 2002) and in those who have recovered from persecutory delusions (e.g., Diez-Alegria et al., 2006; McKay et al., 2005). However, there has been less consistent evidence for attribution biases in analogue samples of non-clinical participants with high trait paranoia (e.g., Combs & Penn, 2004; Lincoln, Mehl, Exner et al., 2010) or

attribution biases being correlated with paranoia across non-clinical populations (e.g., Lincoln, Mehl, Exner et al., 2010; Martin & Penn, 2001; McKay et al., 2005).

The findings from the current study appear somewhat contradictory, but interpretation largely depends on whether the findings are assessed against either the phenomenological or vulnerability perspectives of a paranoia continuum (Costello, 1994). On the one hand, the failure to link modified attribution bias to state paranoia in this non-clinical sample is not able to support the phenomenological continuum model of paranoia, as the hypothesised link between attribution bias and paranoia found in clinical samples has not been replicated in this non-clinical sample. Therefore, this tentatively calls into question the idea that an external-personal attribution bias explains paranoid ideation in both non-clinical and clinical populations. On the other hand, the correlation of trait paranoia with later attributional bias and state paranoia may lend some tentative support to the vulnerability approach, as it suggests that differences in even low levels of trait paranoia were linked to later paranoid reactions to our stressor. This is consistent with the findings of Green et al. (2011) who found that trait paranoia (as measured by the GPTS and PS) was associated with more paranoid interpretations of interruptions and laughter.

However, it is also possible that the limited findings here cautiously indicate that non-clinical paranoia may be qualitatively different to clinical paranoia, or that other factors need to be considered to explain how paranoia may occur in a healthy non-clinical population. Whilst Freeman (2007) was a clear supporter of the continuum hypothesis, he acknowledged that the distribution of paranoia may in fact be "quasicontinuous, lying between dichotomous and continuous" (p.430). This remains a difficult hypothesis to test, and whilst the current findings are not

conclusive, they are unable to lend support to either a phenomenological or vulnerability view of a paranoia continuum.

4.5 Implications for Clinical Practice

As an exploratory study with non-clinical participants, the potential applications to clinical practice are only hypothetical at this stage, especially given the lack of clarity about whether non-clinical paranoia works in the same way as clinical delusions implied by the phenomenological view of a paranoia continuum (Costello, 1994). However, given the implications for cognitive theory (specifically Bentall et al., 1991, 2001) mentioned above, some potential implications for current practice of CBT are suggested below, along with ideas about how a clinical intervention using CBM-I could be tested in the future.

4.5.1 CBT for Paranoia

Traditional techniques in CBT attempt to target cognitive biases through explicit exploration with patients (Beck, 1976). Cognitive restructuring involves a detailed breakdown of meaningful incidents which triggered the particular emotional problem the patient is struggling with. This involves differentiating between the observable facts of the situation, thoughts and interpretations of that situation, and the emotion which is elicited, and recognising how these link together (Beck, 1995). The thoughts and interpretations are the explicit focus for the cognitive work in CBT and examining these thoughts in detail addresses a number of cognitive biases such as jumping to conclusions too soon or on the basis of tangential evidence, mind

reading (theory of mind and attribution errors), and personalisation (ideas of reference). CBTp takes a similar approach to traditional CBT, with aims of teaching patients to identify, evaluate, and correct their interpretations about specific situations which occur (Hagen & Turkington, 2011). However, Freeman (2011) noted that the effect sizes in studies of traditional CBTp are weak to moderate, prompting questions about different ways to develop cognitive strategies.

The range of treatments subsumed under the CBT umbrella for paranoia is constantly expanding. Freeman (2011) noted that interventions targeted at particular facets of delusional thinking have been found to be successful, such as worrying processes (e.g., Foster, Startup, Potts, & Freeman, 2010), and jumping to conclusions either through one explicit education session (e.g., Ross, Freeman, Dunn, & Garety 2011; Moritz, Kerstan, et al., 2011; Waller, Freeman, Jolley, Dunn, & Garety, 2011), or more sessions also targeting attributions, theory of mind, and mood in MCT (Moritz & Woodward, 2007) or SCIT (e.g., Combs, Adams, et al., 2007; Roberts et al., 2006; Roberts & Penn, 2009). Although the current study was unable to lend support to a focus on modifying external attribution biases in order to reduce paranoia, further research needs to be carried out to confirm this finding.

4.5.2 CBM-I for Paranoia

Whilst the current study was not able to support the use of implicit measures such as CBM-I in reducing paranoid interpretations and experiences, the success of other CBM-I paradigms in modifying anxious (e.g., Beard et al., 2011; Brosan et al., 2011; Hayes et al., 2010) or depressive (e.g., Blackwell & Holmes, 2010; Lang et al., 2012) interpretations and symptoms through repeated practice and exposure to positive interpretations suggests that CBM may be a promising paradigm worthy of

further investigation across a range of clinical symptoms (MacLeod, 2012). Mathews (2012) noted that CBM programmes have the advantage over CBT of being easy to provide through computer programmes or over the internet, and of targeting habitual cognitive biases which may operate outside of attentional awareness and hence are unaffected when attentional control is compromised. Therefore, further refinement of the materials and procedures as described above would be useful to test further the possible role that modifying paranoid attributions may have in protecting vulnerable individuals from forming distressing and debilitating paranoid beliefs.

It would also be important to test the acceptability and credibility of the CBM procedures for clients. Beard et al. (2012) conducted a qualitative study with 10 patients with social anxiety regarding their views of CBM. They found that the patients largely preferred CBM-I over CBM-A, and rated CBM-I as more credible, although still rather boring; feedback echoed in the satisfaction questionnaire used by Beard et al. (2011). Other studies have also sought qualitative feedback about CBM-I in a less systematic way. For example, Blackwell and Holmes (2010) found that whilst some people found themselves consciously noticing the effects of the training, some found it difficult to engage with the training due to verbal processing of the situation. Steel et al. (2010) found that their clients with psychosis rated auditory CBM-I as acceptable and moderately enjoyable, whilst Turner et al. (2011) found that participants wanted more interesting, realistic, and longer-lasting CBM-I training.

Credibility of the therapeutic potential of CBM could be especially important to establish with paranoid clients as the procedure itself could tap into common paranoid concerns about thought insertion or brainwashing (Freeman & Freeman,

2008). Therefore, in this client group, credibility would need to be a preliminary focus before any training could take place. This is similar to the emphasis in CBTp in establishing a sound therapeutic relationship, education and normalising of the symptoms, and explaining the rationale prior to any work on challenging symptoms (e.g., Hagen & Turkington, 2011).

4.6 Implications for Further CBM-I Research

4.6.1 Developing Paranoid CBM-I Training Materials

The limited findings of the study suggests that further improvements could be made to the training to have a stronger effect in modifying positive interpretations, and to also affect emotional reactivity. The training materials could benefit from further tests of the reliability and validity. For example, further work with service users might be useful to increase the relevance of training materials to the clinical experience of paranoia to improve content validity (Barker, Pistrang, & Elliott, 2002).

Alternatively, research could explore alternative forms of CBM to address other parts of cognitive models of paranoia (Bentall et al., 1991, 2001; Freeman, 2007; Freeman & Garety, 2004; Freeman et al., 2002) such as the JTC bias (e.g., Fine et al., 2007), and vigilant attention toward interpersonal threat (e.g., Bentall & Kaney, 1989; Fear et al., 1996). Combining different types of CBM may be the most efficacious method to influence paranoid thinking, as demonstrated by Brosan et al. (2011) and Beard et al. (2011) who both combined CBM-A and CBM-I in anxious patients. In addition, the impact of multiple CBM sessions over time would also be a

useful development, as used by Beard et al. (2011), Blackwell and Holmes (2010), Brosan et al. (2011), and Lang et al. (2012).

4.6.2 Measuring Paranoid Attribution Bias

Further testing of the paranoia recognition task used in the present study would be useful in order to calculate and improve the psychometric properties of this measure. Test-retest reliability could be assessed, and internal consistency established through calculating Cronbach's alpha. In order to improve validity, firstly the items could be developed using the assistance of a service user, as mentioned above for the training materials. Secondly, ratings on the recognition task could be compared with other validated measures of interpretation bias to aid in establishing criterion validity. Attribution questionnaires, such as the IPSAQ (Kinderman & Bentall, 1996a), have commonly been used in paranoia research (Bentall et al., 2001), and could be utilised for this purpose.

Alternatively, implicit measures have the advantage of ruling out demand effects, testing the transfer of interpretation training to different types of tasks, and focusing on interpretations 'on-line,' that is, as they occur. Examples could include the EAST used by Salemink et al. (2007b), or measures relying on response latency to probe items during training, or lexical decisions regarding congruent or non-congruent materials such as those used by Grey and Mathews (2000). Alternatively, a modified version of the PIT (Winters & Neale, 1985) often used in paranoid attribution research (e.g., Diez-Alegria et al., 2006; Humphreys & Barrowclough, 2006; Lyon et al., 1994; Martin & Penn, 2002; Mehl et al., 2010) might provide a useful alternative focused specifically on attributions.

A baseline assessment of paranoid attributions or interpretation bias would be important in further research, to allow pre-existing biases to be accounted for either as a covariate or as a pre-test to be entered into ANOVA. This would be important so that any specific effects of the training could be separated from pre-existing bias.

4.6.3 Comparing Paranoia Stressors

Several different ways have been used to elicit paranoid thoughts and feelings. It could be interesting to compare the original version of Ellett and Chadwick's (2007) paranoia induction with the modification used here to establish how these alterations affected paranoia and other emotions. It could also be useful to compare the effects of this technique with those of other researchers who have attempted to elicit paranoid thoughts and feelings. For example, Ellett, Allen-Crooks, Stevens, Wildschut, and Chadwick (2013) used the Prisoner's Dilemma Game to induce paranoia by adding a more interpersonal element to the induction, with the key outcomes being distrust-based competition as a behavioural marker of paranoia, and state paranoia as measured on a new brief self-report tool designed for that study. Freeman and colleagues have used neutral virtual reality social situations (library, underground tube ride) to test for paranoid attributions (Freeman et al., 2003, 2010; Freeman, Garety, Bebbington, Slater, et al., 2005, Freeman, Pugh, et al., 2008), which, whilst ideal in controlling the environment, may not be possible within the budget of many research teams. Green et al. (2011) used an interruption to the session and laughter outside the testing room to test for paranoid interpretations, and whilst this was successful with some participants, the vast majority (85%) did not report any paranoia and hence it might be difficult to compare groups if so few might respond with paranoid thoughts.

These protocols varied in their effects, and as such, different methods could be used to assess how CBM-I training might impact on not just cognition, but also emotions and behaviour, to test the generalisability of the training. For example, Lange et al. (2010) assessed gaze avoidance of angry faces, whilst Combs and Penn (2004) measured physical avoidance of the researcher.

It should be noted that in an experimental study, it would not be appropriate or possible to use a procedure to induce paranoid fears of severe threat at the top of the Freeman, Garety, Bebbington, Smith, et al. (2005) hierarchy in Figure 1.1, thought to be representative of severe clinical paranoia. At best, such procedures may trigger thoughts regarding social evaluation, ideas of reference, and perhaps ideas of mild threat such as annoyance. Therefore, the conclusions that might be drawn from such procedures will remain limited to non-clinical paranoia.

4.6.4 Measuring Non-Clinical Paranoia

The measurement of trait paranoia in non-clinical populations has largely been done through self-report measures, such as the PS (Fenigstein & Vanable, 1992), and the GPTS (Green et al., 2007). A limitation of these self-report trait measures is the impact of social desirability concerns in responding- especially to the more unusual items, the fact that thinking 'paranoid' thoughts might actually represent reality for that person of having been victim of some sort of interpersonal persecution, and they are not suitable for assessing state paranoia during an experimental procedure.

Measures of state paranoia during a controlled experimental environment removes the confound of prior experience and are more relevant to the experimental situation, but many assessment measures still rely on self-report such as the PDS

used here (Bodner & Mikulincer, 1998), and the State Social Paranoia Scale (Freeman, Pugh, et al., 2007). Further work is needed to validate a measure of sub-clinical state paranoia to allow assessment of the impact of CBM-I training upon paranoid thoughts and feelings. The choice of measure may depend upon the procedure which is used to induce paranoia.

4.6.5 Testing Theoretical Models of Paranoia

As mentioned above, early CBM studies targeting a new cognitive bias tend to be used to test cognitive models by comparing training to induce the maladaptive negative bias, to training to induce a more adaptive positive or benign bias. Therefore, CBM-I training to induce a negative external-personal paranoid attribution could be compared to training to induce a positive external-situational bias to test whether the paranoid attributions lead to increased experience of paranoia and associated negative emotions. The existing literature about attribution biases in paranoid individuals is fraught with contradictory findings, in part due to the myriad of extraneous confounding variables present when studying clinical persecutory delusions in patients (Freeman, 2007). Therefore, a direct manipulation of attributions using CBM-I while controlling other variables would be a useful way to add clear findings to the complex phenomenon of paranoia. It would also be interesting to assess the range of emotional responses when paranoid thoughts and/or behaviours may be induced, to further test when paranoid attributions serve a function of alleviating negative emotion, or in creating problematic negative emotions.

To test the phenomenological view of a paranoid continuum, Costello (1994) recommended that studies would need to test whether the variables that affect

clinical paranoia (i.e., the external-personal attribution bias here) also affect the 'normal' version of paranoia (i.e., state sub-clinical paranoia). Whilst the current study was unable to provide support, methodological limitations mean that a replication of the CBM-I protocol with the improvements recommended above would possibly help to provide further clarity on this matter. Alternatively, a longitudinal study measuring the links between trait paranoia attribution bias and later clinical paranoia would be an effective way to test the vulnerability view.

4.6.6 CBM-I with Analogue and Clinical Samples

Following successful development of training materials, paranoia inductions, and outcome measures with non-clinical participants, it would be interesting to further test the ideas with people experiencing sub-clinical or clinical levels of paranoia. Firstly, an analogue sample of the general population with high subclinical levels of trait paranoia could be selected, and positive CBM-I training could be compared to the neutral placebo CBM-I training used in the present study regarding the impact upon interpretation bias and state paranoia in response to a mild paranoid stressor. Analogue samples are a useful way to test and refine materials which may have clinical utility (Beard, 2011). If this were successful, a single case series could explore the feasibility and efficacy of using the positive training in people with clinical levels of paranoia, such as used by Blackwell and Holmes (2010), and Turner et al. (2011). It would be important to measure and attempt to control for other clinical variables, such as depression, anxiety, core beliefs, self-esteem, grandiosity, and severity of illness and dimensions of paranoia (conviction, preoccupation, and distress). Finally, if different types of CBM were developed to target different aspects of paranoid thinking, combining these might be a further

extension of this research, similar to Beard et al. (2011) and Brosan et al. (2011) who combined CBM-A and CBM-I.

4.7 Conclusions

This study demonstrated that the CBM-I training approach pioneered by Mathews and Mackintosh (2000) can be adapted to train non-clinical participants to make significantly less paranoid external-personal attributions, and that state paranoia can be induced in a non-clinical population in an adaptation of the method used by Ellett and Chadwick (2007). However, the positive CBM-I training did not affect positive attributions, nor attenuate paranoia or other emotional reactions to a stressor task. Likewise, there was no relationship between the trained interpretation bias and state paranoia or other emotional reactions. Unfortunately, methodological limitations of the study (e.g., limited state paranoia measurement, small sample size reducing power) mean it is impossible to conclude whether these null findings contradict the assumption of the Bentall et al. (1991, 2001) 'delusion as defence' model that attribution biases have a causal role in paranoid reactions to events. It is also unclear whether the null results refute a phenomenological (Costello, 1994) model of a continuum of paranoia across the non-clinical population. However, the finding of pre-existing trait paranoia being correlated with both interpretation bias and state paranoia under stress suggests that it is important to measure both trait and state paranoia, as existing biases may be able to override the effects of the CBM-I.

As a small preliminary investigation of new CBM-I materials for paranoid attributions, this study requires replication with a larger sample to increase the power

to detect small or varied effects, and with greater emphasis on increasing the validity of the training, and the reliability and validity of the outcome measures. The causal roles of many factors within cognitive models of paranoia need testing (Freeman, 2007), and CBM provides an excellent paradigm to do so. Secondly, the modifications to the paranoia induction of Ellett and Chadwick (2007) require further testing to clarify differential effects compared to the original method, or other paranoia induction methods. Thirdly, more extensive assessments of a range of emotional reactions throughout experiments would be useful given the range of possible emotions which can accompany paranoid ideas in reaction to CBM and stressors. Additionally, if successful, a range of CBM strategies could be tested with analogue and clinical samples to assess the potential clinical application in reducing vulnerability to paranoia.

In conclusion, CBM techniques have enjoyed success in training positive or benign cognitive biases leading to beneficial effects upon various anxiety disorders (e.g., Beard et al., 2011; Brosan et al., 2011; Hayes et al., 2010) and depression (e.g., Blackwell & Holmes, 2010), and this study was a promising but limited start in adapting this technique to help people with paranoia. Further research is required to test models of paranoid thinking and develop ways of modifying unhelpful biases that may lead to paranoia.

References

Aakre, J. M., Seghers, J. P., St-Hilaire, A., & Docherty, N. (2009). Attributional style in delusional patients: A comparison of remitted paranoid, remitted nonparanoid, and current paranoid patients with nonpsychiatric controls. *Schizophrenia Bulletin, 35,* 994-1002. doi:10.1093/schbul/sbn033

Abramson, L. Y., Seligman, M. E. P., & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology, 87,* 49-74.

Allardyce, J., Suppes, T., & van Os, J. (2007). Dimensions and the psychosis phenotype. *International Journal of Methods in Psychiatric Research, 16(S1),* S34-S40. doi:10.1002/mpr.214

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.

Amir, N., & Taylor, C. T. (2012). Interpretation training in individuals with generalized social anxiety disorder: A randomized controlled trial. *Journal of Consulting and Clinical Psychology, 80,* 497-511. doi:10.1037/a0026928

Amir, N., Bomyea, J., & Beard, C. (2010). The effect of a single session of interpretation modification on attention bias in socially anxious individuals. *Journal of Anxiety Disorders, 24,* 178-182. doi:10.1016/j.janxdis.2009.10.005

An, S. K., Kang, J. I., Park, J. Y., Kim, K. R., Lee, S. Y., & Lee, E. (2010). Attribution bias in ultra-high risk for psychosis and first episode schizophrenia. *Schizophrenia Research, 118,* 54-61. doi:10.1016/j.schres.2010.01.025

Appelbaum, P. S., Robbins, P. C., & Roth, L. H. (1999). Dimensional approach to delusions: Comparison across types and diagnoses. *American Journal of Psychiatry, 156,* 1938-1943.

Barker, C., Pistrang, N., & Elliott, R. (2002). *Research methods in clinical psychology.* Chichester: John Wiley.

Beard, C. (2012). Cognitive bias modification for anxiety: current evidence and future directions. *Expert Review of Neurotherapeutics, 11,* 299-311. doi:10.1586/ern.10.194

Beard, C., & Amir, N. (2008). A multi-session interpretation modification program: Changes in interpretation and social anxiety symptoms. *Behaviour Research and Therapy, 46,* 1135-1141. doi:10.1016/j.brat.2008.05.012

Beard, C., Weisberg, R. B., & Amir, N. (2011). Combined cognitive bias modification treatment for social anxiety disorder: A pilot trial. *Depression and Anxiety, 28,* 981-988. doi:10.1002/da.20873

Beard, C., Weisberg, R. B., & Primack, J. (2012). Socially anxious primary care patients' attitudes toward cognitive bias modification (CBM): A qualitative study. *Behavioural and Cognitive Psychotherapy, 40,* 618-633. doi:10.1017/S1352465811000671

Bebbington, P. E., McBride, O., Steel, C., Kuipers, E., Radovanovic, M., Brugha, T., . . . Freeman, D. (2013). The structure of paranoia in the general population. *British Journal of Psychiatry, 202,* 419-427. doi:10.1192/bjp.bp.112.119032

Bebbington, P. E., Bhugra, D., Bhugra, T., Singleton, N., Farrell, M., Jenkins, R., . . . Meltzer, H. (2004). Psychosis, victimisation and childhood disadvantage: Evidence from the second British National Survey of Psychiatric Morbidity. *British Journal of Psychiatry, 185,* 220-226. doi:10.1192/bjp.185.3.220

Beck, A. T. (1952). Successful out-patient psychotherapy of a chronic schizophrenic with a delusion based on borrowed guilt. *Psychiatry, 15,* 305-312.

Beck, A. T. (1963). Thinking and depression I: Idiosyncratic Content and Cognitive Distortions. *Archives of General Psychiatry, 9,* 324-333.

Beck, A. T. (1967). *Depression: Clinical, experimental and theoretical aspects.* New York: Harper & Row.

Beck, A. T. (1976). *Cognitive therapy and the emotional disorders.* New York: International Universities Press.

Beck, A. T. (1991). Cognitive therapy: A 30-year retrospective. *American Psychologist, 46,* 368-375.

Beck, A. T., & Steer, R. A. (1993). *Beck Anxiety Inventory Manual.* San Antonio, TX: The Psychological Corporation.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory-II.* San Antonio, TX: Psychological Corporation.

Ben-Zeev, D., Granholm, E., & Cafri, G. (2009). Symptoms of depression and anxiety mediate the relationship between self-esteem and paranoia. *Schizophrenia Research, 115,* 377-378. doi:10.1016/j.schres.2009.06.009

Bentall, R. P. (2003). *Madness explained: Psychosis and human nature.* London: Penguin.

Bentall, R. P., Corcoran, R., Howard, R., Blackwood, N., & Kinderman, P. (2001). Persecutory delusions: A review and theoretical integration. *Clinical Psychology Review, 21,* 1143-1192.

Bentall, R. P., Fernyhough, C., Morrison, A. P., Lewis, S., & Corcoran, R. (2007). Prospects for a cognitive-developmental account of psychotic experiences.

British Journal of Clinical Psychology, 46, 155-173. doi:10.1348/014466506X123011

Bentall, R. P., & Kaney, S. (1989). Content specific processing and persecutory delusions: an investigation using the emotional Stroop test. *British Journal of Medical Psychology, 62,* 355-364.

Bentall, R. P., & Kaney, S. (2005). Attributional lability in depression and paranoia. *British Journal of Clinical Psychology, 44,* 475-488. doi:10.1348/014466505X29602

Bentall, R. P., Kaney, S., & Dewey, M. E. (1991). Paranoia and social reasoning: An attribution theory analysis. *British Journal of Clinical Psychology, 30,* 13-23.

Bentall, R. P., Kinderman, P., & Kaney, S. (1994). The self, attributional processes and abnormal beliefs: Towards a model of persecutory delusions. *Behaviour Research and Therapy, 32,* 331-341.

Bentall, R.P., Kinderman, P., & Moutoussis, M. (2008). The role of self-esteem in paranoid delusions: the psychology, neurophysiology and development of persecutory beliefs. In D. Freeman, R. P. Bentall & P. Garety (Eds.), *Persecutory Delusions: Assessment, Theory and Treatment* (pp. 143-174). Oxford: Oxford University Press.

Bentall, R. P., Rowse, G., Shryane, N., Kinderman, P., Howard, R., Blackwood, N., . . . Corcoran, R. (2009). The cognitive and affective structure of paranoid delusions: A transdiagnostic investigation of patients with schizophrenia spectrum disorders and depression. *Archives of General Psychiatry, 66,* 236-247. doi: 10.1001/archgenpsychiatry.2009.1.

Blackwell, S. E., & Holmes, E. A. (2010). Modifying interpretation and imagination in clinical depression: A single case series using cognitive bias modification. *Applied Cognitive Psychology, 24,* 338-350. doi:10.1002/acp.1680

Bodner, E., & Mikulincer, M. (1998). Learned helplessness and the occurrence of depressive-like and paranoid-like responses: The role of attentional focus. *Journal of Personality and Social Psychology, 74,* 1010-1023.

Bowler, J. O., Mackintosh, B., Dunn, B. D., Mathews, A., Dalgleish, T., & Hoppitt, L. (2012). A comparison of cognitive bias modification for interpretation and computerized cognitive behaviour therapy: Effects on anxiety, depression, attentional control, and interpretive bias. *Journal of Consulting and Clinical Psychology, 80,* 1021-1033. doi:10.1037/a0029932

Brosan, L., Hoppitt, L., Shelfer, L., Sillence, A., & Mackintosh, B. (2011). Cognitive bias modification for attention and interpretation reduces trait and state anxiety in anxious patients referred to an out-patient service: Results from a pilot study. *Journal of Behavior Therapy and Experimental Psychiatry, 42,* 258-264. doi:10.1016/j.jbtep.2010.12.006

Calvo, M. G., Eysenck, M. W., & Estevez, A. (1994). Ego-threat interpretative bias in test anxiety: On-line inferences. *Cognition and Emotion, 8,* 127-146.

Cameron, I. M., Crawford, J. R., Lawton, K., & Reid, I. C. (2008). Psychometric comparison of PHQ-9 and HADS for measuring depression severity in primary care. *British Journal of General Practice, 58,* 32-36. doi:10.3399/bjgp08X263794

Campbell, M. L. C., & Morrison, A. P. (2007a). The relationship between bullying, psychotic-like experiences and appraisals in 14-16 year olds. *Behaviour Research and Therapy, 45,* 1579-1591. doi:10.1016/j.brat.2006.11.009

Campbell, M. L. C., & Morrison, A. P. (2007b). The subjective experience of paranoia: Comparing the experiences of patients with psychosis and individuals with no psychiatric history. *Clinical Psychology and Psychotherapy, 14,* 63-77. doi:10.1002/cpp.510

Campbell, W. K., & Sedikedes, C. (1999). Self-threat magnifies the self-serving bias: A meta-analytic integration. *Review of General Psychology, 3,* 23-42.

Candido, C. L., & Romney, D. M. (1990). Attributional style in paranoid vs depressed patients. *British Journal of Medical Psychology, 63,* 355-363.

Castle, D. J., Phelan, M., Wessely, S., & Murray, R. M. (1994). Which patients with non-affective functional psychosis are not admitted at first contact? *British Journal of Psychiatry, 165,* 101-106. doi: 10.1192/bjp.165.1.101

Chadwick, Peter. (1995). *Understanding paranoia: what causes it, how it feels and what to do about it.* London: Thorsons.

Chadwick, P., Birchwood, M., & Trower, P. (1996). *Cognitive therapy for delusions, voices and paranoia.* Chichester: Wiley.

Chapman, L. J., & Chapman, J. P. (1980). Scales for rating psychotic and psychotic-like experiences as continua. *Schizophrenia Bulletin, 6,* 476-489.

Cicero, D. C., & Kerns, J. G. (2011). Is paranoia a defence against or an expression of low self-esteem? *European Journal of Personality, 25,* 326-335. doi:10.1002/per.794

Claridge, G. (1994). Single indicator of risk for schizophrenia: probable fact or likely myth? *Schizophrenia Bulletin, 20,* 151-168.

Clerkin, E. M., & Teachman, B. A. (2010). Training implicit social anxiety associations: An experimental intervention. *Journal of Anxiety Disorders, 24,* 300-308. doi:10.1016/j.janxdis.2010.01.001

Clerkin, E. M., & Teachman, B. A. (2011). Training interpretation biases among individuals with symptoms of obsessive compulsive disorder. *Journal of Behaviour Therapy and Experimental Psychiatry, 42,* 337-343.

Cockburn, P., & Cockburn, H. (2011). *Henry's demons. Living with schizophrenia: A father and son's story.* London: Simon & Schuster.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112,* 155-159.

Combs, D. R., Adams, S. D., Penn, D. L., Roberts, D., Tiegreen, J., & Stern, P. (2007). Social cognition and interaction training (SCIT) for inpatients with schizophrenia spectrum disorders: Preliminary findings. *Schizophrenia Research, 91,* 112-116. doi:10/1016/j.schres.2006.12.010

Combs, D. R., & Penn, D. L. (2004). The role of subclinical paranoia on social perception and behaviour. *Schizophrenia Research, 69,* 93-104.doi: 10.1016/S0920-9964(03)00051-3

Combs, D. R., Penn, D. L., Chadwick, P., Trower, P., Michael, C. O., & Basso, M. R. (2007). Subtypes of paranoia in a nonclinical sample. *Cognitive Neuropsychiatry, 12,* 537-553. doi:10.1080/13546800701707306

Combs, D. R., Penn, D. L., Michael, C. O. Basso, M. R., Wiedeman, R., Siebenmorgan, M. ... Chapman, D. (2009). Perceptions of hostility by persons with and without persecutory delusions. *Cognitive Neuropsychiatry, 14,* 30-52. doi:10.1080/13546800902732970

Combs, D. R., Penn, D. L., Wicher, M., & Waldheter, E. (2007). The Ambiguous Intentions Hostility Questionnaire (AIHQ): A new measure for evaluating hostile social-cognitive biases in paranoia. *Cognitive Neuropsychiatry, 12,* 128-143. doi:10.1080/13546800600787854

Corcoran, R., & Kaiser, S. (2008). Persecutory delusions and theory of mind: Longstanding debates and emerging issues. In D. Freeman, R. P. Bentall, & P. A. Garety (Eds.), *Persecutory delusions: Assessment, theory, and treatment* (pp.205-220). Oxford: Oxford University Press.

Costello, C. G. (1994). Two dimensional views of psychopathology. *Behaviour, Research and Therapy, 32,* 391-402.

Craig, J. S., Hatton, C., Craig, F. B., & Bentall, R. P. (2004). Persecutory beliefs, attributions and theory of mind: comparison of patients with paranoid delusions, Asperger's syndrome and healthy controls. *Schizophrenia Research, 69,* 29-33. doi:10.1016/S0920-9964(03)00154-3

David, A. S. (2010). Why we need more debate on whether psychotic symptoms lie on a continuum with normality. *Psychological Medicine, 40,* 1935-1942. doi:10.1017/S0033291710000188

Department of Health (2011). *Talking therapies: A four-year plan of action.* London: Department of Health.

DeVylder, J. E., Ben-David, S., Kimhy, D., & Corcoran, C. M. (2013). Attributional style among youth at clinical risk for psychosis. *Early Intervention in Psychiatry, 7,* 84-88. doi:10.1111/j.1751-7893.2012.00347.x

Diez-Alegria, C., Vasquez, C., Nieto-Moreno, M., Valiente, C., & Fuentenebro, F. (2006). Personalizing and externalizing biases in deluded and depressed patients: are attributional biases a stable and specific characteristic of delusions? *British Journal of Clinical Psychology, 45,* 531-544. doi:10.1348/014466505X86681

Edens, J. F., Marcus, D. K., & Morley, L. C. (2009). Paranoid personality has a dimensional latent structure: taxometric analyses of community and clinical

samples. *Journal of Abnormal Psychology, 118,* 545-553. doi:10.1037/a0016313

Ellett, L., Allen-Crooks, R., Stevens, A., Wildschut, T., & Chadwick, P. (2013). A paradigm for the study of paranoia in the general population: the Prisoner's Dilemma Game. *Cognition and Emotion, 27,* 53-62. doi:10.1080/02699931.2012.689757

Ellett, L., & Chadwick, P. (2007). Paranoid cognitions, failure and focus of attention in college students. *Cognition and Emotion, 21,* 558-576. doi:10.1080/02699930600758155

Ellett, L., Lopes, B., & Chadwick, P. (2003). Paranoia in a non-clinical population of college students. *Journal of Nervous and Mental Disease, 191,* 425-430.

Fear, C., Sharp, H., & Healy, D. (1996). Cognitive processes in delusional disorders. *British Journal of Psychiatry, 168,* 1-8.

Fenigstein, A., & Vanable, P. A. (1992). Paranoia and self-consciousness. *Journal of Personality and Social Psychology, 62,* 129-138.

Field, A. (2009). *Discovering statistics using SPSS.* London: Sage.

Field, A., & Hole, G. (2003). *How to design and report experiments.* London: Sage.

Fine, C., Gardner, M., Craigie, J., & Gold, I. (2007). Hopping, skipping or jumping to conclusions? Clarifying the role of the JTC bias in delusions. *Cognitive Neuropsychiatry, 12,* 46-77. doi:10.1080/13546800600750597

Fisher, H. I., Appiah-Kusi, E., & Grant, C. (2012). Anxiety and negative self-schemas mediate the association between childhood maltreatment and paranoia. *Psychiatry Research, 196,* 323-324. doi:10.1016/p.psychres.2011.12.004

Fornells-Ambrojo, M., & Garety, P. A. (2009a). Attributional biases in paranoia: the development and validation of the Achievement and Relationships Attributions Task (ARAT). *Cognitive Neuropsychiatry, 14,* 87-109. doi:10.1080/13546800902844197

Fornells-Ambrojo, M., & Garety, P. A. (2009b). Understanding attributional biases, emotions, and self-esteem in 'poor me' paranoia: Findings from an early psychosis sample. *British Journal of Clinical Psychology, 48,* 141-162. doi:10.1348/014466508X377135

Foster, C., Startup, H., Potts, L., & Freeman, D. (2010). A randomised controlled trial of a worry intervention for individuals with persistent persecutory delusions. *Journal of Behavioural Therapy and Experimental Psychiatry, 41,* 45-51.

Fowler, D., Freeman, D., Smith, B., Kuipers, E., Bebbington, P. E., Bashforth, H. . . . Garety, P. A. (2006). The Brief Core Schema Scales (BCSS): psychometric properties and associations with paranoia and grandiosity in non-clinical and psychosis samples. *Psychological Medicine, 36,* 749–759. doi:10.1017/S0033291706007355

Fowler, D., Hodgekins, J., Garety, P. A., Freeman, D., Kuipers, E., Dunn, G. . . . Bebbington, P. E. (2011). Negative cognition, depressed mood, and paranoia: A longitudinal pathway analysis using structural equation modeling. *Schizophrenia Bulletin, 38,* 1063-1073. doi:10.1093/schbul/sbr019

Freeman, D. (2007). Suspicious minds: the psychology of persecutory delusions. *Clinical Psychology Review, 27,* 425-457.

Freeman, D. (2011). Improving cognitive treatments for delusions. *Schizophrenia Research, 132,* 135-139. doi:10.1016/j.schres.2011.08.012

Freeman, D., & Freeman, J. (2008). *Paranoia: The 21st century fear.* Oxford: Oxford University Press.

Freeman, D., & Garety, P. A. (2000). Comments on the content of persecutory delusions: Does the definition need clarification? *British Journal of Clinical Psychology, 39,* 407-414.

Freeman, D., & Garety, P. A. (2004). *Paranoia: The psychology of persecutory delusions.* Hove: Psychology Press.

Freeman, D., & Garety, P. A. (2006). Helping patients with paranoid and suspicious thoughts: a cognitive–behavioural approach. *Advances in Psychiatric Treatment, 12,* 404-415.

Freeman, D., Garety, P. A., Bebbington, P. E., Slater, M., Kuipers, E., Fowler, D., . . . Dunn, G. (2005). The psychology of persecutory ideation II: A virtual reality experimental study. *Journal of Nervous and Mental Disease, 193,* 309-315. doi:10.1097/01.nmd.0000161686.53245.70

Freeman, D., Garety, P. A., Bebbington, P. E., Smith, B., Rollinson, R., Fowler, D., . . . Dunn, G. (2005). Psychological investigation of the structure of paranoia in a non-clinical population. *British Journal of Psychiatry, 186,* 427-435.

Freeman, D., Garety, P. A., Kuipers, E., Fowler, D., & Bebbington, P. E. (2002). A cognitive model of persecutory delusions. *British Journal of Clinical Psychology, 41,* 331-347.

Freeman, D., Pugh, K., Antley, A., Slater, M., Bebbington, P., Gittens, M. . . . Garety, P. (2008). Virtual reality study of paranoid thinking in the general population. *British Journal of Psychiatry, 192,* 258-263. doi:10.1192/bjp.bp.107.044677

Freeman, D., Pugh, K., Green, C., Valmaggia, L., Dunn, G., & Garety, P. A. (2007). A measure of state persecutory ideation for experimental studies. *The Journal of Nervous and Mental Disease, 195,* 781-784. doi:10.1097/NMD.0b013e318145a0a9

Freeman, D., Slater, M., Bebbington, P., Garety, P., Kuipers, E., Fowler, D. . . . Vinayagamoorthy, V. (2003). Can virtual reality be used to investigate persecutory ideation? *Journal of Nervous and Mental Disease, 191,* 509-514. doi:10.1097/01.nmd.0000082212.83842.fe.

Frith, C. D. (1992). *The cognitive neuropsychology of schizophrenia.* Hillsdale, NJ: Lawrence Erlbaum.

Garety, P. A., Bentall, R. P., & Freeman, D. (2008). Research evidence of the effectiveness of cognitive behaviour therapy for persecutory delusions: more work is needed. In, D., Freeman, R. P., Bentall, & , P. A. Garety (Eds.), *Persecutory Delusions: Assessment, Theory, and Treatment* (pp.329-350). Oxford: Oxford University Press.

Garety, P. A., & Freeman, D. (1999). Cognitive approaches to delusions: A critical review of theories and evidence. *British Journal of Clinical Psychology, 38,* 113-154.

Gilbert, P., Boxall, M., Cheung, M., & Irons, C. (2005). The relation of paranoid ideation and social anxiety in a mixed clinical population. *Clinical Psychology & Psychotherapy, 12,* 124–133. doi:10.1002/cpp.438

Gotlib, I. H. & Joormann, J. (2010). *Annual Review of Clinical Psychology, 6,* 285-312. doi:10.1146/annurev.clinpsy.121208.131305

Gracie, A., Freeman, D., Green, S., Garety, P. A., Kuipers, E., Hardy, A., . . . Fowler, D. (2007). The association between traumatic experience, paranoia and

hallucinations: a test of the predictions of psychological models. *Acta Psychiatrica Scandinavica, 116,* 280-289. doi:10.1111/j.1600-0447.2007.01011.x

Green, C., Garety, P. A., Freeman, D., Fowler, D., Bebbington, P., Dunn, G., & Kuipers, E. (2006). Content and affect in persecutory delusions. *British Journal of Clinical Psychology, 45,* 561-577.

Green, C. E. L, Freeman, D., Kuipers, E., Bebbington, P., Fowler, D., Dunn, G., & Garety, P. A. (2007). Measuring ideas persecution and reference: the Green et al. Paranoid Thoughts Scale (GPTS). *Psychological Medicine, 38,* 101-111. doi:10.1017/S0033291707001638

Green, C. E. L., Freeman, D., Kuipers, E., Bebbington, P., Fowler, D., Dunn, G., & Garety, P. A. (2011). Paranoid explanations of experience: A novel experimental study. *Behavioural and Cognitive Psychotherapy, 39,* 21-34. doi:10.1017/S1352465810000457

Green, M. J., & Phillips, M. L. (2004). Social threat perception and the evolution of paranoia. *Neuroscience and Biobehavioural Reviews, 28,* 333-342. doi:10.1016/j.neubiorev.2004.03.006

Grey, S., & Mathews, A. (2000). Effects of training on interpretation of emotional ambiguity. *The Quarterly Journal of Experimental Psychology, 53,* 1143–1162.

Hagen, R., & Turkington, D. (2011). Introduction: CBT for psychosis: A symptom based approach. In R. Hagen, D. Turkington, T. Berge, & R. W. Grawe (Eds.), *CBT for psychosis: A symptom based approach* (pp. 3-11). London: Routledge.

Hallion, L. S., & Ruscio, A. M. (2011). A meta-analysis of the effect of cognitive bias modification on anxiety and depression. *Psychological Bulletin, 137,* 940-958. doi:10.1037/a0024355.

Havner P. H., & Izard, T. E. (1962). Unrealistic self-enhancement in paranoid schizophrenics. *Journal of Consulting Psychology, 26,* 65-68.

Hawkins, K. A., & Cougle, J. R. (2013). Effects of interpretation training on hostile attribution bias and reactivity to interpersonal insult. *Behavior Therapy, 44,* 479-488.

Hayes, S., Hirsch, C. R., Krebs, G. & Mathews, A. (2010). The effects of modifying interpretation bias on worry in generalised anxiety disorder. *Behaviour Research and Therapy, 48,* 171-178. doi:10.1016/j.brat.2009.10.006

Heeren, A., Lievens, L., & Philippot, P. (2011). How does attention training work in social phobia: Disengagement from threat or reengagement to non-threat? *Journal of Anxiety Disorders, 25,* 1108-1115.

Heider, F. (1958). *The psychology of interpersonal relations.* New York: Wiley.

Hertel, P. T., & Mathews, A. (2012). Cognitive bias modification: Past perspectives, current findings, and future applications. *Perspectives on Psychological Science, 6,* 521-536. doi:10.1177/1745691611421205

Hertel, P. T., Mathews, A., Peterson, S., & Kintner, K. (2003). Transfer of training emotionally biased interpretations. *Applied Cognitive Psychology, 17,* 775-784. doi:10.1002/acp.905

Hirsch, C. R., Hayes, S. & Mathews, A. (2009). Looking on the bright side: Accessing benign meanings reduces worry. *Journal of Abnormal Psychology, 118,* 44-54.

Hirsch, C. R., & Mathews, A. (2000). Impaired positive inferential bias in social phobia. *Journal of Abnormal Psychology, 109,* 705-712. doi:10.1037/0021-843X.109.4.705

Hirsch, C. R., Mathews, A., & Clark, D. M. (2007). Inducing an interpretation bias changes self-imagery: A preliminary investigation. *Behaviour Research and Therapy, 45,* 2173-2181. doi:10.1016/j.brat.2006.11.001

Holmes, E. A., Lang, T. J., & Shah, D. M. (2009). Developing interpretation bias modification as a "cognitive vaccine" for depressed mood: Imagining positive events makes you feel better that thinking about them verbally. *Journal of Abnormal Psychology, 118,* 76-88.

Holmes, E. A., & Mathews, A. (2005). Mental imagery and emotion: A special relationship? *Emotion, 5,* 489-497.

Holmes, E. A., Mathews, A., Dalgleish, T., & Mackintosh, B. (2006) Positive interpretation training: Effects of mental imagery versus verbal training on positive mood. *Behaviour Therapy, 37,* 237-247.

Hoppitt, L., Mathews, A., Yiend, J., & Mackintosh, B. (2010a). Cognitive bias modification: The critical role of active training in modifying emotional responses. *Behavior Therapy, 41,* 73-81. doi:10.1016/j.beth.2009.01.002

Hoppitt, L., Mathews, A., Yiend, J., & Mackintosh, B. (2010b). Cognitive mechanisms underlying the emotional effects of bias modification. *Applied Cognitive Psychology, 24,* 312-325.

Humphreys, L., & Barrowclough, C. (2006). Attributional style, defensive functioning and persecutory delusions: Symptom-specific or general coping strategy? *British Journal of Clinical Psychology, 45,* 231-246. doi:10.1348/014466505X50509

Janssen, I., Vermissen, D., Campo, J. A., Myin-Germeys, I., Van Os, J., & Krabbendam, L. (2006). Attribution style and psychosis: evidence for an externalizing bias in patients but not in individuals at high risk. *Psychological Medicine, 36,* 771-778. doi:10.1017/S0033291706007422

Johns, L. C., & Van Os, J. (2001). The continuity of psychotic experiences in the general population. *Clinical Psychology Review, 21,* 1125-1141.

Jolley, S., Garety, P. A., Bebbington, P., Dunn, G., Freeman, D., Kuipers, E. . . . Hemsley, D. (2006). Attributional style in psychosis- The role of affect and belief type. *Behaviour Research and Therapy, 44,* 1597-1607. doi:10.1016/j.brat.2005.12.002

Kaney, S., & Bentall, R. P. (1989). Persecutory delusions and attributional style. *British Journal of Medical Psychology, 62,* 191-198.

Kaney, S., & Bentall, R. P. (1992). Persecutory delusions and the self-serving bias. Evidence from a contingency judgment task. *Journal of Nervous and Mental Disease, 180,* 773-780.

Kaymaz, N., Drukker, M., Lieb, R., Wittchen, H.-U., Werbeloff, N., Weiser, M., Lataster, T., & Van Os, J. (2012). Do subthreshold psychotic experiences predict clinical outcome in unselected non-help-seeking population-based samples? A systematic review and meta-analysis, enriched with new results. *Psychological Medicine, 42,* 2239-2253. doi:10.1017S0033291711002911

Kelleher, I., Harley, M., Lynch, F., Arseneault, L., Fitzpatrick, C., & Cannon, M. (2008). Associations between childhood trauma, bullying and psychotic symptoms among a school-based adolescent sample. *British Journal of Psychiatry, 193,* 378-382. doi: 10.1192/bjp.bp.108.049536

Kinderman, P. (1994). Attentional bias, persecutory delusions and the self-concept. *British Journal of Medical Psychology, 67,* 53-66. doi:10.1111/j.2044-8341.1994.tb01770.x

Kinderman, P., & Bentall, R. P. (1996a). A new measure of causal locus: the internal, personal and situational attributions questionnaire. *Personality and Individual Differences, 20,* 261-264.

Kinderman, P., & Bentall, R. P. (1996b). Self-discrepancies and persecutory delusions: evidence for a model of paranoid ideation. *Journal of Abnormal Psychology, 105,* 106-113.

Kinderman, P., & Bentall, R. P. (1997). Causal attributions in paranoia: Internal, personal and situational attributions for negative events. *Journal of Abnormal Psychology, 106,* 341-345.

Kinderman, P., Kaney, S., Morley, S., & Bentall, R.P. (1992). Paranoia and the defensive attributional style: Deluded and depressed patients' attributions about their own attributions. *British Journal of Medical Psychology, 65,* 371-383.

Kingdon, D., & Turkington, D. (2002). *The case study guide to cognitive behaviour therapy of psychosis.* Chichester: John Wiley & Sons.

Kingdon, D., & Turkington, D. (2005). *Cognitive therapy of schizophrenia.* New York: Guilford.

Koster, E. H. W., Fox, E., & MacLeod, C. (2009). Introduction to the special section on cognitive bias modification for emotional disorders. *Journal of Abnormal Psychology, 118,* 1-4.

Krabbendam, L., Myin-Germys, I., & van Os, J. (2004). The expanding psychosis phenotype. *International Journal of Psychology and Psychological Therapy, 4,* 411-420.

Kroenke ,K., Spitzer, R. L., Williams, J. B. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine, 16,* 606-613. doi:10.1046/j.1525-1497.2001.016009606.x

Kuipers, E., Garety, P., Fowler, D., Dunn, G., Bebbington, P., Freeman, D., & Hadley, C. (1997). London–East Anglia randomised controlled trial of cognitive-behavioural therapy for psychosis: I. Effects of the treatment phase. *British Journal of Psychiatry, 171,* 319-327.

Lang, T. J., Blackwell, S. E., Harmer, C. J., Davison, P., & Holmes, E. A. (2012). Cognitive bias modification using mental imagery for depression: Developing a novel computerized intervention to change negative thinking styles. *European Journal of Personality, 26,* 145-157. doi:10.1002/per.855

Lang, T. J., Moulds, M. L., & Holmes, E. A. (2009). Reducing depressive intrusions via a computerized cognitive bias modification of appraisals task: Developing a cognitive vaccine. *Behaviour Research and Therapy, 47,* 139-145. doi:10.1016/j.brat.2008.11.002

Langdon, R., Corner, T., McLaren, J., Ward, P. B., & Coltheart, M. (2006). Externalizing and personalizing biases in persecutory delusions: the relationship with poor insight and theory-of-mind. *Behaviour Research and Therapy, 44,* 699-713.

Langdon, R., Ward, P. B., & Coltheart, M. (2010). Reasoning anomalies associated with delusions in schizophrenia. *Schizophrenia Bulletin, 36,* 321-330. doi:10.1093/schbul/sbn069

Lange, W-G., Salemink, E., Windey, I.,. Keijsers, G. P. J., Krans, J., Becker, E. S., & Rinck, M. (2010). Does modified interpretation bias influence automatic

avoidance behaviour? *Applied Cognitive Psychology*, 24, 326-337. doi:10.1002/acp.1679

Lau, J. Y., Molyneaux, E., Telman, M. D., & Belli, S. (2011). The plasticity of adolescent cognitions: data from a novel cognitive bias modification training task. *Child Psychiatry and Human Development, 42,* 679-93. doi:10.1007/s10578-011-0244-3.

Lawrie, S. M., Hall, J., McIntosh, A. M., Owens, D. G. C., & Johnstone, E. C. (2010). The 'continuum of psychosis': scientifically unproven and clinically impractical. *The British Journal of Psychiatry, 197,* doi:10.1192/bjp.bp.109.072827

Lee, H. J. (2000). Attentional bias, memory bias and the self-concept in paranoia. *Psychological Science, 9,* 77– 99.

Lee, D. A., Randall, F., Beattie, G., & Bentall, R. P. (2004). Delusional discourse: An investigation comparing the spontaneous attributions of paranoid and non-paranoid individuals. *Psychology and Psychotherapy: Theory, Research and Practice, 77,* 525-540. doi:10.1348/1476083042555361

Leary, M. R. (1983). A brief version of the Fear of Negative Evaluation Scale. *Personality and Social Psychology Bulletin*, *9,* 371–375.

Lester, K. J., Mathews, A., Davison, P. S., Burgess, J. L., & Yiend, J. (2011). Modifying cognitive errors promotes cognitive well being: A new approach to bias modification. *Journal of Behavior Therapy and Experimental Psychiatry*. *42,* 298-308. doi:10.1016/j.jbtep.2011.01.001

Lincoln, T. M., Lange, J., Burau, J., Exner, C., & Moritz, S. (2010). The effect of state anxiety on paranoid ideation and jumping to conclusions. An

experimental investigation. *Schizophrenia Bulletin, 36,* 1140-1148. doi:10.1093/schbul/sbp029

Lincoln, T. M., Mehl, S., Exner, C., Lindenmeyer, J., & Rief, W. (2010). Attributional style and persecutory delusions. Evidence for an event independent and state specific external-personal attribution bias for social situations. *Cognitive Therapy Research, 34,* 297-302. doi:10.1007/s10608-009-9284-4

Lincoln, T. M., Mehl, S., Ziegler, M., Kesting, M-L., Exner, C., & Rief, W. (2010). Is fear of others linked to an uncertain sense of self. The relevance of self-worth, interpersonal self-concepts and dysfunctional beliefs to paranoia. *Behavior Therapy, 41,* 187–197.

Lincoln, T. M., Peter, N., Shäfer, M., & Moritz, S. (2010). From stress to paranoia: an experimental investigation of the moderating and mediating role of reasoning biases. *Psychological Medicine, 40,* 169-171. doi:10.1017/S003329170999095X

Lothmann, C., Holmes, E. A., Chan, S. W., & Lau, J. Y. (2011). Cognitive bias modification training in adolescents: effects on interpretation biases and mood. *Journal of Child Psychology and Psychiatry, 52,* 24-32. doi:10.1111/j.1469-7610.2010.02286.x.

Löwe, B., Decker, O., Müller, S., Brähler, E., Schellberg, D., Herzog, W. & Herzberg, P. Y. (2008). Validation and standardization of the Generalised Anxiety Disorder Screener (GAD-7) in the general population. *Medical Care, 46,* 266-274.

Lyon, H. M., Kaney, S., & Bentall, R. P. (1994). The defensive function of persecutory delusions: evidence from attribution tasks. *British Journal of Psychiatry, 164,* 637-646.

MacDonald, E. M., Koerner, N., & Antony, M. M. (2013). Modification of interpretive bias: Impact on anxiety sensitivity, information processing and response to induced bodily sensations. *Cognitive Therapy Research, 37,* 860-871. doi:10.1007/s10608-012-9519-7

Mackinnon, K., Newman-Taylor, K., & Stopa, L. (2011). Persecutory delusions and the self: An investigation of implicit and explicit self-esteem. *Journal of Behavior Therapy and Experimental Psychiatry, 42,* 54-64. doi:10.1016/j.jbtep.2010.05.003

Mackintosh, B., Mathews, A., Yiend, J., Ridgeway, V., & Cook, E. (2006). Induced biases in emotional interpretation influence stress vulnerability and endure despite changes in context. *Behavior Therapy, 37,* 209-222. doi:10.1016/j.beth.2006.03.001

MacLeod, C. (2012). Cognitive bias modification in the management of mental disorders. *Current Opinion in Psychiatry, 25,* 114-120. doi:10.1097/YCO.0b013e32834fda4a

MacLeod, C., Koster, E. H. W., & Fox, E. (2009). Whither cognitive bias modification research? Commentary on the special section articles. *Journal of Abnormal Psychology, 118,* 89-99.

MacLeod, C., Rutherford, E., Campbell, L., Ebsworthy, G., & Holker, L. (2002). Selective attention and emotional vulnerability: Assessing the causal basis of their association through the experimental manipulation of attentional bias.

Journal of Abnormal Psychology,111, 107-123. doi:10.1037/0021-843X.111.1.107

Martin, J. A., & Penn, D. L. (2001). Social cognition and subclinical paranoid ideation. *British Journal of Clinical Psychology, 40,* 261-265.

Martin, J. A., & Penn, D. L. (2002). Attributional style in schizophrenia: An investigation in outpatients with and without persecutory delusions. *Schizophrenia Bulletin, 28,* 131-141.

Mathews, A. (2012). Effects of modifying the interpretation of emotional ambiguity. *Journal of Cognitive Psychology, 24,* 92-105. doi:10.1080/20445911.2011.584527

Mathews, A., & Mackintosh, B. (2000). Induced emotional interpretation bias and anxiety. *Journal of Abnormal Psychology, 109,* 602–615. doi:10.1037/0021-843X.109.4.602

Mathews, A., & MacLeod, C. (1994). Cognitive approaches to emotion and emotional disorders. *Annual Review of Psychology, 45,* 25-50.

Mathews, A., & MacLeod, C. (2002). Induced processing biases have causal effects on anxiety. *Cognition & Emotion, 16,* 331-354. doi:10.1080/02699930143000518

Mathews, A., & MacLeod, C. (2005). Cognitive vulnerability to emotional disorders. *Annual Review of Clinical Psychology, 1,* 167-195. doi:10.1146/annurev.clinpsy.1.102803.143916

Mathews, A., Ridgeway, V., Cook, E., & Yiend, J. (2007). Inducing a benign interpretational bias reduces trait anxiety. *Journal of Behaviour Therapy and Experimental Psychiatry, 38,* 225-236. doi:10.1016/j.jbtep.2006.10.011

McKay, R., Langdon, R. & Coltheart, M. (2005). Paranoia, persecutory delusions and attributional biases. *Psychiatry Research, 136,* 233-245.

McKay, R., Langdon, R. & Coltheart, M. (2007). Jumping to delusions? Paranoia, probabilistic reasoning and need for closure. *Cognitive Neuropsychiatry, 12,* 362-376. doi:10.1080/13546800701203769

McKinnon, K., Newman-Taylor, K., & Stopa, L. (2011). Persecutory delusions and the self: An investigation of implicit and explicit self-esteem. *Journal of Behaviour Therapy and Experimental Psychiatry, 42,* 54-64. doi:10.1016/j.jbtep.2010.05.003

Mehl, S., Rief, W., Lüllmann, E., Ziegler, M., Müller, M. J., & Lincoln T. M. (2010). Implicit attributional style revisited: Evidence for a state-specific "self-decreasing" implicit attributional style in patients with persecutory delusions. *Cognitive Neuropsychiatry, 15,* 451-476. doi:10.1080/13546801003640419

Melo, S. S., Taylor, J. L., & Bentall, R. P. (2006). 'Poor me' versus 'bad me' paranoia and the instability of persecutory ideation. *Psychology and Psychotherapy: Theory, Research and Practice, 79,* 271-287. doi:10.1348/147608305X52856

Merrin, J., Kinderman, P., & Bentall, R. P. (2007). 'Jumping to conclusions' and attributional style in persecutory delusions. *Cognitive Therapy and Research, 31,* 741-758. doi:10.1007/s10608-006-9097-7

Miller, D. T. (1976). Ego involvement and attributions for success and failure. *Journal of Personality and Social Psychology, 34,* 901-906.

Mobini, S., Reynolds, S., & Mackintosh, B. (2013). Clinical implications of cognitive bias modification for interpretative biases in social anxiety: An integrative literature review. *Cognitive Therapy Research, 37,* 173-182.

Moritz, S., Burnette, P., Sperber, S., Köther, U., Hagemann-Goebel, M., Hartmann, M., & Lincoln, T. M. (2011). Elucidating the black box from stress to paranoia. *Schizophrenia Bulletin, 37,* 1311-1317. doi:10.1093/schbul/sbq055

Moritz, S., Kerstan, A., Veckenstedt, R., Randjbar, S., Vitzthum, F., Schmidt, C. . . . Woodward, T. S. (2011). Further evidence for the efficacy of a metacognitive group training in schizophrenia. *Behaviour Research and Therapy, 49,* 151-7. doi:10.1016/j.brat.2010.11.010

Moritz, S., & Woodward, T. S. (2007). Metacognitive training in schizophrenia: from basic research to knowledge translation and intervention. *Current Opinion in Psychiatry, 20,* 619-625.

Moritz, S., Woodward, T. S., Burlon, M., Braus, D. F., & Andresen, B. (2007). Attributional style in schizophrenia: evidence for a decreased sense of self-causation in currently paranoid patients. *Cognitive Therapy Research, 31,* 371–383. doi:10.1007/s10608-006-9070-5

Morrison, A., Read, J., & Turkington, D. (2005). Trauma and psychosis: theoretical and clinical implications. *Acta Psychiatrica Scandinavica, 112,* 327–329. DOI: 10.1111/j.1600-0447.2005.00644.x

Mullen, R. (2003). Delusions: the continuum versus category debate. *Australian and New Zealand Journal of Psychiatry, 37,* 5050-511.

Murphy, R., Hirsch, C. R., Mathews, A., Smith, K., & Clark, D. M. (2007). Facilitating a benign interpretation bias in a high socially anxious population. *Behaviour Research and Therapy, 45,* 1517-1529. doi:10.1016/j.brat.2007.01.007

National Institute for Health and Clinical Excellence (2009). *The NICE guideline on schizophrenia: Core interventions in the treatment and management of*

schizophrenia in adults in primary and secondary care (Updated edition). Leicester & London: The British Psychological Society & The Royal College of Psychiatrists.

Oltmanns, T. F., & Maher, B. A. (1988). *Delusional beliefs.* New York: John Wiley.

Orne, M. T. (1962). On the social psychology of the psychological experiment. *American Psychologist, 17,* 776-783.

Orne, M. T. (1969). Demand characteristics and the concept of quasi-controls. In R. Rosenthal & R. L. Rosnow (Eds.), *Artifact in behavioral research* (pp.143-179). New York: Academic Press.

Personal accounts of paranoia. Retrieved from http://www.iop.kcl.ac.uk/apps/paranoidthoughts/accounts/default.aspx

Peters, E. R., Joseph, S. A., & Garety, P. A. (1999). Measurement of delusional ideation in the normal population: Introducing the PDI (Peters et al. Delusions Inventory). *Schizophrenia Bulletin, 25,* 553-576.

Peters, K. D., Constans, J. I., & Mathews, A. (2011). Experimental modification of attribution processes. *Journal of Abnormal Psychology, 120,* 168-173. doi:10.1037/a0021899.

Peterson, C., Semmel, A., von Baeyer, C., Abramson, L. Y., Metalsky, G. I., & Seligman, M. E. P. (1982). The Attributional Style Questionnaire. *Cognitive Therapy Research, 6,* 287-299.

Randall, F., Corcoran, R., Day, J. C., & Bentall, R. P. (2003). Attention, theory of mind, and causal attributions in people with persecutory delusions: A preliminary investigation. *Cognitive Neuropsychiatry, 8,* 287-294. doi:10.1080/135468000057

Read, J. (1997). Child abuse and psychosis: A literature review and implications for professional practice. *Professional Psychology: Research and Practice, 28,* 228-456. doi:10.1037/0735-7028.28.5.448

Rietdijk, J., van Os, J., de Graaf, R., Delespaul, P., & van der Gaag, M. (2009). Are social phobia and paranoia related, and which comes first? *Psychosis: Psychological, Social and Integrative Approaches, 1,* 29-38. doi:10.1080/17522430802654105

Roberts, D. L., & Penn, D. L. (2009). Social cognition and interaction training (SCIT) for outpatients with schizophrenia: A preliminary study. *Psychiatry Research, 166,* 141-147. doi:10.1016/j.psychres.2008.02.007

Roberts, D. L., Penn, D. L. & Combs, D. (2006). *Social cognition and interaction training.* Unpublished treatment manual, University of North Carolina, Chapel Hill, NC.

Romme, M., & Escher, S. (1993). *Accepting voices.* London: Mind.

Rosenthal, R., & Rosnow, R. L. (1991). *Essentials of behavioural research: Methods and data analysis.* New York: McGraw-Hill.

Ross, L. (1977). The intuitive psychologist and his shortcomings: Distortions in the attribution process. In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology, Vol. 10* (pp. 173-220). New York: Academic Press.

Ross, K., Freeman, D., Dunn, G., & Garety, P. (2011). Can jumping to conclusions be reduced in people with delusions? An experimental investigation of a brief reasoning training module. *Schizophrenia Bulletin, 37,* 324-333.

Rutten, B. P. F., van Os, J., Dominguez, M., & Krabbendam, L. (2008). Epidemiology and social factors: findings from the Netherlands Mental Health Survey and Incidence Study (NEMESIS). In D. Freeman, R. Bentall, & P.

Garety (Eds.), *Persecutory delusions: Assessment, theory, and treatment* (pp. 53-72). Oxford: Oxford University Press.

Salemink, E., Hertel, P., & Mackintosh, B. (2010). Interpretation training influences memory for prior interpretations. *Emotion, 10,* 903-907. doi:10.1037/a0020232

Salemink, E., & van den Hout, M. (2010a). Trained interpretive bias survives mood change. *Journal of Behavior Therapy and Experimental Psychiatry, 41,* 310-315. doi:10.1016/j.jbtep.2010.02.010

Salemink, E., & van den Hout, M. (2010b). Validation of the "recognition task" used in the training of interpretation biases. *Journal of Behavior Therapy and Experimental Psychiatry, 41,* 140-144. doi:10.1016/j.jbtep.2009.11.006

Salemink , E., van den Hout, M. A., & Kindt, M. (2007a). Trained interpretive bias and anxiety. *Behaviour Research and Therapy, 45,* 329-340. doi:10.1016/j.brat.2006.03.011

Salemink , E., van den Hout, M. A., & Kindt, M. (2007b). Trained interpretive bias: Validity and effects on anxiety. *Journal of Behaviour Therapy and Experimental Psychiatry, 38,* 212-224. doi:10.1016/j.jbtep.2006.10.010

Salemink, E., van den Hout, M. A., & Kindt, M. (2009). Effects of positive interpretive bias modification in highly anxious individuals. *Journal of Anxiety Disorders, 23,* 676-683. doi:10.1016/j.jandis.2009.02.006

Salemink, E., van den Hout, M. A., & Kindt, M. (2010a). Generalisation of modified interpretative bias across tasks and domains. *Cognition and Emotion, 24,* 453-464. doi:10.1080/02699930802692053

Salemink, E., van den Hout, M. A., & Kindt, M. (2010b). How does cognitive bias modification affect anxiety? Mediation analyses and experimental data.

Behavioural and Cognitive Psychotherapy, 38, 59-66. doi:10.1017/S1352465809990543

Salemink, E., & Wiers, R. W. (2011). Modifying threat-related interpretive bias in adolescents. *Journal of Abnormal Child Psychology, 39,* 967-976. doi:10.1007/s10802-011-9523-5

Schartau, P. E. S., Dalgleish, T., & Dunn, B. D. (2009). Seeing the bigger picture: training in perspective broadening reduces self-reported affect and psychophysiological response to distressing films and autobiographical memories. *Journal of Abnormal Psychology, 188,* 15-27. doi:10.1037/a0012906

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference.* Boston: Houghton Mifflin.

Sharp, H., Fear, C., & Healy, D. (1997). Attributional style and delusions: an investigation based on delusional content. *European Psychiatry, 12,* 1-7. doi:10.1016/S0924-9338(97)86371-7.

Spitzer, R. L., Kroenke, K., Williams, J. B., Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of Internal Medicine, 166,* 1092-1097.

Sprong, M., Schothorst, P., Vos, E., Hox, J., & Van Engeland, H. (2007). Theory of mind in schizophrenia: Meta-analysis. *The British Journal of Psychiatry,191,* 5-13. doi:10.1192/bjp.bp.107.035899.

Standage, H., Ashwin, C., & Fox, E. (2010). Is manipulation of mood a critical component of cognitive bias modification procedures? *Behaviour Research and Therapy, 48,* 4-10. doi:10.1016/j.brat.2009.08.005

Steel, C. (2008). Cognitive behaviour therapy for psychosis: Current evidence and future directions. *Behavioural and Cognitive Psychotherapy, 36,* 705-712. doi:10.1017/S1352465808004785

Steel, C., Wykes, T., Ruddle, A., Smith, G., Shah, D. M., & Holmes, E. (2010). Can we harness computerised cognitive bias modification to treat anxiety in schizophrenia? A first step highlighting the role of mental imagery. *Psychiatry Research, 178,* 451-455. doi:10.1016/j.psychres.2010.04.042

Steinman, S. A., & Teachman, B. A. (2010). Modifying interpretations among individuals high in anxiety sensitivity. *Journal of Anxiety Disorders, 24,* 71-78. doi:10.1016/j.janxdis.2009.08.008

Strauss, J. S. (1969). Hallucinations and delusions as points on continua function: Rating scale evidence. *Archives of General Psychiatry, 21,* 581-586.

Thewissen, V., Bentall, R. P., Lecompte, T., van Os, J., & Myin-Germys, I. (2008). Fluctuations in self-esteem and paranoia in the context of daily life. *Journal of Abnormal Psychology, 117,* 143-153. doi:10.1037/0021-843X.117.1.143

Tran, T. B., Siemer, M., & Joormann, J. (2011). Implicit interpretation biases affect emotional vulnerability: A training study. *Cognition and Emotion, 25,* 546-558. doi:10.1080/02699931.2010.532393

Trower, P., & Chadwick, P. (1995). Pathways to defense of the self: A theory of two types of paranoia. *Clinical Psychology: Science and Practice, 2,* 263-278. doi:10.1111/j.1468-2850.1995.tb00044.x

Turner, R., Hoppitt, L., Hodgekins, J., Wilkinson, J., Mackintosh, B., & Fowler, D. (2011). Cognitive bias modification in the treatment of social anxiety in early psychosis: A single case series. *Behavioural and Cognitive Psychotherapy, 39,* 341-347. doi:10.1017/S1352465810000706

Van Os, J., Hanssen, M., Bijl, R. V., & Ravelli, A. (2000). Strauss (1969) revisted: a psychosis continuum in the general population? *Schizophrenia Research, 45,* 11-20.

Van Os, J., Linscott, R. J., Myin-Germys, I., Delespaul, P., & Krabbendam, L. (2009). A systematic review and meta-analysis of the psychosis continuum: evidence for a psychosis-proneness-persistence-impairment model of psychotic disorder. *Psychological Medicine, 39,* 179-195. doi:10.1017/S0033291708003814

Verdoux, H., Maurice-Tison, S., Gay, B., van Os, J., Salamon, R., & Bourgeois, M. L. (1998). A survey of delusional ideation in primary care patients. *Psychological Medicine, 28,* 127-134.

Waller, H., Freeman, D., Jolley, S., Dunn, G., & Garety, P. (2011). Targeting reasoning biases in delusions: A pilot study of the Maudsley Review Training Programme for individuals with persistent, high conviction delusions. *Journal of Behavior Therapy and Experimental Psychiatry, 42,* 414–421. doi:10.1016/j.jbtep.2011.03.001

Watkins, P. C. (2002). Implicit memory bias in depression. *Cognition and Emotion, 16,* 381-402.

Watson, D. & Friend, R. (1969). Measurement of social-evaluative anxiety. *Journal of Consulting and Clinical Psychology, 33,* 448-457.

Weeks, J. W., Heimberg, R. G., Fresco, D. M., Hart, T. A., Turk, C. L., Schneier, F. R., & Liebowitz, M. R. (2005). Empirical validation and psychometric evaluation of the Brief Fear of Negative Evaluation scale in patients with social anxiety disorder. *Psychological Assessment, 17,* 179-190. doi:10.1037/1040-3590.17.2.179

Weiner, B. (1986). *An attributional theory of motivation and emotion.* New York: Springer-Verlag.

Wiers, R. W., Gladwin, T. E., Hofmann, W., Salemink, E., & Ridderinkhof, K. R. (2013). Cognitive bias modification and control training in addiction and related psychopathology: mechanisms, clinical perspectives and ways forward. *Clinical Psychological Science, 1,* 192–212. doi:10.1177/2167702612466547

Wilson, E. J., MacLeod, C., Mathews, A., & Rutherford, E. M. (2006). The causal role of interpretive bias in anxiety reactivity. *Journal of Abnormal Psychology, 115,* 103-111. doi:10.1037/0021-843X.115.1.103

Winters, K. C., & Neale, J. M. (1985). Mania and low self-esteem. *Journal of Abnormal Psychology, 94,* 282-290.

Woud, M. L., Holmes, E. A., Postma, P., Dalgleish, T., & Mackintosh, B. (2012). Ameliorating intrusive memories of distressing experiences using computerized reappraisal training. *Emotion, 12,* 778-784. doi:10.1037/a0024992

Wykes, T., & Spaulding, W. D. (2011). Thinking about the future of cognitive remediation therapy- what works and could we do better? *Schizophrenia Bulletin, 37,* S80-90. doi:10.1093/schbul/sbr064.

Yiend, J. (2010). The effects of emotion on attention: A review of attentional processing of emotional information. *Cognition and Emotion, 24,* 3-47. doi:10.1080/02699930903205698

Yiend, J., Mackintosh, B., & Mathews, A. (2005). Enduring consequences of experimentally induced biases in interpretation. *Behaviour Research and Therapy, 43,* 779-797. doi:10.1016/j.brat.2004.06.007

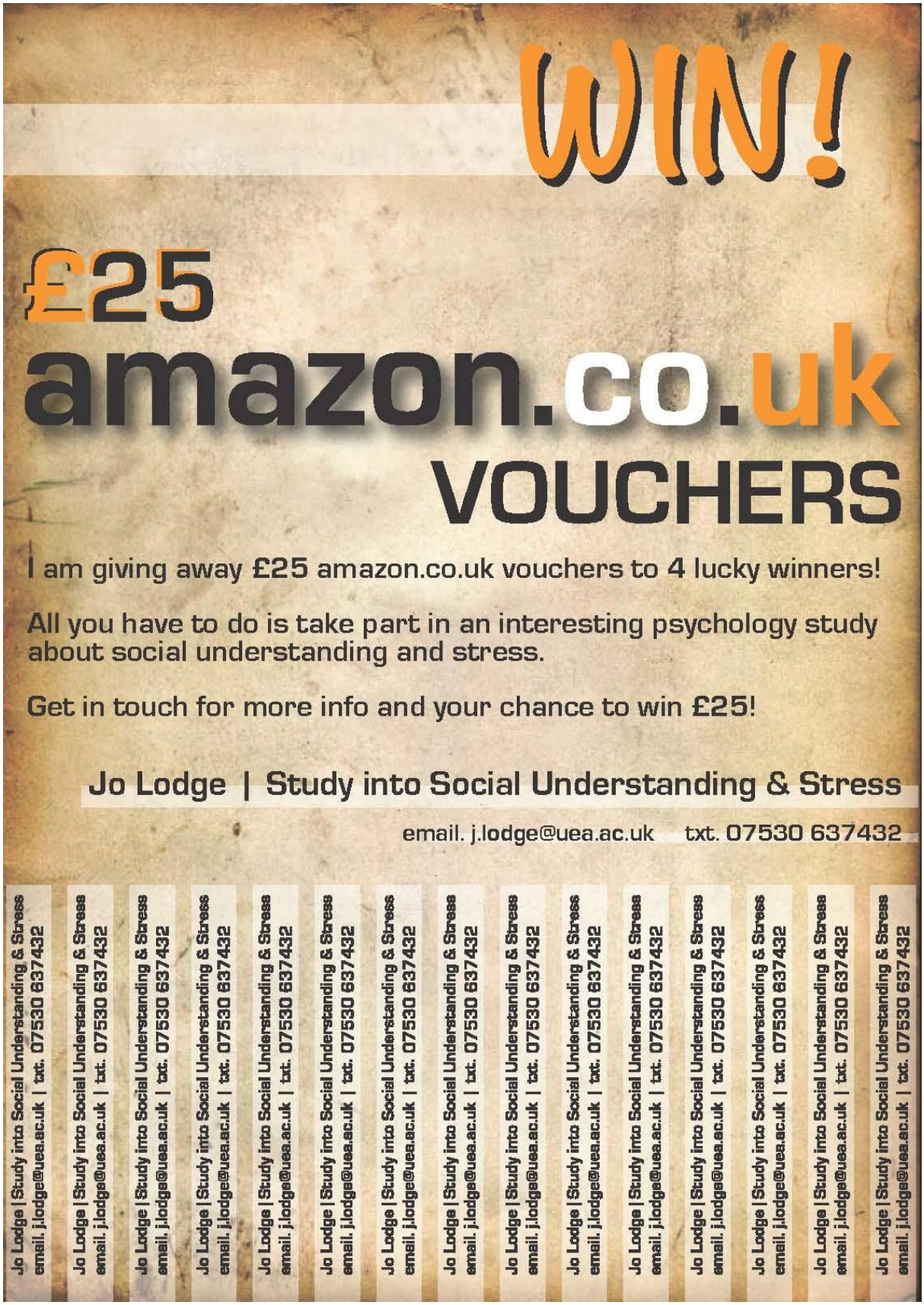
Yiend, J., Savulich, G., Coughtrey, A., & Shafran, R. (2011). Biased interpretation in perfectionism and its modification. *Behaviour, Research, and Therapy, 49,* 892-900. doi:10.1016/j.brat.2011.10.004

Yung, A. R., & McGorry, P. D. (1996). The prodromal phase of first-episode psychosis: Past and current conceptualizations. *Schizophrenia Bulletin, 22,* 353-370.

Zigmond, A. S., & Snaith, R. P. (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica, 67,* 361-370.

Zimmerman, G., Favrod, T. J., Trieu, V. H., & Pomini, V. (2005). The effect of cognitive behavioral treatment on the positive symptoms of schizophrenia spectrum disorders: A meta-analysis. *Schizophrenia Research, 77,* 1-9. doi:10.1016/j.schres.2005.02.018

Appendix A- Recruitment poster



Appendix B- Ethical Approval of Original Procedure

Faculty of Medicine and Health Sciences Research Ethics Committee

Jo Lodge
Post Graduate Research Office
Room 2.30
Elizabeth Fry Building
University of East anglia
Norwich NR4 7TJ

Research & Enterprise Services
REN West (SCI)
University of East Anglia
Norwich
NR4 7TJ

Email: fmh.ethics@uea.ac.uk
Direct Dial: +44 (0) 1603 59 157197

Web: http://www.uea.ac.uk

22nd November 2011

Dear Jo

An investigation of Cognitive Bias Modification for Paranoid Attributions: Reference 2010/2011-57

The amendments to your above proposal have been considered by the Chair of the Faculty Research Ethics Committee and we can confirm that your proposal has been approved.

Please could you ensure that any amendments to either the protocol or documents submitted are notified to us in advance and also that any adverse events which occur during your project are reported to the Committee. Please could you also arrange to send us a report once your project is completed.

The Committee would like to wish you good luck with your project

Yours sincerely

Yvonne Kirkham
Project Officer

Appendix C- Ethical Approval for Amendment to Procedure

Faculty of Medicine and Health Sciences Research Ethics Committee

University of East Anglia

Jo Lodge
DClinPsy
Postgraduate Research Office
Room 2.30, Elizabeth Fry Building
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Norwich NR4 7TJ

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Fax: 01603 591550
Email: fmh.ethics@uea.ac.uk

Web: www.uea.ac.uk/researchandenterprise

9th February 2012

Dear Jo

An investigation of Cognitive Bias Modification for paranoid attributions.
Reference no. 2010/2011-57

Thank you for your e-mail dated (20.01.12) notifying us of the amendments you would like to make to your above proposal. These have been considered by the Chair of the Faculty Research Ethics Committee and we can now confirm that your amendments have been approved.

Please can you ensure that any further amendments to either the protocol or documents submitted are notified to us in advance, and also that any adverse events which occur during your project are reported to the Committee.

Please can you also arrange to send us a report once your project is completed.

Yours sincerely,

Yvonne Kirkham
Project Officer

Appendix D- Information Sheet

Research Study: Social Understanding and Stress

~ Information Sheet ~

Please read this Information Sheet carefully before deciding to take part in the study. If you are happy to participate then you will be asked to sign a consent form when we meet.

Introduction

My name is Jo Lodge and I am a Trainee Clinical Psychologist studying here at UEA on the Doctoral Programme in Clinical Psychology. I am working on a research project as part of my course and would like to invite you to take part.

What the study is about

I am conducting a study about the emotional factors which influence how people think about social situations. We are testing whether a questionnaire and computer-based method can help people. You can ask me any questions about this and take your time to decide if you wish to take part.

What will happen in the study

If you agree to join in this study, we will meet for one session only in a room on the UEA campus for up to 90 minutes. The room will contain a desk and chair, computer, camera, and two monitors. Firstly I will go through what will happen and you can ask me any questions you have at this point. Then I will ask you to read and sign a consent form. Second, I will give you some questionnaires for you to fill out by yourself about different kinds of thoughts and feelings. Some people will either finish at this point or continue into the next phase of the study. Your credit for taking part is unaffected if you finish or continue at this point.

If you continue, I will ask you to do two tasks on the computer, then a paper task, followed by another questionnaire. I will ask you to rate how you are feeling at several points during the session.

Afterwards I can tell you more about the study and answer any queries you have about what you've done and what happens with your data.

Right to refuse or end participation in the study

Participation in this study is entirely voluntary and you may refuse to take part or continue at any point during or after the session. You do not need to give a reason. You can ask to

leave during the session and/or have your data destroyed, or refuse to answer any questions which you find uncomfortable.

Confidentiality and data protection

I will not record your name on your questionnaires or computer files with your data, as your data will be given a code and the information linking that code to your name will be kept separate from all other information. Your agreement to participate and your study data will be kept private and only I will have access to the data. The questionnaires will be stored in a locked cabinet on campus and computer data will be stored in password protected files. Nothing that can identify you will be kept with your answers or appear in any reports which are written about the study.

Possible Risks

I do not envisage any significant risks to you by taking part in this study, however if at any point you feel uncomfortable or need to take a break, you can choose to stop or leave the study. The questionnaires and tasks have been used before without causing any problems, however we will do our best to help with any issues that arise. We have contact details of places to go should any feelings arise which you feel you might need support with.

Potential Benefits

If you agree to participate there are no guaranteed direct benefits to you, however you will be entered into a prize draw to win one of four £25 Amazon vouchers to thank you for your participation. Also, the answers that you give may be useful in the future production of training materials to help people learn under stress.

Has the study been approved by UEA?

This study has been reviewed by the UEA Faculty of Health Research Ethics Committee and been given ethical approval to be conducted at the university.

Contact details

You can contact me about the study using the email address below, or the mobile number. For your information, Dr Margo Ononaiye is supervising this project.

Jo Lodge
Trainee Clinical Psychologist
j.lodge@uea.ac.uk
< TELEPHONE NUMBER >

Dr Margo Ononaiye
Senior Clinical Tutor in Clinical Psychology
m.ononaiye@uea.ac.uk

Thank you for taking the time to read this information sheet.
Please keep it for your own reference.

Appendix E- Consent Form

A research study by Joanna Lodge: Social Understanding and Stress

Consent Form

Have you ever sought help for a mental health problem before, such as an anxiety disorder, depression, paranoia, or psychosis? YES NO

If your answer is 'yes,' we cannot continue with the experiment, however you can still be entered in the prize draw if you wish.
If your answer is 'no,' we can continue.

Please INITIAL the following statements to indicate your agreement:

I have read and understood the Information Sheet for this study.	
I agree to take part in this study and for my data to be used for the purposes of the study outlined in the Information Sheet only.	
I understand that I can withdraw this consent and leave at any time.	
I understand that my data will be anonymous and will be securely stored separately from this sheet, during and after the study.	

Name of Participant: .....

Signature of Participant: .....

Date: .....

Name of Researcher: Joanna Lodge

Signature of Researcher: .....

Date: .....

Email address for contact about the prize draw .....

Do you wish to be emailed a summary of the findings? YES NO

Appendix F- Debriefing Sheet for Those Screened Out

A research study by Joanna Lodge: Social Understanding and Stress

Thank you for agreeing to take part in this study. However, we noticed that you scored high on a measure of anxiety, depression or paranoia. Therefore, we cannot continue with the study.

Below is some information about some places where you can seek advice or support if you feel you need to. The researcher will also give you some self-help materials you might be interested in using. Alternatively, we recommend you speak to the UEA counselling service or other welfare supports, or contact your local GP if you are feeling very worried or low.

Self Help and Information:

This link will take you to a website which has many different self-help leaflets for mental health issues written by clinical psychologists and using evidence-based methods:

Internet: http://www.ntw.nhs.uk/pic/selfhelp

Mind have published information sheets about different mental health issues here:

Internet: http://www.mind.org.uk/help/diagnoses_and_conditions/

UEA Counselling Service

UEA provides confidential counselling and support for any difficulties encountered while at UEA. This includes one-to-one person centred counselling, groupwork and workshops.

Call: 01603 592 651 *Email:* csr@uea.ac.uk

UEA Mental Health Coordinator

You can speak to a mental health advisor or coordinator Monday to Friday 9.00am-5.00pm by calling, emailing or dropping into the Reception of the Dean of Studies office.

Call: 01603 593 032 or 01603 593 774 *Email:* dos.reception@uea.ac.uk

Samaritans

The Samaritans offer confidential emotional support 24 hours a day. There is a local branch in Norwich city centre and a national network which anyone can access.

Call: 01603 611 311 or 08457 90 90 90.

Email: jo@samaritans.org *Write:* Chris, PO Box 9090, Stirling, KK8 2SA.

Visit: Walk-in 7 days a week 8.00am - 9.30pm. 19 St. Stephen's Square, Norwich, NR1 3SS.

Internet: www.norwichsams.org.uk for more information about the Norwich branch.

NHS Direct

For health advice and reassurance, 24 hours a day, 365 days a year.

Call: 0845 46 47 *Internet:* http://www.nhsdirect.nhs.uk/

Appendix G- Debriefing Sheet for Study Completers

University of East Anglia

Research Study: An investigation of Cognitive Bias Modification of Paranoid Attributions

~ Debriefing Sheet ~

Thank you for participating in this study.

What was the aim of this study?

The aim of this study was to investigate whether a type of training called Cognitive Bias Modification for Interpretations can help people make positive interpretations of ambiguous situations, even when under pressure.

What were the questionnaires about?

The questionnaires were asking about levels of anxiety, depression and paranoia as these are shown to be important in how people interpret different social situations.

What were the rating scales for?

The rating scales were designed to assess how you were feeling because this could affect how you perform on different types of tasks. It was also important for us to gauge the effects of the tasks on your feelings.

What was the first computer task?

This task is called Cognitive Bias Modification for Interpretations. It was designed to train people to interpret situations in a certain way. We used two types in the study, one designed to train a positive interpretation and one designed to have no impact on existing interpretation styles. In this study you did the positive / control condition. Both types will not have had any adverse effects.

What was the anagram task about?

The anagram task was designed to increase stress and thoughts about being watched and being tricked. The camera image was a live image only and was not recording you. The anagram task was designed to be very hard, and no one was expected to be able to do well at it. These features were important in order to increase self-consciousness and the stress which can trigger some paranoid feelings.

What was the memory task and last questionnaire?

The memory task was designed to test how you interpreted situations after being put under pressure. We wanted to see if training can protect people from making negative interpretations, as it could reduce their distress. The questionnaire was useful to test out feelings which were evoked.

What happens now?

The data from this study will be analysed and a doctoral thesis will be written by the researcher about the findings. It is possible that a report will also be submitted for publication in a psychology journal. If you wish to hear about the results of the study then the researcher can email you a summary of the findings. You will be contacted in May 2012 by email if you have won one of the four prizes.

Sources of Support

If anything you have read or experienced during the study has affected you or highlighted existing issues which you might like some help with, below are some places where you can seek advice or support, or we recommend you speak to your local GP. The researcher can also give you some useful self-help information.

Self Help and Information:

This link will take you to a website which has many different self-help leaflets for mental health issues written by clinical psychologists and using evidence-based methods:

Internet: http://www.ntw.nhs.uk/pic/selfhelp

Mind have published many information leaflets. There is a good leaflet about paranoia here:

Internet: http://www.mind.org.uk/help/diagnoses_and_conditions/paranoia

UEA Counselling Service

UEA provides confidential counselling and support for any difficulties encountered while at UEA. This includes one-to-one person centred counselling, groupwork and workshops.

Call: 01603 592 651 *Email:* csr@uea.ac.uk

UEA Mental Health Coordinator

You can speak to a mental health advisor or coordinator Monday to Friday 9.00am-5.00pm by calling, emailing or dropping into the Reception of the Dean of Studies office.

Call: 01603 593 032 or 01603 593 774 *Email:* dos.reception@uea.ac.uk

Samaritans

The Samaritans offer confidential emotional support 24 hours a day. There is a local branch in Norwich city centre and a national network which anyone can access.

Call: 01603 611 311 or 08457 90 90 90.

Email: jo@samaritans.org *Write:* Chris, PO Box 9090, Stirling, KK8 2SA.

Visit: Walk-in 7 days a week 8.00am - 9.30pm. 19 St. Stephen's Square, Norwich, NR1 3SS.

Internet: www.norwichsams.org.uk for more information about the Norwich branch.

NHS Direct

For health advice and reassurance, 24 hours a day, 365 days a year.

Call: 0845 46 47 *Internet:* http://www.nhsdirect.nhs.uk/

Appendix H- Patient Health Questionnaire (PHQ-9)

PHQ-9 Depression

Over the last two weeks, how often have you been bothered by the following problems? *Circle a number to indicate your answer.*	***Not at all***	***Several days***	***More than half the days***	***Nearly every day***
1. Little interest or pleasure in doing things.	0	1	2	3
2. Feeling down, depressed, or hopeless.	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much.	0	1	2	3
4. Feeling tired or having little energy.	0	1	2	3
5. Poor appetite or overeating.	0	1	2	3
6. Feeling bad about yourself- or that you are a failure, or have let yourself or your family down.	0	1	2	3
7. Trouble concentrating on things, such as reading a newspaper or watching television.	0	1	2	3
8. Moving or speaking so slowly that other people have noticed? Or the opposite- being so fidgety or restless that you have been moving around a lot more than usual?	0	1	2	3
9. Thoughts that you would be better off dead, or of hurting yourself in some way.	0	1	2	3
Column totals:	___ +	___ +	___ +	___

Total score = ___

From the Primary Care Evaluation of Mental Disorders Patient Health Questionnaire (PRIME-MD PHQ). The PHQ was developed by Drs. Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke and colleagues. For research information, contact Dr. Spitzer at rls8@columbia.edu. PRIME-MD® is a trademark of Pfizer Inc.

Appendix I- Generalised Anxiety Disorder scale (GAD-7).

GAD-7 Anxiety

Over the last two weeks, how often have you been bothered by the following problems? *Circle a number to indicate your answer.*	***Not at all***	***Several days***	***More than half the days***	***Nearly every day***
1. Feeling nervous, anxious or on edge.	0	1	2	3
2. Not being able to stop worrying, or control worrying.	0	1	2	3
3. Worrying too much about different things.	0	1	2	3
4. Trouble relaxing.	0	1	2	3
5. Being so restless that it is hard to sit still.	0	1	2	3
6. Being easily annoyed or irritated.	0	1	2	3
7. Feeling afraid as if something awful might happen.	0	1	2	3

Column totals: ___ + ___ + ___ + ___

Total score = ___

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	**Somewhat difficult**	**Very difficult**	**Extremely difficult**
☐	☐	☐	☐

Appendix J- Green et al. Paranoid Thoughts Scale (GPTS)

GPTS

Please read each of the statements carefully. They refer to thoughts and feelings you may have had about others over the last month. Think about the last month and indicate the extent of these feelings from 1 (Not at all) to 5 (Totally). Please complete both Part A and Part B.

(Note. Please do not rate items according to any experiences you may have had under the influence of drugs.)

Part A	*Not at all*		*Somewhat*		*Totally*
1. I spent time thinking about friends gossiping about me	1	2	3	4	5
2. I often heard people referring to me	1	2	3	4	5
3. I have been upset by friends and colleagues judging me critically	1	2	3	4	5
4. People definitely laughed at me behind my back	1	2	3	4	5
5. I have been thinking a lot about people avoiding me	1	2	3	4	5
6. People have been dropping hints for me	1	2	3	4	5
7. I believed that certain people were not what they seemed	1	2	3	4	5
8. People talking about me behind my back upset me	1	2	3	4	5
9. I was convinced that people were singling me out	1	2	3	4	5
10. I was certain that people have followed me	1	2	3	4	5
11. Certain people were hostile towards me personally	1	2	3	4	5
12. People have been checking up on me	1	2	3	4	5
13. I was stressed out by people watching me	1	2	3	4	5
14. I was frustrated by people laughing at me	1	2	3	4	5
15. I was worried by people's undue interest in me	1	2	3	4	5
16. It was hard to stop thinking about people talking about me behind my back	1	2	3	4	5

Part B	*Not at all*		*Somewhat*		*Totally*
1. Certain individuals have had it in for me	1	2	3	4	5
2. I have definitely been persecuted	1	2	3	4	5
3. People have intended me harm	1	2	3	4	5
4. People wanted me to feel threatened, so they stared at me	1	2	3	4	5
5. I was sure certain people did things in order to annoy me	1	2	3	4	5
6. I was convinced there was a conspiracy against me	1	2	3	4	5
7. I was sure someone wanted to hurt me	1	2	3	4	5
8. I was distressed by people wanting to harm me in some way	1	2	3	4	5
9. I was preoccupied with thoughts of people trying to upset me deliberately	1	2	3	4	5
10. I couldn't stop thinking about people wanting to confuse me	1	2	3	4	5
11. I was distressed by being persecuted	1	2	3	4	5
12. I was annoyed because others wanted to deliberately upset me	1	2	3	4	5
13. The thought that people were persecuting me played on my mind	1	2	3	4	5
14. It was difficult to stop thinking about people wanting to make me feel bad	1	2	3	4	5
15. People have been hostile towards me on purpose	1	2	3	4	5
16. I was angry that someone wanted to hurt me	1	2	3	4	5

Appendix K- Brief Fear of Negative Evaluation Scale (BFNE scale)

Brief Fear of Negative Evaluation Scale

Read each of the following statements carefully and indicate how characteristic it is of you according to the following scale:

1 = Not at all characteristic of me
2 = Slightly characteristic of me
3 = Moderately characteristic of me
4 = Very characteristic of me
5 = Extremely characteristic of me

_____ 1. I worry about what other people will think of me even when I know it doesn't make any difference.

_____ 2. I am unconcerned even if I know people are forming an unfavorable impression of me.

_____ 3. I am frequently afraid of other people noticing my shortcomings.

_____ 4. I rarely worry about what kind of impression I am making on someone.

_____ 5. I am afraid others will not approve of me.

_____ 6. I am afraid that people will find fault with me.

_____ 7. Other people's opinions of me do not bother me.

_____ 8. When I am talking to someone, I worry about what they may be thinking about me.

_____ 9. I am usually worried about what kind of impression I make.

_____ 10. If I know someone is judging me, it has little effect on me.

_____ 11. Sometimes I think I am too concerned with what other people think of me.

_____ 12. I often worry that I will say or do the wrong things.

From: Leary, M. R. (1983). A brief version of the Fear of Negative Evaluation Scale. *Personality and Social Psychology Bulletin, 9*, 371-376.

Appendix L- Brief Core Schema Scales (BCSS)

BELIEFS ABOUT THE SELF AND OTHERS

This questionnaire lists some beliefs that people can hold about themselves and other people.

Please indicate whether you hold each belief (NO or YES).

If you hold the belief, then please indicate how strongly you hold it by circling a number (1-4). Try to judge the beliefs on how you have generally, over time, viewed yourself and others. Do not spend too long on each belief. There are no right or wrong answers and the first response to each belief is often the most accurate.

MYSELF	**Do you believe this at all?**		**If 'YES,' how much?**	**Believe it slightly**		**Believe it moderately**	**Believe it very much**
I am unloved	NO	YES→	1	2	3	4
I am worthless	NO	YES→	1	2	3	4
I am weak	NO	YES→	1	2	3	4
I am vulnerable	NO	YES→	1	2	3	4
I am bad	NO	YES→	1	2	3	4
I am a failure	NO	YES→	1	2	3	4
I am respected	NO	YES→	1	2	3	4
I am valuable	NO	YES→	1	2	3	4
I am talented	NO	YES→	1	2	3	4
I am successful	NO	YES→	1	2	3	4
I am good	NO	YES→	1	2	3	4
I am interesting	NO	YES→	1	2	3	4
OTHER PEOPLE							
Other people are hostile	NO	YES→	1	2	3	4
Other people are harsh	NO	YES→	1	2	3	4
Other people are unforgiving	NO	YES→	1	2	3	4
Other people are bad	NO	YES→	1	2	3	4
Other people are devious	NO	YES→	1	2	3	4
Other people are nasty	NO	YES→	1	2	3	4
Other people are fair	NO	YES→	1	2	3	4
Other people are good	NO	YES→	1	2	3	4
Other people are trustworthy	NO	YES→	1	2	3	4
Other people are accepting	NO	YES→	1	2	3	4
Other people are supportive	NO	YES→	1	2	3	4
Other people are truthful	NO	YES→	1	2	3	4

Memory Test Stage 1

On the following pages are 10 short stories. Each story begins with a title which you should note, and ends with the last word having several letters blanked out (like the stories from before).

For example: ***l e _ t _ r is missing a 't' and an 'e' to make l e t t e r.***

TASK:
Read each title and story carefully. Write the correct letters in the spaces, and turn over to check your answer. Then answer the simple question by ticking yes or no.

When you are reading the stories, try to imagine them in your mind, as this will help you to remember them. You will be asked more about the stories in Stage 2, so it is important that you read them carefully.

Once you have read all 10 stories, ask the experimenter for the Stage 2 booklet.

1. Airport arrival

You have flown abroad for a summer holiday and are feeling excited as you leave the plane. You go through passport control and baggage claim, but you are surprised to be stopped on your way through

c _ s t o m _

c **u** s t o m **s**

Have you taken an aeroplane to another country?

Yes No

2. The job interview

You arrive for a job interview, and are told that one of the interviewers is someone you weren't expecting. The new interviewer is someone very senior in the company.
As you wait, you wonder why this was

c _ a n g _ d

c **h** a n g **e** d

Are the interviewers who you expected?

Yes No

3. The leaving lunch

Your colleague has arranged a leaving lunch for you as it is your last day at work today. They tell you to meet at a restaurant at 1pm. You arrive there on time, and wonder why you find yourself

a l o _ e

a l o **n** e

Have you gone out to a restaurant?

Yes No

4. Meeting a friend

Your friend works at the council and asks you to meet her after work one day. When you arrive at the council offices, you cannot see your friend outside. You walk towards the entrance of the building, and notice a CCTV camera following your

m _ v e m _ n t

m **o** v e m **e** n t

Is your friend waiting outside?

Yes No

5. The tutor's office

You hear that the staff suspect that some students on your course cheated on the last essay you all recently handed in. When your course tutor calls you into their office, you reflect on what you know about those

s _ u d _ n t s

s **t** u d **e** n t s

Have you done an essay recently?

Yes No

6. The canteen

Whilst you wait in the lunch queue in the canteen, a group of people walk past. You think that you hear several of them saying your name. You are curious about this, and then you see one of them turn in your direction and

s m _ l e

s m **i** l e

Was there a queue in the canteen?

Yes No

7. The helicopter

You walk out of your door onto the busy high street during rush hour. The traffic is at a standstill, and as you look to cross the road, you hear a whirring sound approaching above you. Looking up, you notice a helicopter which now appears to be hovering overhead. You wonder why it has chosen to stop

t h e _ e

t h e **r** e

Were you walking on a quiet street?

Yes No

8. The missing sunglasses

For your birthday, you were bought some very expensive sunglasses which you were really pleased with. One sunny day, you cannot find them anywhere in your bedroom. You go downstairs and wonder where they have

g _ n e

g **o** n e

Are you looking for your keys?

Yes No

9. The bus stop

One evening, you decide to get the bus home.
When you arrive at the bus stop, you see a group of young men hanging around. As you check the timetable, one of them comes towards you with something in his

h a _ d

h a **n** d

Are you on your way out to work?

Yes No

10. The police car

You are going on a long journey with friends, and are driving along on the motorway, listening to music and chatting. You hear a police siren in the distance. In your rear-view mirror you spot a police car flashing its lights, so you reduce your speed and pull into the slow

l a _ e

l a **n** e

Were you driving on a motorway?

Yes No

Memory Test Stage 2

Now we will test what you remember about the 10 stories you have just read.

TASK
For each story, you will see 4 different descriptions.
Your task is to rate how similar these descriptions are to the original meaning in those stories.

None of the descriptions will have exactly the same wording as the stories, but any number of them may describe a similar meaning.

Therefore, make sure you rate each description carefully.

1. Airport arrival

Please rate the following descriptions in terms of how similar in meaning they are to the story: 'Airport arrival.'

Tick *one* box for *each* statement.

1. You are stopped by customs officers as part of random checks.

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

2. You are stopped by customs officers for so long that you miss your transfer.

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

3. You are stopped by customs officers because they thought you were a criminal.

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

4. You are stopped by customs officers who are polite when questioning you.

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

2. The job interview

Please rate the following descriptions in terms of how similar in meaning they are to the story: 'The job interview.'

Tick *one* box for *each* statement.

1. The senior interviewer is late to start the interview.

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

2. The senior interviewer stepped in as someone was off sick.

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

3. The senior interviewer offers you the job.

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

4. The senior interviewer was chosen to intimidate and trick you.

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

3. A leaving lunch

Please rate the following descriptions in terms of how similar in meaning they are to the story: 'A leaving lunch.'

Tick *one* box for *each* statement.

1. **Your other colleagues are running a little late.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

2. **Your other colleagues want to embarrass you.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

3. **Your other colleagues are bringing a surprise present for you.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

4. **Your other colleagues think the restaurant is awful.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

4. Meeting a friend

Please rate the following statements in terms of how similar in meaning they are to the story: 'Meeting a friend.'

Tick *one* box for *each* statement.

1. **The camera operator shows the video of you to their friends.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

2. **The camera operator is at the end of their shift.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

3. **The camera is automatically activated by movement.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

4. **The camera operator is following and checking up on you.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

5. The tutor's office

Please rate the following statements in terms of how similar in meaning they are to the story: 'The tutor's office.'

Tick *one* box for *each* statement.

1. **The course tutor is asking everyone on the course what they know.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

2. **The course tutor wants to praise you on your last essay.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

3. **The course tutor thinks you will fail the course.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

4. **The course tutor accuses you of cheating.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

6. The canteen

Please rate the following statements in terms of how similar in meaning they are to the story: 'The canteen.'

Tick *one* box for *each* statement.

1. **The group knock over your lunch tray**.

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

2. **The group are laughing at you.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

3. **The group are being friendly towards you.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

4. **The group invite you to sit with them.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

7. The helicopter

Please rate the following statements in terms of how similar in meaning they are to the story: 'The helicopter.'

Tick *one* box for *each* statement.

1. **The helicopter is hurrying back to base.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

2. **The helicopter is monitoring the traffic.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

3. **The helicopter is following a high-speed car chase.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

4. **The helicopter is watching you.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

8. The missing sunglasses

Please rate the following statements in terms of how similar in meaning they are to the story : 'The missing sunglasses.'

Tick *one* box for *each* statement.

1. **You tread on your sunglasses on the stairs.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

2. **You think that your sunglasses have been stolen.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

3. **You expect your sunglasses to be in another room.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

4. **You find your sunglasses under your bed.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

9. The bus stop

Please rate the following descriptions in terms of how similar in meaning they are to the story: 'The bus stop.'

Tick *one* box for *each* statement.

5. **The young man threatens you with a knife.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

6. **The young man crosses the road to the opposite bus stop.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

7. **The young man shouts names at you.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

4. The young man has got out his bus pass ready for the bus.

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

10. The police car

Please rate the following statements in terms of how similar in meaning they are to the story: 'The police car.'

Tick *one* box for *each* statement.

1. **The police car pulls you over and arrests you.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

2. **The police car crashes around the corner.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

3. **The police car turns off its siren.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

4. **The police car passes you quickly.**

Very different	Fairly different	Fairly similar	Very similar
☐	☐	☐	☐

PDS Experiences Questionnaire

Please rate how you are feeling right now doing the experiment.

For each statement below, rate from 1 (not at all) to 6 (very often) the degree to which you have had these feelings here.

	Not at all		*Sometimes*			*Very often*
I'm disappointed from my performance	1	2	3	4	5	6
I feel that my behaviour is being analyzed	1	2	3	4	5	6
I feel that I do not have the energy to perform other tasks	1	2	3	4	5	6
I feel that people are hostile to me	1	2	3	4	5	6
I feel ashamed of my task performance	1	2	3	4	5	6
I feel that others are examining my actions	1	2	3	4	5	6
I do not have the appropriate abilities to perform the tasks	1	2	3	4	5	6
I do not trust other people's intentions.	1	2	3	4	5	6
I have doubts about my abilities and skills	1	2	3	4	5	6
I feel that people talk about me	1	2	3	4	5	6
I'm critical of my task performance	1	2	3	4	5	6
I feel that others are picking on me	1	2	3	4	5	6
I feel guilty about my task performance	1	2	3	4	5	6
I feel that others influence my performance	1	2	3	4	5	6
I feel that I'm less competent than others	1	2	3	4	5	6
I feel weak and tired	1	2	3	4	5	6
I feel helpless	1	2	3	4	5	6

Appendix O- Mood Visual Analogue Scales (VAS)

Time X

How are you feeling right now?

(please draw a X on each line)

Anxious

Not at all ——————————————— Extremely

Excited

Not at all ——————————————— Extremely

Suspicious

Not at all ——————————————— Extremely

Depressed

Not at all ——————————————— Extremely

Appendix P - CBM training materials including scores from validation

Draft CBM-I training materials for paranoid attributions of persecution

Some are new and taken from clinical accounts and common examples in paranoia literature or from my experience. Others are direct copies or adaptations of materials gained from Laura Hoppitt.

As the intended sample will be students without mental health issues the situations are designed to be relevant to this demographic.

Most of the scenarios are adaptations upon themes in the paranoia literature of interpreting neutral or negative situations as due to the malicious intentions of another person to cause oneself social, psychological or physical harm, such as:

- Being watched or followed or monitored
- Being attacked or hurt or mugged
- Being manipulated or conned
- Being burgled/robbed
- Being singled out
- Being humiliated or laughed at/talked about
- Being betrayed
- Being lied to or cheated
- Being discredited, or fired
- Being rejected
- Being driven crazy

The situations below are resolved by either:

1. a benign circumstance of the situation (external-situational attribution),
2. or a negative attribution of another's malicious intentions ('external-personal attribution').

Excluded materials in italics.

Ratings are listed at the end of the materials.

New materials designed for the study.

1. You are fast asleep at home when you wake up suddenly.
You hear the garden gate creaking outside and
something being knocked onto the ground.
You sit up in bed and think to yourself it must be a
cat/prowler
Do you feel scared about the noise?
Are you feeling relaxed about the noise?

2. One morning you get up feeling groggy from a terrible night's sleep.
You walk sleepily downstairs to make a hot drink. In the kitchen
you glimpse something moving out of the corner of your eye.
You drop your cup on the floor because you are
tired /attacked
Is there an intruder in your house?

Did your tiredness make you clumsy?

3. Your new housemate keeps leaving the kitchen in a mess so you remind them again about the house rules. The next day, the kitchen is spotless, but you find your favourite mug is broken.
You reckon that your mug was broken
accidentally/spitefully
Do you think your housemate sought revenge?
Do you think your housemate had good intentions?

4. As you arrive home and are looking for your keys, you notice the neighbour's curtain moving.
The next day you see the neighbour's curtain twitch again.
You guess the neighbour was
bored/spying
Do you feel suspicious about your neighbour?
Do you feel sorry for the neighbour?

5. One day you receive a letter telling you to pay up immediately.
You have no debts and don't reply,
but get another 2 days later telling you to phone immediately.
You guess that the letter was probably a
mistake/scam
Do you think the sender is trying to con you?
Does the letter seem just an inconvenience?

6. It's winter and you come home late to find the house in darkness.
When you flick the light switch nothing happens.
You are looking around for a torch, and
you presume there must be a
powercut/intruder
Did someone cut off your power on purpose?
Did the power go off by accident?

7. You have been very unwell with the flu and stayed in bed for over a week.
Several times you awoke to find strange shadows in your room.
Thinking back to these shadows,
you figure you must have been
delirious/watched
Was someone in your room?
Did the illness make you woozy?

8. You don't see much of your nextdoor neighbours
but hear that other people have made complaints.
Eventually they are evicted. As they leave,
they come to your house and are
apologetic/hateful
Have the neighbours come to hurt you?
Do the neighbours feel bad about their behaviour?

9. You notice a police car parked near to your house.
You start to wonder what they are doing.
Two policemen gets out and walk towards your house.
You immediately think they must be making
enquiries/arrests
Do the police think you've done something wrong?
Have the police come for information?

10. Whilst making a phonecall on your landline you hear
some clicking sounds and then it cuts out.
It keeps happening and you consider calling the phone company,
because you guess the line is
faulty/tapped
Is someone listening to your phone calls?
Does the phoneline need repairs?

11. You are moving into halls and don't know anyone yet.
A couple of people offer to help you carry your boxes from the car.
When you unpack you cannot find your private diary.
You guess it has been
left/stolen
Do you think someone took your diary on purpose?
Did your diary get left behind by accident?

12. Your doctor signs you off sick for two weeks.
You want to go back to work when you start to feel better.
Your boss offers you reduced hours to start with,
and you believe this must because they are
considerate/annoyed
Is your boss paying you back for having time off?
Does your boss care about your recovery from being unwell?

13. You copy some ideas for your essay off the internet
and confide in a friend that you feel worried about getting caught.
When you get questioned by your tutor about your essay,
you immediately blame your
sources/friend
Did your friend betray you?
Has the tutor got questions about your essay?

14. Your housemates throw a party whilst you're away.
When you get home, you discover that several things
of yours got broken. You decide that your housemates are
unlucky/mean
Have your housemates upset you?
Do you feel sorry for your housemates?

15. You are finding your flatshare too expensive
and tell a friend over the phone that you want to leave.
Later on, your flatmate asks if you want to move out.

You assume that your flatmate
guessed/eavesdropped
Do you suspect your flatmate listened to your phonecall?
Do you think your flatmate realised you had money problems?

16. You move into a new house and discover your walls are very thin.
One day you hear your neighbours
laughing and saying something like your name.
You guess that they are being
kind/critical
Do you think the neighbours dislike you?
Do the neighbours like you?

17. You hear the phone ring and go to answer it.
When you answer you can't hear anything so you hang up,
and then this happens 10 more times that evening.
You guess that the caller is a
callcentre/stalker
Do you feel afraid of the caller?
Do you think the calls are an accident?

18. You are vacuuming the carpet when you
notice the lights flicker and the vacuum goes off.
Realising the electricity has gone off, you go in search of the cause.
You anticipate that it was probably a
fuse/intruder
Are you expecting to find someone in your house?
Is the powercut accidental?

19. You confide in a friend about some problems in your relationship.
A couple of weeks later you are reading the local newspaper.
One of the problems on the 'agony aunt' page is very similar to yours.
You think this must mean your problems were
common/betrayed
Has your friend told your problem to a newspaper behind your back?
Do lots of other people have the same problem?

20. Your new neighbour lives alone, and warns you about the thin walls,
but one day you forget and are singing along to the radio.
You hear the neighbour start talking,
and guess that your neighbour must be
socializing/laughing
Is the neighbour making fun of you?
Do you think the neighbour has company?

21. The couple next door generally keep themselves to themselves,
but one day you overhear loud noises.
The next day you only see the man and ask if everything is ok.
He tells you his wife is gone, and then he looks really
sad/angry

Are you worried about the man hurting someone?
Do you feel sorry for the man?

22. You are looking for your favourite watch but can't find it anywhere.
You are upset because it was a gift that cost a lot of money.
Your housemate helps you look for it, but neither of you find it.
You start to suspect it has been
lost/stolen
Do you think someone has taken your watch?
Do you feel responsible for the watch's disappearance?

23. You share a house with several other people.
One day, you notice that things around the house
seem out of place somehow.
You wonder if someone has been
cleaning/stealing
Are you angry that things have been taken?
Are you pleased to have a tidy house?

24. You go to the hairdressers for a new hairstyle. You notice
another customer is reading a magazine while their hair is cut.
As your hairdresser finishes, you notice the other customer laughing.
You think that they must be laughing at the
magazine hairstyle
Do you feel annoyed that the other customer is mean about your hair?
Was the other customer amused by their magazine?

25. You head out in the car to go the supermarket.
In your rear view mirror you see another car pull out after you.
When you arrive at the supermarket, you notice the same
car is still right behind you. You conclude that they were
shopping/following
Were you followed to the supermarket on purpose?
Are you amused by the coincidence of going to the same shop?

26. You are in a bar and chatting with someone you just met.
They offer to buy you a drink which you gratefully accept.
When you get up, you notice that you are feeling a bit strange and unsteady.
You figure that your drink must have been
exotic/spiked
Did the other person try to trick you?
Do you think the other person was trying to be nice?

27. You are waiting in a queue at the post office when one of
the staff asks you to come to a separate queue.
This means you get served much more quickly than the others.
You notice one man staring in your direction and figure he must be
bored/hostile
Was the man angry that you jumped the queue?
Did the man find queuing dull?

28. You fell out with a friend last week and are hoping to make up,
when you spot them on the other side of the street.
You wave at them and call their name, but they do not respond.
You think that they must be
distracted/angry
Was your friend ignoring you on purpose?
Do you think your friend was concentrating on something else?

29. You get on the bus and notice a group of young teenagers
sitting at the back. You sit half-way up the bus, but then feel
something hit your shoulder. When you turn around and ask
what it was, one of the teenagers
apologises/laughs
Were the teenagers rude to you?
Do you think the teenager will feel bad about hitting you?

30. You leave work and walk down the street.
As you approach a car parked by the curb, it
suddenly pulls away. You guess that the driver
was concerned about being
late/caught
Was the driver up to no good?
Do you think the driver was in a hurry?

31. You go to the park with your young niece
and are playing on the swings.
You notice a man trying to lead a young child away from the park.
You guess that the man is a
father/paedophile
Are you worried about the man?
Do you think the man is caring?

32. You are walking down the street when you
look up and notice there are lots of CCTV cameras.
As you look, one of them turns in your direction.
You guess the cameras are there to check up on
everyone/you
Did the camera move towards you on purpose?
Do you think the camera operators look along the whole street?

33. Your partner is late home and tells you they were working late.
This happens more and more over the next month.
When talking with a friend about it,
you tell them that your partner is
conscientious/cheating
Do you think your partner been unfaithful?
Are you proud of how hard your partner is working?

34. You have a blind date and are getting ready when

you notice you have a big spot on your nose.
When you meet your date, they keep rubbing their nose.
You figure they are probably feeling
nervous/disgusted
Has your date noticed your spot?
Do you think your date likes you?

35. You join a new gym and go for an induction session.
The instructor shows you how to use the machines,
but next time you go, you struggle with one of the machines.
When a man looks over, you think he probably wants to
help /laugh
Does the man think you are silly?
Do you feel grateful for the man's concern?

36. Whilst you are travelling on the underground, it's so crowded that
you can't move. Your friend advises you to check your bag,
so you pull it towards you, but it won't move.
You guess it is getting
stuck/stolen
Is someone taking your bag?
Do you think your bag has got jammed amongst all the people?

37. You are out in the woods one evening walking your dog.
You stop for a moment to tie your shoelaces.
You hear something rushing towards you
and are knocked down by a
dog/man
Are worried that someone is attacking you?
Is another dog in the wood?

38. On a trip to London one day,
you decide to visit Buckingham Palace.
It's very crowded and you feel people pressed against you.
You struggle to find your camera because it has been
hidden/stolen
Has a thief been in your bag?
Have you kept your camera safe?

39. You go out for dinner with a friend. As you enter the restaurant,
you see two people in dark suits follow you in.
You notice that one of them keeps moving his hand up to his face.
You figure he must have a
cold/microphone
Are the suited men checking up on you?
Is the suited man unwell?

40. You have to go to the hospital for an intimate examination.
You are surprised when the doctor
asks if their trainees can watch.

You think that the trainees will find watching you informative/hilarious
Do you think you will feel humiliated by being watched?
Do you think the trainees find your appointment educational?

41. You are walking down the street when you notice a sports shop and cross over the street to visit it. A man crosses over just after you and follows you in. You guess he must be interested in sports/you
Do you feel uneasy about the man?
Do you think the man has similar interests to you?

42. You are sat under a tree in the park, when you see a young man taking photographs with a large camera. He gets quite close to where you are sitting and you guess he must be photographing trees/you
Do you feel uneasy about the man?
Is the man a nature photographer?

43. You are on a sightseeing trip with a group of friends and go to take a picture of them all together. A stranger offers to take the photo so that you can be in it too. After they take the camera, they begin to focus/run
Is the stranger stealing your camera?
Is the stranger helpful?

44. You are trying to hurry into town. You notice a group of schoolgirls laughing and whispering to each other as they walk past you. You guess that they are probably laughing about boys/you
Do the schoolgirls find you laughable?
Do the schoolgirls notice you?

45. Your best friend hasn't spoken to you for a few weeks. Then one evening they invite you over for dinner, and you both eat and drink a lot. On your way home you start to feel queasy and you think it must be caused by the wine/poison
Has your friend tried to hurt you?
Did you drink too much wine?

46. You are driving to work one morning and are pulled over by the police. They ask you lots of questions and want to breathalyse you even though it is only 8.30am. You do as they ask, thinking that this is procedure/persecution

Do you think that the police singled you out?
Do you feel that the police are just doing their job?

47. You go to the shop and buy a chocolate bar with a £20 note.
As you leave the shop, you realise the assistant
only gave you change for a £10 note.
You think this was clearly
accidental/theft
Are you angry with the shop assistant?
Has the shop assistant made an honest mistake?

48. As you wait in a cafe for your friend to arrive,
you hear someone angrily say "there they are!"
You turn around to see a stranger looking at you.
You guess the speaker was angry with
them/you
Is someone talking about you?
Are you witnessing an argument?

49. You are driving home and get stuck in a traffic jam.
You hear someone sounding their horn erratically
in the car behind you. You look in your mirror
and see the driver struggling to control their
child/temper
Are you frightened of the driver?
Is a child beeping the horn?

50. You are cycling home in rush hour and manage to
squeeze past some stationary cars to the front of the queue.
As you do so you hear one them start beeping their horn.
You think that the driver must be annoyed at
queuing/you
Are you concerned about the driver?
Do you feel pity for the driver stuck in the queue?

51. You recently came into some money and
decide to splash out shopping in an expensive designer store.
The shop assistant ignores you when you ask for a top in another size.
You guess the assistant is
oblivious/snobby
Does the shop assistant look down on you?
Do you think the shop assistant is distracted?

52. You go to a friend's wedding and find yourself surrounded
by people who are much wealthier than you.
They talk about yachts, high-flying jobs and meeting celebrities,
and you guess that they want to make you feel
excited/inferior
Are they trying to make you look small?
Are they being friendly with you?

53. At a party you start chatting to someone new, and soon
you discover they are working on very similar projects to you.
They ask you lots of questions about your work,
and you get the feeling that they want to
collaborate/compete
Are you concerned that they will try to do better than you?
Do you feel happy to share ideas with them?

54. You meet your partner's ex for the first time at a party.
You find that they spend a lot of time talking
about their job and how wonderful it is.
You guess that they are trying to be
nice/superior
Are they trying to make you look small?
Are they trying to be friendly?

55. You decide to take your mother out for a special meal.
You take her to a very expensive restaurant which you had
to book weeks in advance. The service at your table is very slow,
and you wonder if the staff are just too
overloaded pretentious
Do the waiters look down on you?
Are the waiters very busy?

56. You are waiting on a train station platform. You listen to
the usual announcements about security over the tannoy.
You notice a large suitcase with no one nearby.
You assume it is likely to be
forgotten/explosive
Are you feeling scared about the suitcase?
Do you feel sorry for the owner of the suitcase?

57. You park your car in a quiet car-park and get out to check
the ticket machine. As you do so, you hear the sound of
running footsteps. You see a man running towards you,
and he reaches into his pocket for his
keys/knife
Is the man going to harm you?
Is the man rushing back to his car?

58. You walk to the local shop one evening.
You notice a group of young teenagers with their hoods up.
One of them asks you for the time, and as you tell them,
you think they will be
grateful/offensive
Are you reluctant to speak with the teenagers?
Will the teenagers thank you?

59. You are leaving the pub after a night out with friends.

You wait in a long taxi queue and are finally at the front.
When a man behind you jumps forward and opens the
door to the next taxi, you realise he's being
polite/rude
Did the man intentionally jump the queue?
Was the man opening the door for you?

60. You have met a friend for coffee. Whilst you are
chatting, their mobile phone rings.
They tell the caller they are with you, laugh, and then end the call.
You guess the caller must have thought you were
nice/laughable
Were they being mean about you?
Do the caller and your friend like you?

61. As you walk into town one day, you see some teenagers
hanging out by the road, and one of them asks you for a light.
You explain to them that you don't smoke, and walk on.
As you go past, you hear them start
chatting/jeering
Did the teenagers respond in a mean way?
Did the teenagers go back to what they were doing?

62. You are sat on the tube opposite some people.
You have to travel several stops, and notice that
a girl sitting opposite keeps looking at you.
You decide that she is probably
bored/staring
Is the girl looking around in boredom?
Is the girl opposite staring at you?

63. You are with a group of friends
when one of them makes a subtle dig at you.
The group laughs and then moves onto teasing someone else.
You feel that your friend wanted you to be
included/humiliated
Were they being spiteful?
Is the banter friendly?

64. You go out for drinks with your colleagues and end up
being persuaded to sing at a karaoke bar.
The next day, everyone is looking at a video of you singing.
You think that the colleague who filmed it thought you'd be
amused/humiliated
Do you feel ridiculed by your colleague?
Are you feeling warm towards your colleague?

65. You have to give a presentation in a seminar with another student.
You decide to take turns in presenting the slides, but your co-presenter
ends up taking over so you start worrying about your own grade.

You assume that they were just
forgetful/selfish
Do you think they took over on purpose?
Are you forgiving of them?

66. You have been struggling with an assignment and ask your tutor for help. They tell you they cannot see you and suggest you check the question and try your best.
You think that the tutor said this because they were very busy/exasperated
Did the tutor think your request was stupid?
Do you think the tutor would have helped if they had more time?

67. In a lecture, you find your mind wandering to the party you're holding that evening. A classmate interrupts your thoughts to ask if they can come to the party. You wonder how they knew you were thinking about it, and conclude that they just read your
Facebook/mind
Do you think this person is telepathic?
Do you think your Facebook profile gave away your party?

68. Your company has been struggling and announces they have to make redundancies. When you meet with your boss they tell you it's bad news and apologise for making you redundant.
You think that your boss seemed very
genuine/smug
Do you think your boss is pleased to fire you?
Do you think your boss feels bad about making you redundant?

69. After failing you on an assignment, you notice that one of your tutors always seems to be more critical than other ones.
Only some of the other students agree with this observation.
You surmise that this tutor's criticism might be
constructive/personal
Do you feel persecuted by this tutor?
Do you think this tutor's feedback is helpful?

70. You are struggling for money and ask for more hours at work.
Later, you see your boss speaking to your immediate supervisor, and then she tells you that she cannot increase your hours.
You put this down to the
recession/supervisor
Are you feeling annoyed at your supervisor?
Are you frustrated by the impact of the slow economy?

71. You go into work and find everyone is in a meeting.
You hear later that they were discussing cost-cutting.
As you were not invited, you wonder why not.
You come to the conclusion that it was
accidental/malicious

Are you feeling worried about your job?
Do you think this would happen again?

72. You get stuck in traffic and are late to meet a group of your friends.
When you arrive they all go quiet.
You apologise for being late and your friends say
that they think you were
unlucky/rude
Are your friends irritated with you?
Do your friends feel sorry for you?

73. You have to introduce yourself to a new team at work
but got held up and are now running late.
When you arrive in the meeting room, the new team goes silent.
As you apologise you guess their silence was out of
respect/hostility
Do the team dislike you?
Are the team polite for you?

74. It is your first day at work, and you feel nervous about your new outfit.
You arrive and find you are overdressed compared to other people.
When you are introduced to the team, people continue chatting.
You guess they must be talking about
work/you
Are the team unfriendly toward you?
Are the team busy?

75. You arrange to meet your colleagues for lunch in the canteen,
but only get there at the end of the lunch break.
Everyone turns to look at you as you walk in.
You think it must be because they were
concerned/angry
Did your colleagues get mad at you for letting them down?
Did your colleagues worry about whether you were ok?

76. You are waiting outside the boss' office to interview for a promotion.
A colleague comes out of the interview looking flushed.
They rush into you and spill their coffee down your shirt.
You guess that it was
accidental/tactical
Did your colleague stain your shirt on purpose?
Did your colleague have a clumsy accident?

77. You are working in a shop, and hear that the cash register was £50
down yesterday. The boss says that another colleague saw you take it.
You didn't take it and wonder what the colleague was thinking.
You guess that they must be
mistaken/deceitful
Did your colleague try to frame you for theft?
Did your colleague mistake you for someone else?

78. You have an important document on a memory stick but can't find it.
You ask your colleagues at work about it but no one can find it.
You miss your deadline and your colleague gets their idea chosen instead.
When your memory stick turns up the next day, you blame your
untidiness/colleague
Do you think your colleague hid the memory stick from you?
Do you blame yourself for being disorganised?

79. You are thinking about taking up a sport to get fit,
as you feel sensitive about having gained a little weight recently.
As you walk into the sports centre, you hear the words "so fat!"
and think someone is probably referring to
themselves/you
Are they calling you names?
Do they have similar concerns to yourself?

80. You are waiting to get your mark back about your latest essay.
Everyone gets their mark back except you, and all say that they passed.
You are told that yours has been delayed.
You think that the marker must be
busy/mean
Do you think yours is delayed on purpose?
Do you think the marker has lots of things to do?

81. You are on Facebook and someone from school
(who you haven't seen for years) tags you in a very old photo.
You think that the old schoolfriend
was trying to make you feel
nostalgic/humiliated
Are you embarrassed to see the photo?
Are you pleased to see the photo?

82. You update your status on Facebook to say
that you are having a hard time.
An acquaintance indicates that they "like" your status.
You reckon that they are showing their
support/spitefulness
Do you think the acquaintance is nasty?
Is the acquaintance being sympathetic to you?

83. You are on Facebook and notice the total number of your friends
has gone down. You work out that someone from your class
has deleted you, but is still friends with some others.
You decide that they think you are not that
close/interesting
Does your classmate think you are too boring?
Do you feel ok because you don't know each other well anyway?

84. You have been dating someone new, and when out one day

they spend a lot of time answering text messages
that makes them smile. They tell you it's nothing,
and you think that it must be a
friend/lover
Do you suspect you date is deceiving you?
Are you happy for your date?

85. You have been on a couple of dates with someone,
but when you try to arrange another date
they can't make any of the times you suggest.
You reckon that they must be
busy/cheating
Do you think that your date has found someone else?
Do you think your date leads an active life?

86. You confide in one of your colleagues about
some issues you've had at work lately. Later on,
you overhear some other people at work say your name.
You guess that you were
popular/betrayed
Did your colleague tell others about your issues?
Do people at work like you?

87. You make a mistake at work and your
boss advises you how to avoid it in the future.
Your colleagues hear about your mistake
and tell you that they think it was
understandable/inexcusable
Did your colleagues look down on you for your mistake?
Were your colleagues supportive about your mistake?

88. You are promoted to supervisor in your job over
some other workmates. In the following weeks
your receive several abusive texts from a withheld number.
You assume it must be a
mistake/workmate
Are you upset with your workmate about the texts?
Do you think that someone dialled your number by accident?

89. As you walk out of a shop, the alarm starts to go off.
The security guard looks at you
and thoroughly checks your bags.
You wonder whether the alarm was set off
accidentally/purposefully
Do you think the security guard thought you were a thief?
Do you think the security guard was just obliged to search you?

90. You are playing pool with your friends
when someone new offers you a game.
You win the first game, and agree to a bet on the outcome of a next.

They beat you very quickly and you realise you've been
unlucky/hustled
Did the person try to trick you out of money?
Did the person have a lucky game?

91. You go to an art gallery, and whilst
looking at some installations you notice an old friend.
You walk up to them but they do not respond.
You guess that they are
enthralled/irritated
Are they annoyed at your interruption?
Are they enjoying the art installation?

From existing physical threat CBM-I materials.

92. You are on your own watching TV.
You must have been dozing, because you suddenly wake up.
You have the impression that you heard a noise somewhere
and guess that it came from the
television/hallway
Is there an intruder in the hallway?
Were you woken by the television?

93. You are lying in bed late at night reading.
From the kitchen you can hear a sound like a faint rattle.
Listening carefully you feel sure
that it is the sound of the
freezer/burglar
Are you being burgled?
Is your freezer very noisy?

94. You wake up in the middle of the night, thinking you heard a noise.
You are alone, but everything seems quiet so you settle down again.
Just as you close your eyes you hear
a soft noise that sounds like
birds/footsteps
are you frightened that there is an intruder?
Are you woken by the sound of birds on the roof?

95. Looking out of your front window you see a group of
teenagers running along your road and throwing stones.
One hits your window and you go out to talk to them.
When they see you, they turn to
apologise/attack
Are you frightened by the teenagers?
Do the teenagers express remorse for their mistake?

96. You are expecting a call from your partner, who is away for the night.
The phone rings earlier than the expected time.
At first you cannot hear anything, and ask if anyone is there.

All you can hear is the sound of
static/breathing
Are you troubled by the sound?
Do you think there is a problem with the line?

97. You are going out for a moment and leave your keys under the mat.
As you walk out you bump into a stranger,
who asks you if you know someone whose name you don't catch.
Then you realize that he is really looking for your
neighbor/keys
Are you worried the man is a burglar?
Is the man looking for someone living nearby?

98. You are at home when you hear someone knocking on the door.
It is someone you have never seen before,
saying he is here to read the electricity meter.
You ask him for identification and he pulls out a
card/blade
Are you scared the man will hurt you?
Are you happy to let him in?

99. You are watching TV at home when you hear a sudden loud noise outside.
You run outside and see a car driving away.
As it accelerates you hear more explosive bangs from the car,
and identify these as
backfiring/shots
Do you feel in danger?
Do you think that the car needs to get fixed?

100. You are returning to your car on a blustery evening,
and can hear that the alarm is going off.
You approach your car and turn off the alarm.
You check the car over and expect the alarm was set off by the
wind/vandals
Do you expect to find the car damaged?
Do you think your alarm has gone off by accident?

101. You are working alone at your local corner shop one evening,
when two large men come in and walk up to you.
There are already lots of people in the queue.
One of the men looks at you and asks for
assistance/money
Are the men trying to rob you?
Do the men want some help from you?

102. You are on a train coming home from an evening out.
There are only two of you left in the carriage.
You stand up as the train approaches your station, and so does
the other person. As the door opens, he
leaves/attacks

Is the other person frightening?
Do you guess that he lives in the same area as you?

103. You are having a quiet drink in a bar with a friend,
but are repeatedly interrupted by a drunk.
When your friend asks him to leave you alone, he glares at you.
When you leave, the stranger is waiting outside for a
taxi/fight
Are you worried about the man's intentions?
Do you feel safe outside?

104. You are on a driving holiday abroad.
When you pull over at a petrol station,
a man comes up to your car and asks for directions.
He pulls out what looks like a
map/gun
Are you scared the man will hurt you?
Is the man lost?

105. You call in at a shop on your way home. As you go in,
you see two men with their backs to you, talking to the shopkeeper.
You go up to the counter and they turn around,
letting you see their
badges/knives
Are you in danger?
Do you feel reassured that the shop is safe?

106. You are in a crowded department store looking for a wedding present.
You see a woman put a large bag on the floor and,
after a moment, hurry out of the door.
You look in the bag, and see she has left a
gift/bomb
Is she a terrorist?
Has the women been absentminded in leaving behind her shopping?

107. You are walking down a busy high street one Saturday afternoon
when you see a homeless person standing in front of you.
You walk around him but he waves his hand at you.
You see he is holding a
magazine/knife
Does he want to hurt you?
Is he trying to earn a living?

108. You take your teenage niece on the bus into town to go shopping.
The bus is very crowded with teenagers, shouting to each other.
A young man lurches up to you and your niece
and raises his fist in a
greeting/threat
Are you worried about the young man?
Is the young man being friendly?

109. Walking in town one evening, you see a group of homeless people
sitting on the pavement ahead of you.
As you approach, they ask you for money.
You walk past and one of them picks up what looks like a
guitar/weapon
Do you think they are angry with you?
Are they going to play music?

110. You visit a large store that is advertising a sale.
The store is packed but you manage to buy some shoes at a bargain price.
On your way out, two people push into you.
Checking for your wallet, you find it is
fine/stolen
Have you been mugged?
Do you still have your wallet?

111. You are out with friends in the street on New Years eve,
when you see a disturbance ahead of you.
You try to stay clear but cannot get away before some people grab you.
Then you see they are a group of
dancers/muggers
Do you worry about getting mugged?
Are you enjoying the celebrations?

112. On your way to a gig, you park your car in a nearby alley.
As you lock the car and walk towards the venue,
you notice a group of youths walking behind you.
You turn around and see that they are holding
tickets/weapons
Do you think they are going to attack you?
Are the youths going to the gig?

113. You have gone to a house party with some new friends.
You are surprised to find that you are feeling dizzy after only one drink.
A few moments later you are aware that someone is trying to lead you away.
You guess that it must be a
friend/rapist
Are you scared of them?
Are they being helpful?

114. You are walking home alone at night, and as you turn down one street
you see that the power must be out as the lights are all off.
There is a dark shape half-hidden in the hedge
by your route that you recognise as a
postbox/stranger
Is there a stranger hiding in the dark?
Do you feel safe walking home?

115. At the local post office, you leave your new car parked by the kerb.

While getting your stamps, you look outside
and see a group of youths standing around your car
giving it a thorough
inspection/bashing
Are they vandalising your car?
Are they admiring your car?

116. You are jogging through the park as it starts to get dark.
You hear the sound of someone running behind you
and wonder whether they are coming in your direction.
As they approach you turn and see a
jogger/knife
Are they there to attack you?
Are they there to keep fit?

From existing social anxiety CBM-I materials.

117. You overhear some work colleagues
discussing other people that they like
and hear your name mentioned.
You think that they talked about you because you were
nearby/disliked
Do you think they were being mean about you?
Were they talking about people who were in the office?

118. Your boss calls a meeting to discuss a new project.
You are asked to contribute your ideas to the discussion,
and then a colleague counters with a different view to yours.
You see your colleague's comments as
useful/insulting
Do you think your colleague was being critical of you?
Do you think your colleague was helping the team?

119. Your firm decides to raise money for a local charity.
You are put in charge of organising your department's fundraising
but your department raises the least amount of money.
The firm puts this down to your
department/incompetence
Do you feel blamed by your firm?
Does your firm understand that the whole department was responsible?

120. You are invited to a charity fancy dress ball and decide
to wear a rather outrageous costume. The next day
you find that your photograph is in the local newspaper with a report.
You think the photographer wanted you to feel
proud/embarrassed
Were you being ridiculed in the paper?
Were you being honoured in the paper?

121. You buy a new camera, but when you get it home, you

decide that you cannot really afford it. You return it to the store to get your money back, and the assistant goes to get the manager. You guess that the assistant is being thorough/obstinate
Do you feel that they are being especially difficult with you?
Was the shop assistant being professional?

122. As you are walking down a crowded street, you see your neighbour on the other side.
You call out but they do not answer you.
You think that this must be because they were preoccupied/annoyed
Was the neighbour ignoring you on purpose?
Was the neighbour's attention elsewhere?

123. You go out to a club with your friends. While dancing, you spot an old friend and wave at them. They do not respond and after a moment, turn and leave the dance floor, heading for the bar.
You decide that this is because they were preoccupied/irritated
Has something about you annoyed your friend?
Was the friend thinking about other things?

124. When you walk into your evening class, you hear some of the students talking about other people. As you walk closer to them, you overhear your name. When they see you, they smile and greet you.
You feel they are being friendly/insincere
Are they trying to cover up their dislike towards you?
Were they saying nice things about you?

125. Whilst shopping, you buy a new jacket on the spur of the moment. When home, you decide that you don't really like it that much and take it back to the shop. The assistant asks lots of questions and their attitude strikes you as professional/suspicious
Does the assistant think you've done something wrong?
Does the assistant treat you properly?

126. Your partner asks you to go to an anniversary dinner that their company is holding. You have not met any of their work colleagues before. Getting ready to go, you think that the new people you will meet will be interesting/competitive
Are you dreading the dinner?
Are you looking forward to the dinner?

127. Whilst at the hairdressers, you are persuaded to try a completely different cut.
In doubt about it, you ask a friend,

who comments that the style makes you look attractive/ridiculous
Do you feel that your friend has ridiculed you?
Do you feel supported by your friend?

128. Recently, you argued with your brother. You decide to break the ice by asking him out for a drink. You get ready and as you are about to leave, he phones to say he can't make it after all.
You think that this is probably because he has a cold/grudge
Is your brother still mad at you?
Are you concerned your brother may be ill?

CBM-I Training Materials- Ratings for Draft Items by Two Raters

Selected materials in bold.
Rejected materials in italics.

Situation	Rater 1	Rater 2	Mean Rating
1	**8**	**8**	**8.00**
2	**6**	**8**	**7.00**
3	**9**	**9**	**9.00**
4	**9**	**8**	**8.50**
5	*7*	*6*	*6.50*
6	*5*	*7*	*6.00*
7	*7*	*7*	*7.00*
8	*4*	*7*	*5.50*
9	**8**	**8**	**8.00**
10	**8**	**8**	**8.00**
11	**6**	**8**	**7.00**
12	**9**	**8**	**8.50**
13	*6*	*7*	*6.50*
14	**6**	**8**	**7.00**
15	**7**	**7**	**7.00**
16	**9**	**8**	**8.50**
17	**8**	**8**	**8.00**
18	*5*	*8*	*6.50*
19	8	9	8.50
20	8	8	8.00
21	*4*	*7*	*5.50*
22	**9**	**7**	**8.00**
23	**9**	**8**	**8.50**
24	**8**	**7**	**7.50**
25	**8**	**9**	**8.50**
26	**7**	**7**	**7.00**
27	**6**	**8**	**7.00**
28	**9**	**8**	**8.50**
29	**8**	**8**	**8.00**
30	*6*	*7*	*6.50*
31	**7**	**7**	**7.00**
32	**9**	**9**	**9.00**
33	**8**	**8**	**8.00**
34	**7**	**7**	**7.00**
35	**6**	**8**	**7.00**
36	**7**	**8**	**7.50**
37	*5*	*8*	*6.50*
38	*7*	*7*	*7.00*
39	**8**	**7**	**7.50**
40	*6*	*7*	*6.50*
41	**9**	**8**	**8.50**
42	**9**	**8**	**8.50**

Situation	Rater 1	Rater 2	Mean Rating
43	**7**	**8**	**7.50**
44	**9**	**8**	**8.50**
45	**7**	**8**	**7.50**
46	**10**	**8**	**9.00**
47	*4*	*8*	*6.00*
48	**6**	**8**	**7.00**
49	*4*	*8*	*6.00*
50	*4*	*8*	*6.00*
51	**8**	**8**	**8.00**
52	**6**	**8**	**7.00**
53	**8**	**8**	**8.00**
54	*5*	*8*	*6.50*
55	**6**	**8**	**7.00**
56	**7**	**8**	**7.50**
57	**6**	**9**	**7.50**
58	**6**	**8**	**7.00**
59	*4*	*7*	*5.50*
60	**7**	**8**	**7.50**
61	**8**	**8**	**8.00**
62	**7**	**7**	**7.00**
63	**8**	**8**	**8.00**
64	**8**	**8**	**8.00**
65	*6*	*8*	*7.00*
66	**7**	**7**	**7.00**
67	**9**	**8**	**8.50**
68	**8**	**8**	**8.00**
69	**8**	**8**	**8.00**
70	**7**	**8**	**7.50**
71	**7**	**8**	**7.50**
72	**6**	**8**	**7.00**
73	*5*	*7*	*6.00*
74	*5*	*8*	*6.50*
75	*5*	*8*	*6.50*
76	**8**	**8**	**8.00**
77	**8**	**8**	**8.00**
78	**9**	**8**	**8.50**
79	**8**	**8**	**8.00**
80	**7**	**8**	**7.50**
81	**6**	**8**	**7.00**
82	**8**	**8**	**8.00**
83	**7**	**8**	**7.50**
84	**8**	**8**	**8.00**
85	**7**	**8**	**7.50**
86	**9**	**8**	**8.50**
87	**6**	**8**	**7.00**
88	**7**	**8**	**7.50**
89	**9**	**8**	**8.50**

Situation	Rater 1	Rater 2	Mean Rating
90	**8**	**8**	**8.00**
91	**8**	**8**	**8.00**
92	**8**	**8**	**8.00**
93	**8**	**8**	**8.00**
94	**6**	**8**	**7.00**
95	**7**	**8**	**7.50**
96	**8**	**8**	**8.00**
97	**9**	**7**	**8.00**
98	**7**	**8**	**7.50**
99	**8**	**7**	**7.50**
100	**7**	**8**	**7.50**
101	*6*	*7*	*6.50*
102	**8**	**8**	**8.00**
103	**7**	**8**	**7.50**
104	**8**	**8**	**8.00**
105	**7**	**7**	**7.00**
106	*7*	*6*	*6.50*
107	**8**	**8**	**8.00**
108	**8**	**7**	**7.50**
109	**6**	**8**	**7.00**
110	**8**	**8**	**8.00**
111	**9**	**8**	**8.50**
112	**8**	**8**	**8.00**
113	**8**	**8**	**8.00**
114	**8**	**8**	**8.00**
115	**6**	**8**	**7.00**
116	**8**	**8**	**8.00**
117	*6*	*7*	*6.50*
118	**8**	**7**	**7.50**
119	*7*	*6*	*6.50*
120	*6*	*7*	*6.50*
121	*6*	*7*	*6.50*
122	**8**	**8**	**8.00**
123	**8**	**8**	**8.00**
124	**7**	**7**	**7.00**
125	**7**	**7**	**7.00**
126	*5*	*6*	*5.50*
127	*6*	*6*	*6.00*
128	**7**	**7**	**7.00**

Appendix Q- Anagram List

Anagram	Solution
acdicent	accident
etjgnedum	judgement
lheceangl	challenge
ncpemloia	policeman
factrria	aircraft
ecmmendor	recommend
ucadionet	education
veelsiotn	television
gaganuel	language
shalopit	hospital
raobtomh	bathroom
avusrliv	survival
baevgltee	vegetable
serposrg	progress
rhnboiegu	neighbour
metinuchl	lunchtime
nrmitfoaoin	information
cortod	doctor
bolofalt	football
repmotuc	computer

Appendix R- Report to Faculty of Health Ethics Committee

< ADDRESS >

Faulty of Medicine and Health Sciences
-Research Ethics Committee
Research and Enterprise Services
West Office (Science Building)
University of East Anglia
Norwich
NR4 7TJ

September 2013

To Whom It May Concern:

Re. An investigation of cognitive bias modification for paranoid attributions: Reference 2010/2011-57.

Following the completion of the above study in November 2012, please find attached a report of the results, summarised from a thesis written for the Doctoral Programme in Clinical Psychology. Should you require any further information, please do not hesitate to contact me or my research supervisor, Dr. Margo Ononaiye, Senior Clinical Tutor.

Kind regards,

Joanna Lodge
Trainee Clinical Psychologist

Enc. Research report

An experimental investigation using Cognitive Bias Modification of paranoid attributions in a non-clinical sample: Effects upon interpretation bias, emotions and paranoia following a stressful paranoia induction.

Background: Bentall, Corcoran, Howard, Blackwood, and Kinderman (2001) suggested that paranoid individuals display an 'external-personal bias' of blaming negative events on other people rather than situational circumstances or themselves, however, the literature remains equivocal. This study tested whether Cognitive Bias Modification for Interpretations (CBM-I) could train a positive attribution bias and affect subsequent reactions to a stressor designed to induce paranoia.
Method: Non-clinical participants were randomly assigned to positive CBM-I training (n = 18), or a neutral control CBM-I (n = 17). Participants were then subject to a stressful paranoia induction: seeing a live video of themselves whilst accessing negative self-beliefs and being given negative feedback when attempting an impossible task. The subsequent effects upon interpretation bias and state paranoia and emotions were assessed.
Results: After the paranoia induction, participants in the positive CBM-I group demonstrated a more positive interpretation bias than those in the neutral control group: they endorsed less paranoid interpretations, although there was no difference in ratings of positive interpretations. However, both groups reported a similar increase in state paranoia and suspiciousness after the stressful paranoia induction, and there was no relationship between the trained interpretation bias and the changes in state paranoia. Unexpectedly, pre-existing trait paranoia was correlated with later state paranoia and interpretation bias after the stressor.
Conclusions: This study demonstrated that CBM-I can train non-clinical participants to endorse less paranoid interpretations. Pre-existing trait paranoia had a stronger relationship to interpretative bias and state paranoia under stress than the CBM-I. The lack of a subsequent effect on emotional reactions suggests that further research is necessary to refine the materials and procedure, and test for possible small or varied effects in a larger sample. Unfortunately, significant methodological problems limit the conclusions that can be drawn about the theory that an external-personal attribution bias causes paranoia.

Beck and colleagues (e.g., Beck, 1976, Beck, Rush, Emery & Shaw, 1979) suggested that emotional disorders arise as a result of distorted thinking processes. Researchers have found that negative biases in attention, interpretation, attributions, and memory do indeed characterise anxiety and depression, however the causal direction remains unclear in most cross-sectional studies, and new paradigms have sought to clarify this by directly modifying cognition.

Cognitive Bias Modification

Cognitive bias modification (CBM) is an umbrella term for a variety of procedures which have been developed to directly test cognitive models about the relationship between biases in attention and interpretation, and subsequent emotions (Koster, Fox, & MacLeod, 2009). Mathews and Mackintosh (2000) used CBM for interpretations (CBM-I) to train non-clinical participants to make interpretations which were positive or negative by having them repeatedly read ambiguous stories which all ended either positive or negative. They found that participants chose interpretations of new ambiguous stories in line with the training they received, and anxiety increased after negative but not positive training. This direct manipulation of interpretations showed that cognition influenced emotion. It has also been

found that CBM can affect how people respond to emotional stressors, like distressing videos (e.g., Hoppitt, Mathews, Yiend, & Mackintosh, 2010b; Lester, Mathews, Davison, Burgess, & Yiend, 2011; Mackintosh, Mathews, Yiend, Ridgeway & Cook, 2006; Wilson, MacLeod, Mathews, & Rutherford, 2006; Woud, Holmes, Postma, Dalgleish, & Mackintosh, 2012) or challenging tasks (e.g., Hirsch, Mathews, & Clarke, 2007; Peters, Constans, & Mathews, 2011), or other stressors (worry period: Hirsch, Hayes, & Mathews, 2009; breathing: Steinman & Teachman, 2010). However, some studies have successfully modified interpretations but do not find an effect upon emotional reactions, such as Salemink, van den Hout, & Kindt (2007a, 2009) who found no difference in anxious reactions to a anagram test, Lang, Moulds, and Holmes (2009) who found no difference in positive or negative emotions after viewing a stressful film or photos, Clerkin and Teachman (2010) who found no difference in anxiety after public speaking, Lester et al. (2011) who found no difference in state anxiety after imagining leading a social discussion.

Therefore, whilst CBM which modifies interpretations has been found to be useful in reducing negative emotional reactions to stressful situations in some studies, the lack of consistency of this finding suggests that further research needs to be done to explore this. Despite some inconsistencies, a few studies have examined the potential therapeutic potential of CBM by using positive training with people with depression (e.g., Blackwell & Holmes, 2010; Lang, Blackwell, Harmer, Davison, & Holmes, 2012), anxiety (e.g., Brosan, Hoppitt, Shelfer, Sillence, & Mackintosh, 2011; Hayes, Hirsch, Krebs, & Mathews, 2010), and social anxiety (e.g., Beard, Weisberg, & Amir, 2011). The findings from these were largely positive, with changes in cognitive and emotional indices, although two small studies working on anxious interpretations in people with co-morbid psychosis were less successful across the samples (Steel et al., 2010; Turner et al., 2011).

Paranoia

Paranoia is the fearful (but unfounded) belief that other people intend you some form of harm (Freeman & Garety, 2000). It can lead to a range of distressing emotions, and is often present in psychiatric disorders such as schizophrenia, delusional disorder, mania, and depression (Freeman & Garety, 2004).

It has been suggested that paranoid beliefs lie on a continuum with normal behaviour (e.g., Strauss, 1969), and that such beliefs can only be defined as delusional when they are unfounded, firmly held with conviction, and preoccupying and/or distressing to the extent of interfering with social or occupational functioning (Oltmanns & Mayer, 1988). Green and Phillips (2004) suggested that clinical paranoia is simply an extension of normal threat detection processes. Costello (1994) suggested that continuums can be viewed in a 'phenomenological' way (where symptoms of disorder exist across the population) or as representing 'vulnerability' (where symptom-like characteristics indicate vulnerability to developing a disorder within an individual).

The phenomenological view has received partial support from questionnaire studies which find that paranoid thoughts are common among healthy individuals (e.g. Ellett, Lopes & Chadwick, 2003; Fenigstein & Vanable, 1992; Freeman, Dunn, et al., 2005), and studies which have

successfully triggered paranoid thoughts in non-clinical samples (e.g., Bodner & Mikulincer, 1998; Ellett & Chadwick, 2007; Fenigstein & Vanable, 1992; Green et al., 2011). However, Freeman (2007) admitted that there may remain qualitative differences between clinical and non-clinical paranoia, and existing studies were not considered sufficient to make conclusions about the phenomenological view (Ellett & Chadwick, 2007).

In examining the vulnerability view, there is a dearth of longitudinal prospective studies, although some studies have looked at associations in an attempt to plot risk factors for paranoia. Greater non-clinical paranoia appears to be associated with anxiety, depression, interpersonal sensitivity, perceptual anomalies and attribution biases (e.g., Freeman, Dunn, et al., 2005; Green et al., 2007, Martin & Penn, 2001). Studies of patients with severe levels of paranoia have confirmed these associations, with paranoia being linked to anomalous experiences or perceptions (e.g., Bunney, et al., 1999; Freeman, Pugh, et al., 2010), being a victim of interpersonal trauma (e.g., Rutten, van Os, Dominguez, & Krabbendam, 2008), having negative beliefs about the self and others (e.g., Fisher, Appiah-Kusi & Grant, 2012; Fowler et al., 2012), low self-esteem (e.g., Bentall et al., 2001, 2009), anxiety and worry (Freeman & Fowler, 2009; Startup, Freeman & Garety, 2007), and a range of reasoning or interpretation biases: theory of mind deficits, jumping to conclusions, and attributions biases.

Frith (1992) suggested that a loss of theory of mind (the ability to understand other people's thoughts and feelings), may lead to paranoid interpretations of others' actions. The evidence suggests that theory of mind deficits are not unique to paranoia, and are more strongly linked to other symptoms of schizophrenia (e.g., Freeman, 2007). It has also been suggested that paranoia may result from a tendency to jump to conclusions (e.g., Freeman, Garety, & Phillips, 2000; Freeman, Pugh, Vorontsova, Antley, & Slater, 2010; McKay, Langdon, & Coltheart, 2007; Startup, Freeman, & Garety, 2008), particularly under stress (Ellett, Freeman, & Chadwick, 2008; Moritz et al., 2011).

Whilst early research supported the idea of paranoia being linked to an extreme self-serving bias or external-personal attribution bias (e.g., Candido & Romney, 1990; Combs et al., 2009; Fear, Sharp & Healy, 1996; Kaney & Bentall, 1989; Kinderman & Bentall, 1996, 1997), there have also been many studies which failed to link paranoia to an extreme SSB attribution bias (e.g., Humphreys & Barrowclough, 2006; Martin & Penn, 2002; McKay, Langdon, & Coltheart, 2005; Moritz, Woodward, Burlon, Braus, & Andreson, 2007) or in fact linked paranoia to a depressive inverse SSB (e.g., Combs et al,. 2007; Diez-Alegria et al., 2006). Therefore, the causal status of attribution biases remains unclear at present.

In summary, paranoia is defined as interpreting events that another person intends you some type of harm, and this may occur when people have past experiences of being a victim, hold negative beliefs about themselves and others, feel anxious and worried, experience odd perceptual disturbances which are confusing, an inability to understand others' thoughts, a tendency to blame other people for negative events, and a tendency to jump to conclusions, especially when under stress.

Bentall, Kaney, and Dewey (1991) and Bentall, Corcoran, Howard, Blackwood and Kinderman (2001) proposed a 'delusion as defence' theory

which suggested that paranoia may arise because external attributions serve a function as a defence in the face of negative events, by preventing access to implicit negative self-beliefs and thus preserving positive self-esteem. Blaming other people rather than situational factors is the default strategy because it is less effortful, and people stick with this attribution due to a tendency to jump to hasty conclusions, and a impaired ability to evaluate beliefs about others' state of mind.

This study sought to use the CBM-I paradigm to investigate whether it could be used to modify attribution biases, and furthermore, attenuate negative reactions to a stressful situation designed to trigger paranoid ideas. This was tested by comparing positive CBM-I training with a placebo condition (where training was not designed to alter biases as it presented an equal number of positive and negative scenarios). Four hypotheses are detailed below:

Hypothesis 1. The positive CBM-I training will lead to a more positive interpretation bias with novel ambiguous situations compared to the neutral CBM-I. A positive interpretation bias is where endorsement for the positive or benign external-situational attributions is higher than endorsement for the paranoid external-personal attributions.

Hypothesis 2. Those in the positive CBM-I training group will report an attenuated emotional response to the stressor compared to those in the neutral CBM-I group.

Hypothesis 3. There will be a significant negative correlation between interpretation bias and state paranoia scores after the stressor, where a more positive interpretation bias will be related to lower paranoia.

Method

Design

This study used a mixed design. Participants were randomly allocated to either positive CBM-I training, or a neutral (placebo) CBM-I condition. Following the intervention, all participants experienced the same stressful paranoia induction, and the groups were then compared on interpretation bias on the recognition task, state paranoia, and other emotions.

Participants

All participants were taken from a non-clinical population and were students or staff aged 18 years or over at the University of East Anglia. They were recruited through various forms of advertisement on campus such as posters, flyers, and emails. Every participant was entered into a prize draw to win one of four £25 gift certificates for a popular online store. Cohen (1992) suggested that to detect a large effect size (d = .80) on interpretation bias (as found in Murphy, Hirsch, Mathews, Smith & Clark, 2007) with alpha at .05 and power at 0.8 when comparing two groups in a t-test, 26 participants would be necessary per group, so the study aimed to recruit 52 participants. Participants were excluded if they reported a history of mental health difficulties or had high scores on measures of anxiety (≥15 on the

Generalised Anxiety Disorder Scale, GAD-7; Spitzer, Kroenke, Williams, & Lowe, 2006), depression (≥15 on the Patient Health Questionnaire, PHQ-9; Kroenke, Spitzer, & Williams, 2001), and trait paranoia (≥68 on the Green et al. Paranoid Thoughts Scale, GPTS; Green et al., 2007).

Measures

Generalised Anxiety Disorder Scale (GAD-7). This self-report questionnaire comprises seven items relating to anxiety symptoms experienced over the previous fortnight, and are scored from 0 to 3, giving a total from 0 to 21. This was used to screen out ineligible participants.

Patient Health Questionnaire (PHQ-9). This self-report questionnaire comprises nine items relating to symptoms of depression over the previous two weeks, and is scored in the same way to the GAD-7, giving a total from 0 to 27. This was used as part of the screening process.

Green et al. Paranoid Thoughts Scale (GPTS). This self-report questionnaire comprises two 16-item scales which assess the frequency of ideas of social reference and persecution over the past month, from 1 to 5, giving a total from 16 to 80 for each scale, and 32-160 for the total scale. This was used to assess compliance with inclusion criteria.

Brief Fear of Negative Evaluation Scale (BFNE). The BFNE (Leary, 1983) was used to measure social anxiety to check both groups were similar before the intervention. This comprises 12 statements which are rated for how typical they are of that person, from 1 to 5, giving a total from 12 to 60.

Brief Core Schema Scales (BCSS). The BCSS by Fowler et al. (2006) measures positive and negative beliefs about the self and others. It comprises 24 statements and participants rate their belief in each from 0 to 4, leading to four scale scores (positive self, negative self, positive other, negative other) each ranging from 0 to 24. It was also used to check for group similarity before intervention.

Recognition task. The main outcome of interpretation bias was assessed using a modified version of the recognition task used by Mathews and Mackintosh (2000). This is presented as a memory test in two stages. First, ten ambiguous stories are presented, and second, four interpretations are presented, each of which has to be rated in terms of similarity in meaning to the original (ambiguous) story from 1 (very different) to 4 (very similar). In stage one, the story is presented as a title and four lines of text, with the final word as a fragment which needs to be solved by the participant, a follow-up question then checks that people have understood the story. For example,

> <u>The bus stop</u>
> One evening, you decide to get the bus home.
> When you arrive at the bus stop, you see a group of
> young men hanging around. As you check the timetable,
> one of them comes towards you with something in his
> h a – d
> Are you on your way out to work? Yes/No

In stage two, two target interpretations are possible interpretations, one representing a positive/benign external-situational attribution, and one representing a paranoid external-personal attribution. Two other foil interpretations are impossible interpretations which are either positive or

negative, and are included to check for a general positive or negative response bias independent of interpretation bias. For example,

> The bus stop
> 1. The young man in holding out his bus pass. *(Positive/benign target)*
> 2. The young man threatens you with a knife. *(Paranoid target)*
> 3. The young man crosses the road to the opposite bus stop. *(Positive/benign foil)*
> 4. The young man shouts names at you. *(Negative foil)*

As well as scores for each target and foil ranging from 1 to 4, an interpretation bias ranging from -3 to +3 is calculated by subtracting the paranoid target ratings from the positive/benign target ratings. Similarly, a response bias is calculated by subtracting the negative foil ratings from the positive foil ratings.

Paranoia and Depression Scale (PDS). The PDS (Bodner & Mikulincer, 1998) was used to assess state paranoia both before training and after the paranoia induction. It comprises seven items for paranoia and ten items for depression which were rated for frequency between 1 and 6, although only the paranoia scores were analysed.

Mood ratings. Four 10cm visual analogue scales (VAS) were used to measure emotional experiences at four points in the study, and asked participants to indicate on the line the extent to which they felt anxious, excited, suspicious, and depressed, from 'not at all' to 'extremely.'

Materials

CBM-I training. The intervention for both groups comprised the presentation of 100 social scenarios on a computer. Each scenario included four lines of text, with the final word presented as a fragment which the participant had to solve. The final word resolved the scenario in either a positive way with a positive/benign external-situational attribution, or a paranoid way with a negative external-personal attribution. For those in the positive condition, all scenarios ended in a positive way, and in the placebo control condition, half of the scenarios ended positive, and half paranoid. A comprehension question followed the scenario to check understanding of the story. For example,

> You are fast asleep in bed when you wake up suddenly.
> You hear the garden gate creaking outside and
> something being knocked to the ground.
> You sit up in bed and think to yourself it must be a
> c – t (cat = positive/benign situational resolution)
> p r – w l – r (prowler = paranoid resolution)
> Do you feel concerned about the noise? Yes/No.

The scenarios included modified versions of some used by a previous study of social anxiety (Turner et al., 2011), and many more new scenarios developed on the basis of reports of clinical paranoia in the literature (e.g., Chadwick, 1995; Cockburn & Cockburn, 2011; Freeman & Freeman, 2008; Romme & Escher, 1993). These were checked and rated for consistency with paranoid thinking by two professionals who work with service users experiencing psychosis.

Paranoia induction. This was based on the study by Ellett and Chadwick (2007) who found that priming negative self-cognitions, experience

of failure, and high self-awareness led to significant increases in paranoia in a non-clinical sample. Self-awareness was triggered by presenting a live video of the participant on a monitor, negative self-cognitions were accessed by writing down ten negative thoughts about themselves, and failure occurred when given the task of completing 20 anagrams but being told they got every one wrong.

Procedure

After completing the consent form, participants firstly completed screening measures (GAD-7, PHQ-9, GPTS), and if these were below the cut-offs, proceeded to completing the baseline measures (BFNE, BCSS, PDS 1, mood VAS 1). They then completed the CBM-I intervention, followed by a second mood VAS. Following this, they completed the paranoia induction by completing a self-beliefs sheet, and then moving on to attempt to solve the anagrams, and finally completing mood VAS 3. They then completed the two outcome measures: the recognition task, and the PDS 2, and continued mood effects were assessed with mood VAS 4. Debriefing explained the procedure in full, and checked for continued consent.

Results

Table 1 shows the means and standard deviations for the demographic variables of gender and age, the screening variables of depression (PHQ-9 score), anxiety (GAD-7 score), and trait paranoia (GPTS scores), and the baseline variables of social anxiety (BFNE score), core schemas (BCSS scores), state paranoia (PDS score), and state mood and arousal (time 1 VAS scores).

A Chi-square test found no significant differences between groups regarding gender, χ^2 (1) = 0.24, p = .625. A Mann-Whitney U test confirmed that there was no significant difference in age, U = 127.0, z = -0.87, p = .384. A t-test found no significant difference in PHQ-9 scores between the groups t (33) = 1.18, p = .247, or in GAD-7 scores, t (33) = 0.93, p = .362. There were no significant differences for trait paranoia in the total score on the GPTS (t (33) = -0.74, p = .466) or the social reference subscale (t (33) = -0.24, p =.811). The data for the persecution subscale approached significance (U = 206.0, z = 1.83, p = .067), with the neutral group having a slightly (but not significantly) elevated mean persecution score. Green et al. (2007) reported that their 353 non-clinical participants had a mean score on the GPTS persecution subscale of 22.1 (SD = 9.2), whilst their 50 clinical participants had a mean score of 55.4 (SD = 15.7). Therefore, the mean score of 18.18 here from a possible range of 16 to 80 is still very low, and does not indicate a clinical level of paranoid ideation.

There were no significant differences in BFNE scores between the groups, t (33) = -0.06, p = .953. There were no significant group differences on any of the BCSS scales: self-positive schema (t (33) = 0.66, p = .514), self-negative schema (U = 119.0, z = -1.18, p = .240), other-negative schema (U = 164.5, z = 0.39, p = .699), or other-positive schema (U = 151.5, z = -0.05, p = .960).

Table 1.
Demographic, screening and baseline variables for the positive training and neutral control groups (N = 35).

Measure	Positive Training Group (*n* = 18)		Neutral Control Group (*n* = 17)	
	n	(%)	*n*	(%)
Gender				
Male	7	(38.9)	8	(47.1)
Female	11	(61.1)	9	(52.9)
	M	*(SD)*	*M*	*(SD)*
Age	26.44	(11.18)	22.29	(7.70)
PHQ-9	5.39	(3.35)	4.18	(3.49)
GAD-7	4.50	(2.98)	3.65	(3.14)
GPTS				
Total	38.22	(5.48)	39.53	(4.96)
Social Reference	21.11	(4.70)	21.47	(4.08)
Persecution	17.11	(1.78)	18.18	(1.85)
BFNE	30.83	(7.19)	31.00	(9.45)
BCSS				
Self-Negative	1.81	(2.04)	1.06	(1.44)
Self-Positive	13.06	(5.93)	11.88	(4.44)
Other-Negative	3.39	(4.75)	2.47	(2.24)
Other-Positive	13.31	(5.09)	13.00	(3.84)
PDS Paranoia	9.56	(4.23)	10.59	(3.92)
Mood VAS 1				
Anxious	1.35	(1.16)	1.33	(1.60)
Excited	4.28	(2.51)	3.74	(2.03)
Suspicious	1.08	(1.74)	1.49	(2.53)
Depressed	1.00	(1.25)	0.80	(1.55)

Note. BCSS = Brief Core Schema Scales; BFNE = Brief Fear of Negative Evaluation Scale; GAD-7 = Generalised Anxiety Disorder scale-7; GPTS = Green et al. Paranoid Thoughts Scale; PDS = Depression and Paranoia Scale; PHQ-9 = Patient Health Questionnaire-9; Mood VAS 1 = visual analogue scale- Time 1.

On the measures of emotional state, there were also no significant group differences. Firstly, there was no significant difference on PDS state paranoia scores between groups prior to intervention, $U = 188.0$, $z = 1.18$, $p = .237$. Secondly, mean VAS scores for feeling 'anxious' were not significantly different between groups, $U = 143.5$, $z = -0.31$, $p = .753$, and neither were scores for feeling 'suspicious,' $U = 127.0$, $z = -0.86$, $p = .387$, or 'excited,' $t\ (33) = 0.43$, $p = .668$. A difference in mean scores for feeling 'depressed' approached significance, $U = 98.0$, $z = -1.83$, $p = .067$, with the positive group reporting slightly higher depressed mood than the neutral group. However, it must be noted that the score remained very low (1.00 out of 10.00), and no significant difference was found in the validated measure of depressed mood used in screening, the PHQ-9 (see above).

In summary, group comparisons on all demographic, screening and baseline variables measured before the intervention revealed no significant

differences between groups, and therefore random assignment appeared to have been successful in creating two equivalent groups. Ergo, any significant group differences measured after the interventions were likely to be caused by the CBM-I rather than any pre-existing differences.

Interpretation Bias

Figure 1 shows that both groups displayed a positive bias for both targets and foils. A mixed ANOVA with training condition as the between-subjects factor (positive vs. neutral control), and target (possible target or impossible foil) as the within-subjects variable, revealed significant main effects of target, $F(1,33) = 73.20$, $p < .001$, $d = 2.98$, and of condition, $F(1,33) = 16.94$, $p < .001$, $d = 1.43$, as well as the crucial interaction of target X condition, $F(1,33) = 5.45$, $p = .026$, $d = 0.81$. This indicates that the recognition ratings for the targets were significantly greater than for the foils, and that those in the positive training condition had a significantly more positive bias overall than those in the neutral control condition. It also shows that the groups differed in how they rated targets and foils: the positive training group had a much larger difference in ratings for targets and foils, and there was a larger difference between groups in target than foil ratings. Therefore, the significant difference between targets and foils suggests that the results are not merely the result of a general response bias, but attributional style has been modified.

Separate ratings for the positive/benign targets and negative paranoid targets are shown at the top of Figure 2. The mean recognition ratings for both the positive training ($M = 3.11$, $SD = 0.46$) and neutral control groups ($M = 2.96$, $SD = 0.43$) were very similar for the positive interpretations,

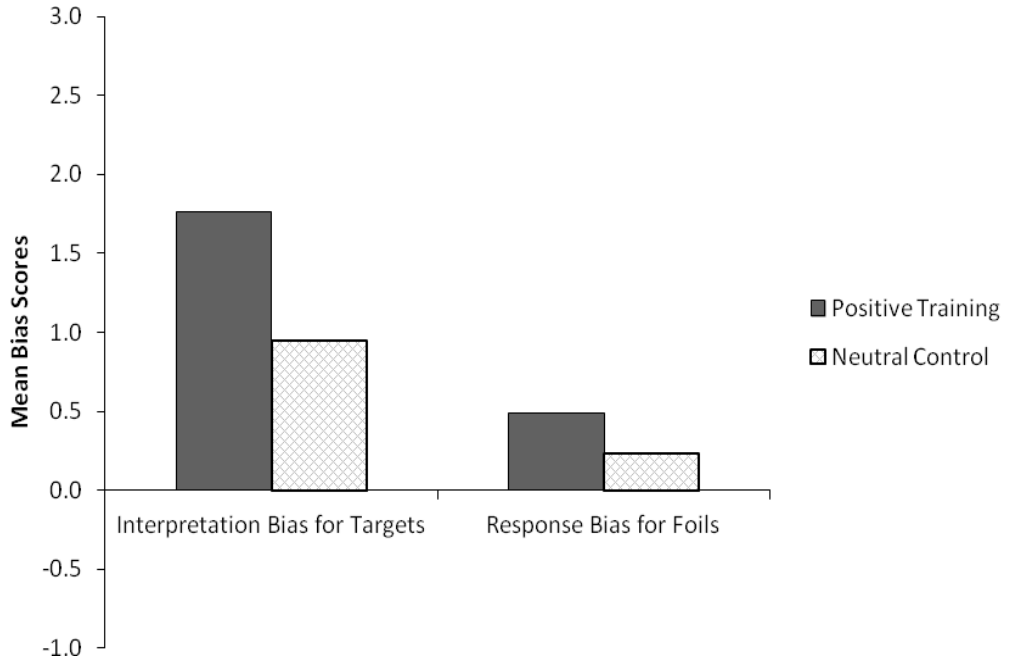
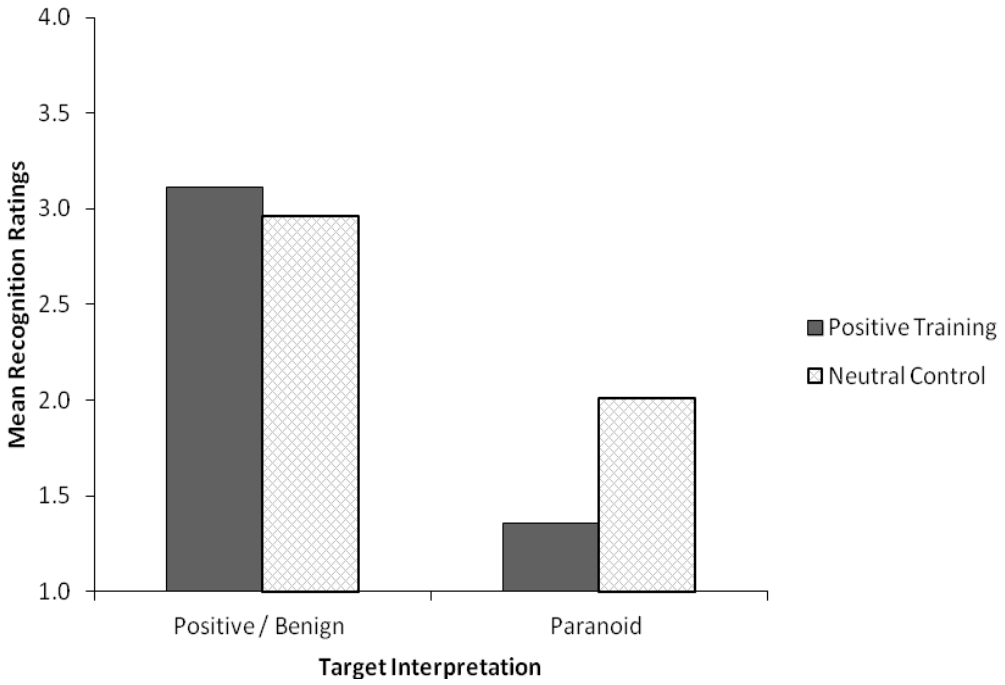
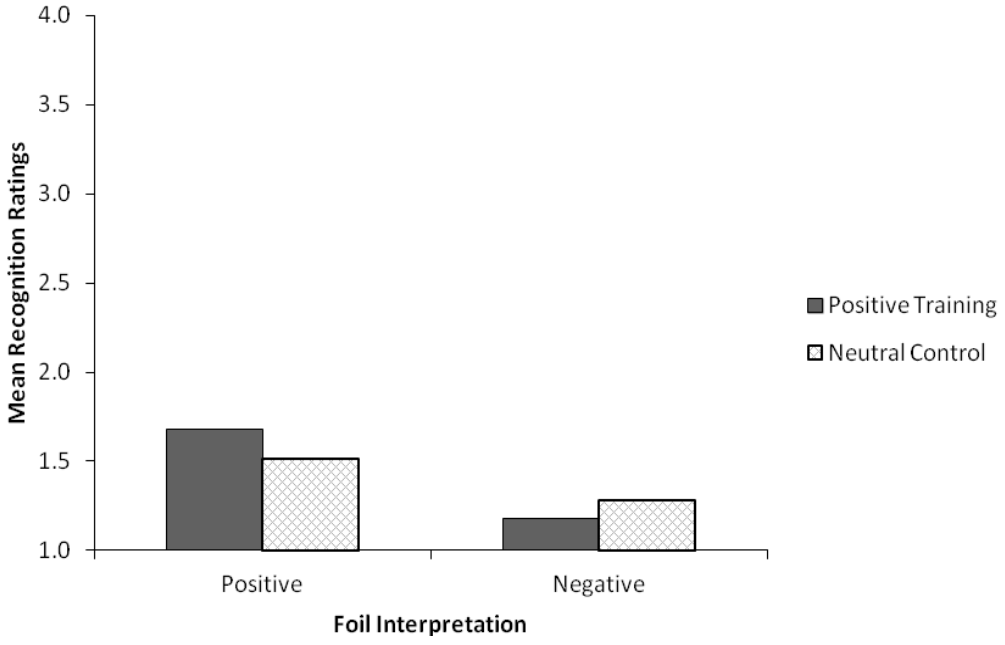


Figure 1. Mean interpretation bias and response bias ($N = 35$).



(a) Recognition ratings for targets.



(b) Recognition ratings for foils.

Figure 2. Mean recognition ratings for (a) target interpretations and (b) foil interpretations on the recognition task (*N* = 35).

t (33) = 1.01, *p* = .321. However, the neutral control group reported significantly higher ratings for the paranoid interpretations (*M* = 2.01, *SD* = 0.33) compared to the positive training group (*M* = 1.36, *SD* = 0.33), *U* = 280.5, *z* = 4.22, *p* < .001, with a large effect size, *d* = 1.97. This suggests that the increased positive interpretation bias found in the positive training group was due to less endorsement of paranoid interpretations, rather than greater endorsement of positive interpretations.

In summary, participants in the positive CBM-I training group displayed a more positive interpretation bias than the neutral control group. Those in the positive CBM-I training group were also significantly less likely to endorse the negative paranoid interpretations than those in the neutral control group (although there was no difference for positive interpretations). This effect did not appear to be part of a generalised positive bias as the ratings for foil interpretations were noticeably lower than for the target interpretations.

Emotions

The change in PDS scores are displayed in Figure 3. A 2-way mixed ANOVA with condition as the between-subjects factor (positive training vs. neutral control) and time as the within-subjects factor (baseline vs. after the induction) confirmed that there was a large significant main effect of time, *F*(1,33) = 14.13, *p* < .001, *d* = 1.31. However, there was no main effect of condition, *F*(1,33) = 0.17, *p* = .682, nor a significant interaction of time X condition, *F*(1,33) = 0.76, *p* = .389. Therefore, whilst state paranoia significantly increased from baseline to after the induction, training condition did not have any effect upon state paranoia, and so hypothesis two is not supported.

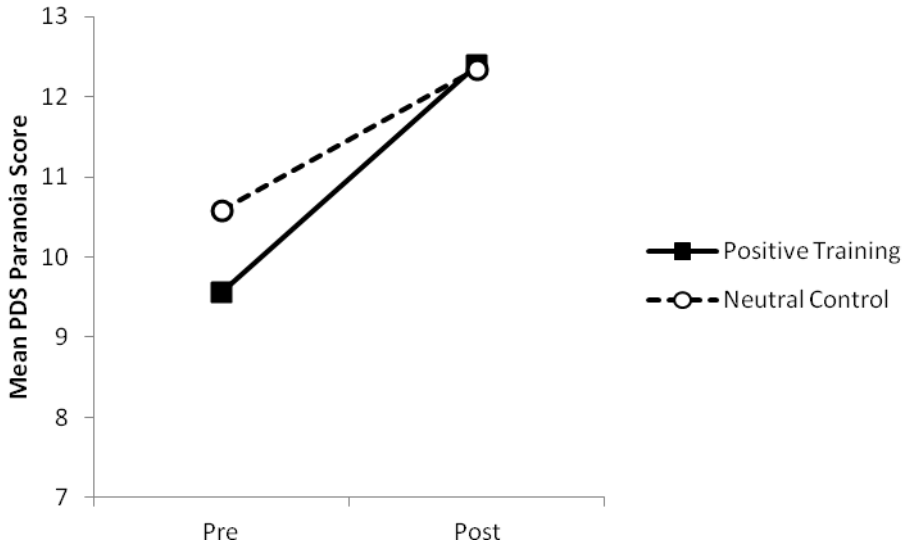


Figure 3. Mean state paranoia scores on the PDS measured at baseline (pre) and after a paranoia induction (post) for the positive CBM-I training group (*n* = 18) and the neutral control group (*n* =17).

Given this null result, the VAS results were also analysed for possible impacts of CBM-I training upon paranoid and other emotional experiences. The four VAS scores (feeling suspicious, anxious, depressed, excited) across the four time points are displayed in Figure 4.

Emotional changes on the VAS across the study were tested using four (each emotion separately: suspiciousness, anxiety, depression, excitement) mixed ANOVAs with condition as the between-subjects variable (positive training vs. neutral control), time as a within-subjects variable (time 1 vs. time 2 vs. time 3 vs. time 4). There were main effects of time across the study upon suspiciousness, $F(2.09, 68.90) = 10.75$, $p < .001$, on anxiety, $F(3,99) = 3.64$, $p = .015$, on depression, $F(1.88, 62.09) = 3.81$, $p = .030$, and on excitement, $F(2.03, 67.07) = 22.11$, $p < .001$. However, there were no main effects of condition, nor interactions of time X condition on any emotion (all $F < 1$, $p > .4$).

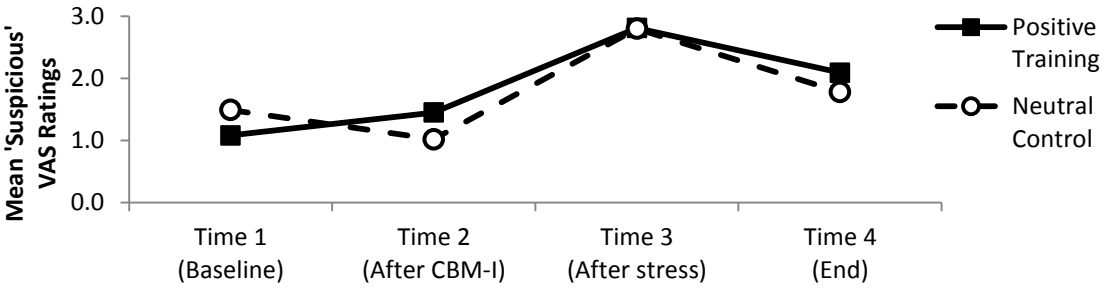
To examine the effects of CBM-I training on emotions, times 1 and 2 were contrasted. Inspection of each graph suggests that emotional changes after the stressor were similar in both groups, and that there was a larger increase in suspiciousness than anxiety depression. The only significant Bonferroni-corrected contrast was a large effect of time on excitement, $F(1,33) = 18.45$, $p < .001$, $d = 1.50$ ($F < 1$, $p > .4$ for all other emotions) showing that across the sample excitement reduced significantly after CBM-I training. However, Bonferroni-corrected contrasts of the interaction of time X condition were not significant for any emotion between time 1 and 2: feeling suspicious, $F(1,33) = 1.85$, $p = .183$, feeling anxious, $F(1,33) = 2.19$, $p = .149$, feeling depressed, $F(1,33) = 5.00$, $p = .032$, or feeling excited, $F(1,33) = 0.45$, $p = .506$. Therefore, whilst the CBM-I training led to reduced excitement across the whole sample, the training did not appear to have immediate differential effects upon suspicion, arousal (excitement), depression, or anxiety for either group.

To examine the specific effects of the stressor on emotions, times 2 and 3 were contrasted. Bonferroni-corrected contrasts revealed large significant effects of time upon feeling suspicious, $F(1,33) = 22.74$, $p < .001$, $d = 1.66$, and on feeling excited, $F(1,33) = 34.16$, $p < .001$, $d = 2.04$, whilst the contrast approached significance for feeling anxious, $F(1,33) = 6.14$, $p = .018$, $d = 0.86$, but was not significant for feeling depressed, $F(1,33) = 4.62$, $p = .039$, $d = 0.75$. However, none of the contrasts for interactions of time X condition were significant (all $F < 1$, $p > .3$). Therefore, whilst reports of suspiciousness increased and excitement decreased across the sample after the stressful paranoia induction, there were no differences in how the two groups reported their emotions.

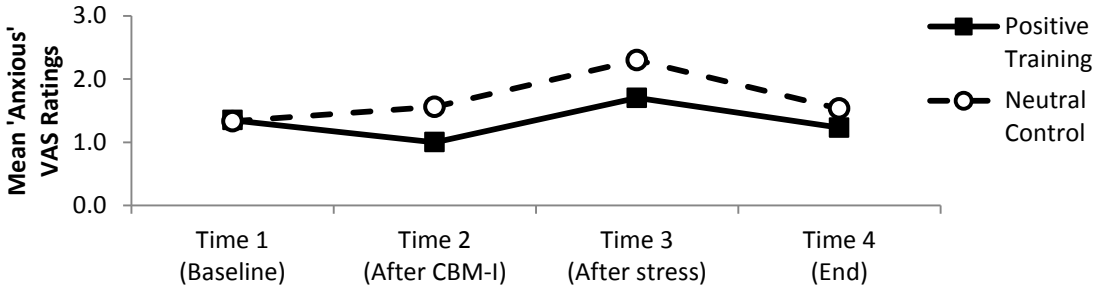
Therefore, the VAS results confirmed the findings from the PDS paranoia scores; that the type of CBM-I training received did not appear to affect emotional responses to the paranoia induction. So, hypothesis two was not supported as the positive CBM-I training group did not show any attenuation in their emotional response which was, in fact, very similar to the neutral group.

Interpretation Bias and Emotional Changes

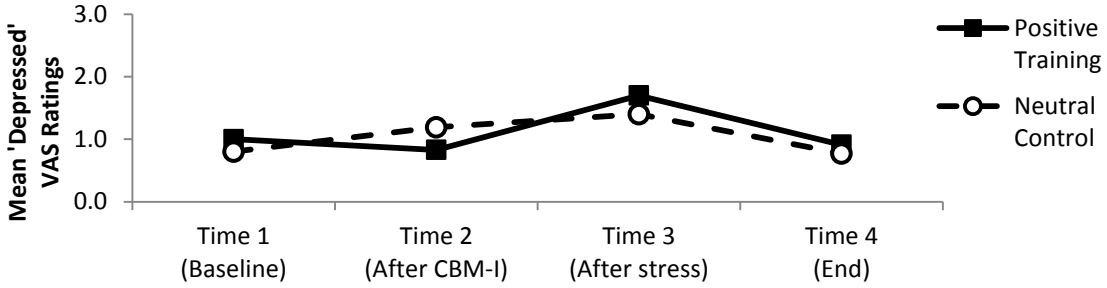
Correlation analyses were performed with interpretation bias, and state paranoia as measured by the PDS paranoia scores and VAS



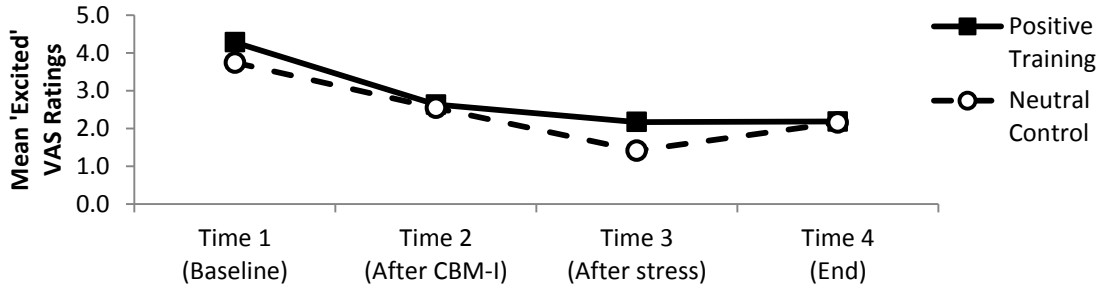
(a) Mean VAS ratings for feeling 'suspicious.'



(b) Mean VAS ratings for feeling 'anxious.'



(c) Mean VAS ratings for feeling 'depressed.'



(d) Mean VAS ratings for feeling 'excited.'

Figure 4. Mean VAS scores for feeling (a) suspicious, (b) anxious, (c), depressed and (d) excited, at Time 1 (baseline), Time 2 (after CBM-I), Time or 3 (after stressor), and Time 4 (End) for the positive training (n = 18) and control (n = 17) groups.

suspiciousness ratings. There were no significant correlations between interpretation bias and PDS paranoia score, r_s = -.21, p = .109 (one-tailed), or time 3 VAS suspiciousness, r_s = -.01, p = .383 (one-tailed). Therefore, hypothesis three was not supported as there appeared to be no relationship between interpretation bias and either measure of state paranoia.

Exploratory analyses revealed a significant correlation between the baseline GPTS Total (trait paranoia) and later interpretation bias, r = -.34, p = .022 (one-tailed). There were also significant correlations between baseline GPTS Total scores and later PDS state paranoia, r_s = .35, p = .019 (one-tailed), and VAS suspiciousness, r_s = .49, p = .002 (one-tailed). Therefore, it appears that whilst there were no significant differences in trait paranoia between groups before the CBM-I intervention, higher existing levels of trait paranoia were correlated with less positive interpretation biases and increased state paranoia following the stressful paranoia induction.

Discussion

Our first hypothesis was partially supported as those participants in the positive CBM-I training group displayed a more positive interpretation bias than the neutral control group. Those in the positive CBM-I training group were significantly less likely to endorse the negative paranoid interpretations than those in the neutral control group. The findings for ratings of positive interpretations did not support the hypothesis, however, as there was no difference between groups in ratings for positive interpretations.

Our findings have replicated those of others who have modified Mathrews and Mackintosh's (2000) CBM-I procedure to target interpretation biases through social stories (e.g., Hirsch et al., 2007; Hoppitt et al., 2010a; Lange et al., 2010; Lester et al., 2011; Mackintosh et al., 2006; Salemink et al., 2007a,b, 2010a; Yiend, Mackintosh & Mathews, 2005; Yiend, Savulich, Coughtrey, & Shafran, 2011). These studies all compared positive to negative CBM-I training, so the finding of significant results here comparing positive to placebo training appears all the more remarkable, as you would expect smaller sized effects. Our findings are also comparable with Salemink and Wiers (2011) who compared positive and placebo CBM-I in non-clinical adolescents and found positive training had a large effect in decreasing negative interpretations, and a medium effect in increasing positive interpretations. The lack of an effect upon increasing positive interpretations may be unsurprising as people from a non-clinical population are known to have a natural positive bias (e.g., Calvo et al., 1994, Grey & Mathews, 2000, Mathews & Mackintosh, 2000) which may have been difficult to enhance any further (Hoppitt et al., 2010b). Mathews and Mackintosh (2000) also suggested that positive training works through decreasing non-congruent (i.e. negative) interpretations rather than increasing congruent (i.e. positive) interpretations, which is in line with our findings. Furthermore, Grey and Mathews (2000) and Hoppitt et al. (2010b) suggested that training positive/benign interpretations may be difficult as it often involves a range of positive and non-negative meanings which is less cohesive as a category than a negative category.

Whilst the stressor worked as intended in increasing state paranoia, hypothesis two was not supported, as the participants who received positive CBM-I training reported negative emotional reactions which were no different to the control group. Therefore, the modified interpretation bias did not influence the emotional reactions to the stressor. This study is not the first which failed to find an effect of a trained interpretation bias upon emotional reactivity in non-clinical participants (e.g., Salemink et al., 2007a), a finding which is more common among analogue samples (see Clerkin & Teachman, 2010, 2011; Lester et al., 2011; Murphy et al., 2007; Salemink et al., 2009) where the comparisons are often between positive and placebo CBM-I training. Therefore, our finding may be an artefact of using these comparison groups, or suggestive that interpretation biases are not sufficient to produce changes in emotional reactions. It is also possible that the procedure here could be responsible, for example the stressor used was a modification of the Ellett and Chadwick (2007) method and would have benefited from piloting, the PDS measure of state paranoia has not been extensively tested and its reliability is unclear, and the choice of measures may not have been able to capture the range of possible emotional reactions to having paranoid ideas about others (e.g. anxiety, depression, anger).

Finally, hypothesis three predicted that a more positive interpretation bias would be associated with lower levels of paranoia after the paranoia induction. This was not supported as the correlations of interpretation bias with changes in state paranoia (as measured on the PDS or suspicious item on the VAS) were not significant.

Unplanned exploratory analyses revealed that higher pre-existing trait paranoia was related to higher state paranoia and a less positive interpretation bias after the stressor, and may be an important indicator of how people may respond differently to such procedures. Unfortunately, the very low trait paranoia scores, and neglecting to measure trait paranoia after the stressor, limit the conclusions that might be drawn. However, it is interesting that trait paranoia appeared to have a greater impact than the training, perhaps being more resistant to intervention.

The study had some methodological limitations which need to be considered. Firstly, comparing positive to neutral 'placebo' CBM-I training is uncommon in non-clinical populations, and whilst it was considered more ethical as a preliminary study, use of a negative CBM-I training would have enabled a better test of the assumption that attribution biases affect paranoid thoughts and feelings, and would increase the power to detect larger differences. Secondly, the sample size was one-third smaller than intended and so the study was under powered, so whilst it was sufficient to find large effects upon negative paranoid interpretations, and interpretation biases overall, the sample size may be a factor in the limited findings with emotional reactivity. Thirdly, the CBM-I training and recognition test used new materials which may have benefited from further piloting. Fourth, the paranoid induction procedure was slightly modified from the original method used by Ellett and Chadwick (2007) and so could also have benefited from further piloting to check that the intended effects were the same. Fifth, the recognition task has been criticised for being too similar to the training and not sufficiently assessing spontaneous interpretations (Salemink et al., 2007b, 2010a), and the reliability and validity of the PDS remain to be seen.

Sixth, the timing of measures was not ideal, in particular, state paranoia should have been measured straight after the induction, as well as trait paranoia.

The lack of transfer from training an attribution bias to experiencing paranoia does not support the Bentall et al. (1991, 2001) 'delusion as defence' theory which placed attribution biases at the centre of a cycle of attributions and self-schemas in the formation of paranoid beliefs. This is in line with the equivocal literature which has had difficulty consistently linking paranoia and external-personal attribution biases or an extreme SSB (e.g., Freeman, 2007). Therefore, it appears that non-clinical paranoia may differ from clinical paranoia that the Bentall model attempts to explain, or other factors such as those included in the Freeman et al. (2002) model are also necessary to consider beyond attribution biases.

The limited findings do not allow significant suggestions to be made about clinical practice, however further studies addressing the above limitations may help to elucidate the clinical potential of the CBM paradigm further.

In conclusion, whilst CBM techniques have enjoyed success in training positive or benign cognitive biases which have beneficial effects upon various anxiety disorders (Beard et al., 2011; Brosan et al., 2011; Hayes et al., 2010) and depression (e.g., Blackwell & Holmes, 2010), this study was a promising but limited start in adapting this technique to help people with paranoia. However, future research is required to test models of paranoid thinking and develop ways of modifying a range of unhelpful biases that may lead to paranoia.

Beard, C., Weisberg, R. B., & Amir, N. (2011). Combined cognitive bias modification treatment for social anxiety disorder: A pilot trial. *Depression and Anxiety, 28,* 981-988. doi:10.1002/da.20873

Beck, A. T. (1976). *Cognitive therapy and the emotional disorders.* New York: International Universities Press.

Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). *Cognitive therapy of depression.* New York: Guilford Press.

Bentall, R. P., Corcoran, R., Howard, R., Blackwood, N., & Kinderman, P. (2001). Persecutory delusions: A review and theoretical integration. *Clinical Psychology Review, 21,* 1143-1192.

Bentall, R. P., Kaney, S., & Dewey, M. E. (1991). Paranoia and social reasoning: An attribution theory analysis. *British Journal of Clinical Psychology, 30,* 13-23.

Bentall, R. P., Rowse, G., Shryane, N., Kinderman, P., Howard, R., Blackwood, N., . . . Corcoran, R. (2009). The cognitive and affective structure of paranoid delusions: A transdiagnostic investigation of patients with schizophrenia spectrum disorders and depression. *Archives of General Psychiatry, 66,* 236-247. doi: 10.1001/archgenpsychiatry.2009.1.

Blackwell, S. E., & Holmes, E. A. (2010). Modifying interpretation and imagination in clinical depression: A single case series using cognitive bias modification. *Applied Cognitive Psychology, 24,* 338-350. doi:10.1002/acp.1680

Bodner, E., & Mikulincer, M. (1998). Learned helplessness and the occurrence of depressive-like and paranoid-like responses: The role of attentional focus. *Journal of Personality and Social Psychology, 74,* 1010-1023.

Brosan, L., Hoppitt, L., Shelfer, L., Sillence, A., & Mackintosh, B. (2011). Cognitive bias modification for attention and interpretation reduces trait and state anxiety in anxious patients referred to an out-patient service: Results from a pilot study. *Journal of Behavior Therapy and Experimental Psychiatry, 42,* 258-264. doi:10.1016/j.jbtep.2010.12.006

Bunney, W. E., Hetrick, W. P., Bunney, B. G., Patterson, J. V., Jin, Y., Potkin, S. G., & Sandman, C. A. (1999). Structured Interview for Assessing Perceptual Anomalies (SIAPA). *Schizophrenia Bulletin, 25,* 577-592.
Calvo, M. G., Eysenck, M. W., & Estevez, A. (1994). Ego-threat interpretative bias in test anxiety: On-line inferences. *Cognition and Emotion, 8,* 127-146.
Candido, C. L., & Romney, D. M. (1990). Attributional style in paranoid vs depressed patients. *British Journal of Medical Psychology, 63,* 355-363.
Chadwick, P. (1995). *Understanding paranoia: what causes it, how it feels and what to do about it.* London: Thorsons.
Clerkin, E. M., & Teachman, B. A. (2010). Training implicit social anxiety associations: An experimental intervention. *Journal of Anxiety Disorders, 24,* 300-308. doi:10.1016/j.janxdis.2010.01.001
Clerkin, E. M., & Teachman, B. A. (2011). Training interpretation biases among individuals with symptoms of obsessive compulsive disorder. *Journal of Behaviour Therapy and Experimental Psychiatry, 42,* 337-343.
Cockburn, P., & Cockburn, H. (2011). *Henry's demons. Living with schizophrenia: A father and son's story.* London: Simon & Schuster.
Cohen, J. (1992). A power primer. *Psychological Bulletin, 112,* 155-159.
Combs, D. R., Penn, D. L., Chadwick, P., Trower, P., Michael, C. O., & Basso, M. R. (2007). Subtypes of paranoia in a nonclinical sample. *Cognitive Neuropsychiatry, 12,* 537-553. doi:10.1080/13546800701707306
Combs, D. R., Penn, D. L., Michael, C. O. Basso, M. R., Wiedeman, R., Siebenmorgan, M. ... Chapman, D. (2009). Perceptions of hostility by persons with and without persecutory delusions. *Cognitive Neuropsychiatry, 14,* 30-52. doi:10.1080/13546800902732970
Costello, C. G. (1994). Two dimensional views of psychopathology. *Behaviour, Research and Therapy, 32,* 391-402.
Diez-Alegria, C., Vasquez, C., Nieto-Moreno, M., Valiente, C., & Fuentenebro, F. (2006). Personalizing and externalizing biases in deluded and depressed patients: are attributional biases a stable and specific characteristic of delusions? *British Journal of Clinical Psychology, 45,* 531-544. doi: 10.1348/014466505X86681
Ellett, L., & Chadwick, P. (2007). Paranoid cognitions, failure and focus of attention in college students. *Cognition and Emotion, 21,* 558-576. doi:10.1080/02699930600758155
Ellett, L., Freeman, D., & Chadwick, P. (2008). The psychological effect of an urban environment on individuals with persecutory delusions: The Camberwell walk study. *Schizophrenia Research, 99,* 77-84. doi: 10.1016/j.schres.2007.10.027
Ellett, L., Lopes, B., & Chadwick, P. (2003). Paranoia in a non-clinical population of college students. *Journal of Nervous and Mental Disease, 191,* 425-430.
Fear, C., Sharp, H., & Healy, D. (1996). Cognitive processes in delusional disorders. *British Journal of Psychiatry, 168,* 1-8.
Fenigstein, A., & Vanable, P. A. (1992). Paranoia and self-consciousness. *Journal of Personality and Social Psychology, 62,* 129-138.
Fisher, H. I., Appiah-Kusi, E., & Grant, C. (2012). Anxiety and negative self-schemas mediate the association between childhood maltreatment and paranoia. *Psychiatry Research, 196,* 323-324. doi:10.1016/p.psychres.2011.12.004
Fowler, D., Freeman, D., Smith, B., Kuipers, E., Bebbington, P. E., Bashforth, H. . . . Garety, P. A. (2006). The Brief Core Schema Scales (BCSS): psychometric properties and associations with paranoia and grandiosity in non-clinical and psychosis samples. *Psychological Medicine, 36,* 749–759. doi:10.1017/S0033291706007355
Fowler, D., Hodgekins, J., Garety, P. A., Freeman, D., Kuipers, E., Dunn, G. . . . Bebbington, P. E. (2012). Negative cognition, depressed mood, and paranoia: A longitudinal pathway analysis using structural equation modeling. *Schizophrenia Bulletin, 38,* 1063-1073. doi: 10.1093/schbul/sbr019
Freeman, D. (2007). Suspicious minds: the psychology of persecutory delusions. *Clinical Psychology Review, 27,* 425-457.
Freeman, D., Dunn, G., Garety, P. A., Bebbington, P., Slater, M., Kuipers, E. . . . Ray, K. (2005). The psychology of persecutory ideation I: A questionnaire survey. *Journal of Nervous and Mental Disease, 193,* 302-308.
Freeman, D., & Fowler, D. (2009). Routes to psychotic symptoms: trauma, anxiety and psychosis-like experiences. *Psychiatry Research, 169,* 107-112. doi:10.1016/j.psychres.2008.07.009

Freeman, D., & Freeman, J. (2008). *Paranoia: The 21st century fear.* Oxford: Oxford University Press
Freeman, D., & Garety, P. A. (2000). Comments on the content of persecutory delusions: Does the definition need clarification? *British Journal of Clinical Psychology, 39,* 407-414.
Freeman, D., & Garety, P. A. (2004). *Paranoia: The psychology of persecutory delusions.* Hove: Psychology Press.
Freeman, D., Garety, P. A., Kuipers, E., Fowler, D., & Bebbington, P. E. (2002). A cognitive model of persecutory delusions. *British Journal of Clinical Psychology, 41,* 331-347.
Freeman, D., Garety, P. A. & Phillips, M. L. (2000). An examination of hypervigilance for external threat in individuals with generalised anxiety disorder and individuals with persecutory delusions using visual scan paths. *Quarterly Journal of Experimental Psychology, 53A*, 549-567. DOI:10.1080/713755896
Freeman, D., Pugh, K., Vorontsova, N., Antley, A., & Slater, M. (2010). Testing the continuum of delusional beliefs: an experimental study using virtual reality. *Journal of Abnormal Psychology, 119*, 83-92. doi:10.1037/a0017514
Frith, C. D. (1992). *The cognitive neuropsychology of schizophrenia.* Hillsdale, NJ: Lawrence Erlbaum.
Green, C. E. L, Freeman, D., Kuipers, E., Bebbington, P., Fowler, D., Dunn, G., & Garety, P. A. (2007). Measuring ideas persecution and reference: the Green et al. Paranoid Thoughts Scale (GPTS). *Psychological Medicine, 38,* 101-111. doi:10.1017/S0033291707001638
Green, C. E. L., Freeman, D., Kuipers, E., Bebbington, P., Fowler, D., Dunn, G., & Garety, P. A. (2011). Paranoid explanations of experience: A novel experimental study. *Behavioural and Cognitive Psychotherapy, 39,* 21-34. doi:10.1017/S1352465810000457
Green, M. J., & Phillips, M. L. (2004). Social threat perception and the evolution of paranoia. *Neuroscience and Biobehavioural Reviews, 28,* 333-342. doi:10.1016/j.neubiorev.2004.03.006
Grey, S., & Mathews, A. (2000). Effects of training on interpretation of emotional ambiguity. *The Quarterly Journal of Experimental Psychology, 53,* 1143–1162.
Hayes, S., Hirsch, C. R., Krebs, G. & Mathews, A. (2010). The effects of modifying interpretation bias on worry in generalised anxiety disorder. *Behaviour Research and Therapy, 48,* 171-178. doi:10.1016/j.brat.2009.10.006
Hirsch, C. R., Mathews, A., & Clark, D. M. (2007). Inducing an interpretation bias changes self-imagery: A preliminary investigation. *Behaviour Research and Therapy, 45,* 2173-2181. doi:10.1016/j.brat.2006.11.001
Hirsch, C. R., Hayes, S. & Mathews, A. (2009). Looking on the bright side: Accessing benign meanings reduces worry. *Journal of Abnormal Psychology, 118,* 44-54.
Hoppitt, L., Mathews, A., Yiend, J., & Mackintosh, B. (2010a). Cognitive bias modification: The critical role of active training in modifying emotional responses. *Behavior Therapy, 41,* 73-81. doi:10.1016/j.beth.2009.01.002
Hoppitt, L., Mathews, A., Yiend, J., & Mackintosh, B. (2010b). Cognitive mechanisms underlying the emotional effects of bias modification. *Applied Cognitive Psychology, 24,* 312-325.
Humphreys, L., & Barrowclough, C. (2006). Attributional style, defensive functioning and persecutory delusions: Symptom-specific or general coping strategy? *British Journal of Clinical Psychology, 45,* 231-246. doi:10.1348/014466505X50509
Kaney, S., & Bentall, R. P. (1989). Persecutory delusions and attributional style. *British Journal of Medical Psychology, 62,* 191-198.
Kaney, S., & Bentall, R. P. (1992). Persecutory delusions and the self-serving bias. *Journal of Nervous and Mental Disease, 180,* 773-780.
Kinderman, P., & Bentall, R. P. (1996a). A new measure of causal locus: the internal, personal and situational attributions questionnaire. *Personality and Individual Differences, 20,* 261-264.
Kinderman, P., & Bentall, R. P. (1997). Causal attributions in paranoia: Internal, personal and situational attributions for negative events. *Journal of Abnormal Psychology, 106,* 341-345.
Koster, E. H. W., Fox, E., & MacLeod, C. (2009). Introduction to the special section on cognitive bias modification for emotional disorders. *Journal of Abnormal Psychology, 118,* 1-4.

Kroenke ,K., Spitzer, R. L., Williams, J. B. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine, 16,* 606-613. doi:10.1046/j.1525-1497.2001.016009606.x

Lang, T. J., Blackwell, S. E., Harmer, C. J., Davison, P., & Holmes, E. A. (2012). Cognitive bias modification using mental imagery for depression: Developing a novel computerized intervention to change negative thinking styles. *European Journal of Personality, 26,* 145-157. doi:10.1002/per.855

Lang, T. J., Moulds, M. L., & Holmes, E. A. (2009). Reducing depressive intrusions via a computerized cognitive bias modification of appraisals task: Developing a cognitive vaccine. *Behaviour Research and Therapy, 47,* 139-145. doi:10.1016/j.brat.2008.11.002

Lange, W-G., Salemink, E., Windey, I.,. Keijsers, G. P. J., Krans, J., Becker, E. S., & Rinck, M. (2010). Does modified interpretation bias influence automatic avoidance behaviour? *Applied Cognitive Psychology,* 24, 326-337. doi:10.1002/acp.1679

Leary, M. R. (1983). A brief version of the Fear of Negative Evaluation Scale. *Personality and Social Psychology Bulletin*, *9,* 371–375.

Lester, K. J., Mathews, A., Davison, P. S., Burgess, J. L., & Yiend, J. (2011). Modifying cognitive errors promotes cognitive well being: A new approach to bias modification. *Journal of Behavior Therapy and Experimental Psychiatry*. *42,* 298-308. doi:10.1016/j.jbtep.2011.01.001

Mackintosh, B., Mathews, A., Yiend, J., Ridgeway, V., & Cook, E. (2006). Induced biases in emotional interpretation influence stress vulnerability and endure despite changes in context. *Behavior Therapy, 37,* 209-222. doi:10.1016/j.beth.2006.03.001

Martin, J. A., & Penn, D. L. (2001). Social cognition and subclinical paranoid ideation. *British Journal of Clinical Psychology, 40,* 261-265.

Martin, J. A., & Penn, D. L. (2002). Attributional style in schizophrenia: An investigation in outpatients with and without persecutory delusions. *Schizophrenia Bulletin, 28,* 131-141.

Mathews, A., & Mackintosh, B. (2000). Induced emotional interpretation bias and anxiety. *Journal of Abnormal Psychology, 109,* 602–615. doi:10.1037/0021-843X.109.4.602

McKay, R., Langdon, R. & Coltheart, M. (2007). Jumping to delusions? Paranoia, probabilistic reasoning and need for closure. *Cognitive Neuropsychiatry, 12,* 362-376. doi:10.1080/13546800701203769

McKay, R., Langdon, R. & Coltheart, M. (2005). Paranoia, persecutory delusions and attributional biases. *Psychiatry Research, 136,* 233-245.

Moritz, S., Burnette, P., Sperber, S., Köther, U., Hagemann-Goebel, M., Hartmann, M., & Lincoln, T. M. (2011). Elucidating the black box from stress to paranoia. *Schizophrenia Bulletin, 37,* 1311-1317. doi:10.1093/schbul/sbq055

Moritz, S., Woodward, T. S., Burlon, M., Braus, D. F., & Andresen, B. (2007). Attributional style in schizophrenia: evidence for a decreased sense of self-causation in currently paranoid patients. *Cognitive Therapy Research, 31,* 371–383. doi:10.1007/s10608-006-9070-5

Murphy, R., Hirsch, C. R., Mathews, A., Smith, K., & Clark, D. M. (2007). Facilitating a benign interpretation bias in a high socially anxious population. *Behaviour Research and Therapy, 45,* 1517-1529. doi:10.1016/j.brat.2007.01.007

Oltmanns, T. F., & Maher, B. A. (1988). *Delusional beliefs.* New York: John Wiley.

Peters, K. D., Constans, J. I., & Mathews, A. (2011). Experimental modification of attribution processes. *Journal of Abnormal Psychology, 120,* 168-173. doi:10.1037/a0021899.

Romme, M., & Escher, S. (1993). *Accepting voices.* London: Mind.

Rutten, B. P. F., van Os, J., Dominguez, M., & Krabbendam, L. (2008). Epidemiology and social factors: findings from the Netherlands Mental Health Survey and Incidence Study (NEMESIS). In D. Freeman, R. Bentall, & P. Garety (Eds.), *Persecutory delusions: Assessment, theory, and treatment* (pp. 53-72). Oxford: Oxford University Press.

Salemink , E., van den Hout, M. A., & Kindt, M. (2007a). Trained interpretive bias and anxiety. *Behaviour Research and Therapy, 45,* 329-340. doi:10.1016/j.brat.2006.03.011

Salemink , E., van den Hout, M. A., & Kindt, M. (2007b). Trained interpretive bias: Validity and effects on anxiety. *Journal of Behaviour Therapy and Experimental Psychiatry, 38,* 212-224. doi:10.1016/j.jbtep.2006.10.010

Salemink, E., van den Hout, M. A., & Kindt, M. (2009). Effects of positive interpretive bias modification in highly anxious individuals. *Journal of Anxiety Disorders, 23,* 676-683. doi:10.1016/j.jandis.2009.02.006

Salemink, E., van den Hout, M. A., & Kindt, M. (2010a). Generalisation of modified interpretative bias across tasks and domains. *Cognition and Emotion, 24,* 453-464. doi:10.1080/02699930802692053
Salemink, E., van den Hout, M. A., & Kindt, M. (2010b). How does cognitive bias modification affect anxiety? Mediation analyses and experimental data. *Behavioural and Cognitive Psychotherapy, 38,* 59-66. doi:10.1017/S1352465809990543
Salemink, E., & Wiers, R. W. (2011). Modifying threat-related interpretive bias in adolescents. *Journal of Abnormal Child Psychology, 39,* 967-976. doi:10.1007/s10802-011-9523-5
Spitzer, R. L., Kroenke, K., Williams, J. B., Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of Internal Medicine, 166,* 1092-1097.
Startup, H., Freeman, D., & Garety, P. A. (2007). Persecutory delusions and catastrophic worry in psychosis: Developing the understanding of delusion distress and persistence. *Behaviour Research and Therapy, 45,* 523-537. doi:10.1016/j.brat.2006.04.006
Startup, H., Freeman, D., & Garety, P. A. (2008). Jumping to conclusions and persecutory delusions. *European Psychiatry, 23,* 457-459. doi:10.1016/j.eurpsy.2008.04.005
Steel, C., Wykes, T., Ruddle, A., Smith, G., Shah, D. M., & Holmes, E. (2010). Can we harness computerised cognitive bias modification to treat anxiety in schizophrenia? A first step highlighting the role of mental imagery. *Psychiatry Research, 178,* 451-455. doi:10.1016/j.psychres.2010.04.042
Steinman, S. A., & Teachman, B. A. (2010). Modifying interpretations among individuals high in anxiety sensitivity. *Journal of Anxiety Disorders, 24,* 71-78. doi:10.1016/j.janxdis.2009.08.008
Strauss, J. S. (1969). Hallucinations and delusions as points on continua function: Rating scale evidence. *Archives of General Psychiatry, 21,* 581-586.
Turner, R., Hoppitt, L., Hodgekins, J., Wilkinson, J., Mackintosh, B., & Fowler, D. (2011). Cognitive bias modification in the treatment of social anxiety in early psychosis: A single case series. *Behavioural and Cognitive Psychotherapy, 39,* 341-347. doi:10.1017/S1352465810000706
Wilson, E. J., MacLeod, C., Mathews, A., & Rutherford, E. M. (2006). The causal role of interpretive bias in anxiety reactivity. *Journal of Abnormal Psychology, 115,* 103-111. doi:10.1037/0021-843X.115.1.103
Woud, M. L., Holmes, E. A., Postma, P., Dalgleish, T., & Mackintosh, B. (2012). Ameliorating intrusive memories of distressing experiences using computerized reappraisal training. *Emotion, 12,* 778-784. doi:10.1037/a0024992
Yiend, J., Mackintosh, B., & Mathews, A. (2005). Enduring consequences of experimentally induced biases in interpretation. *Behaviour Research and Therapy, 43,* 779-797. doi:10.1016/j.brat.2004.06.007
Yiend, J., Savulich, G., Coughtrey, A., & Shafran, R. (2011). Biased interpretation in perfectionism and its modification. *Behaviour, Research, and Therapy, 49,* 892-900. doi:10.1016/j.brat.2011.10.004