

**Metacognition and experiences of psychosis: an investigation of metacognitive beliefs
and coping strategies**

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List of abbreviations

ACTION: Assessment of Cognitive Therapy instead of Neuroleptics

AIC: Akaike Information Criterion

ANCOVA: Analysis of Covariance

ANOVA: Analysis of Variance

AnTI: Anxious Thoughts Inventory

APA: American Psychological Association

BAI: Bayesian Information Criterion

BaPS: Beliefs about Paranoia Scale

BCSS: Brief Core Schema Scales

BDI-7: Beck Depression Inventory-7

BPS: British Psychological Society

CAS: Cognitive Attentional Syndrome

CAS-1: Cognitive Attentional Syndrome Scale

CBT: Cognitive Behavioural Therapy

CC: Cognitive Confidence

CERQ: Cognitive Emotional Regulation Questionnaire

CI: Confidence Interval

CISR: Clinical Interview Schedule Revised

CMHT: Community Mental Health Team

CONSORT: Consolidated Standards of Reporting Trials

CSC: Cognitive Self-Consciousness

DASS: Depression Anxiety and Stress Scale

DOI: Duration of Illness

DSM-IV: Diagnostic and Statistical Manual of Mental Disorders

DUP: Duration of Untreated Psychosis

EEG: Electroencephalogram

ESM: Experience Sampling Methodology

GP: General Practitioner

GRADE: The Grades of Recommendation, Assessment, Development and Evaluation working group

GSR: Galvanic Skin Response

HADS: Hospital Anxiety and Depression Scale

IACT: Investigating Attention Control Training

ICD-10: International Classification of Diseases

IPD: Individual Patient Data

IRAS: Integrated Research Application System

IVI: Interpretation of Voices Inventory

MCAR: Missing Completely At Random

MCQ: Metacognitions Questionnaire

MCQ-SAM: Metacognitions Questionnaire Shortened and Modified

MeSH: Medical Subject Heading

MOOSE: Meta-analysis Of Observational Studies in Epidemiology

MRI: Magnetic Resonance Imaging

MSE: Mean Square Error

NBRS: Negative Beliefs relating to Responsibility and Superstition

NBUD: Negative Beliefs relating to Uncontrollability and Danger

NCCMH: National Collaborating Centre for Mental Health

NHS: National Health Service

NICE: National Institute for health and Care Excellence

NIHR: National Institute for Health Research

NTC: Negative Beliefs relating to need for Control

PANSS: Positive and Negative Syndrome Scale

PBW: Positive Beliefs about Worry

PCL: Paranoia Checklist

PET: Positron Emission Tomography

PIS: Participant Information Sheet

PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-analysis

PRU: Psychosis Research Unit

PSCS: Private Self-Consciousness Scale

PSWQ: Penn State Worry Questionnaire

PSYRATS: Psychotic Symptoms Rating Scales

PTQ: Perseverative Thinking Questionnaire

QPR: Process of Recovery Questionnaire

RRQ: Ruminative and Reflection Questionnaire

RRS: Ruminative Response Scale

RSQ: Response Styles Questionnaire

SAS: Self-Absorption Scale

SCS: Self-Consciousness Scale

SCS-R: Self-Consciousness Scale-Revised

SD: Standard Deviation

SEM: Structural Equation Model

SFSC: Self-Focus Sentence Completion

SIAS: Social Interaction Anxiety Scale

SPSS: Statistical Package for the Social Sciences

S-REF: Self-Regulatory Executive Function

SSAS: Situational Self-Awareness Scale

STAI: State-Trait Anxiety Inventory

STROBE: Strengthening the Reporting of Observational studies in Epidemiology

SURG: Service User Reference Group

TCQ: Thought Control Questionnaire

UREC: University Research Ethics Committee

WBSI: White Bear Suppression Inventory

WHOQOL: World Health Organisation Quality of Life Scale

Abstract

The University of Manchester

Candidate: Rachel Sellers

A thesis submitted to the University of Manchester for the degree of Doctor of Philosophy in the Faculty of Biology, Medicine and Health

Thesis title: Metacognition and experiences of psychosis: an investigation of metacognitive beliefs and coping strategies

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This thesis investigated the application of the Self-Regulatory Executive Function (S-REF) model (Wells & Matthews, 1994, 1996) to distressing experiences of psychosis. A multi-method approach tested a series of hypotheses derived from the S-REF model. The methods included systematic review, meta-analysis, cross-sectional and experimental designs. Statistical methods examined relationships between metacognitive beliefs, coping strategies, positive symptoms and distress.

Chapter 1 provides a general introduction to psychosis and metacognition, and outlines the aims and objectives of the thesis. Chapter 2 provides an overview of the methods used in subsequent studies and presents a detailed rationale for the choice of design and analysis. Chapters 3 and 4 (study 1 and 2) present the findings of two systematic reviews and meta-analyses. The reviews reflect two fundamental aspects of the S-REF model (metacognitive beliefs and unhelpful coping strategies) and summarise the current empirical position of research in each area respectively. Study 1 revealed a high level of similarity between metacognitive beliefs endorsed by people with psychosis and people with emotional disorder. Study 2 revealed several plausible links between unhelpful coping strategies, experiences of psychosis and negative affect. The reviews identified areas that require further investigation and guided the development of the subsequent studies.

Chapter 5 (study 3) examines the relationships between metacognitive beliefs, positive symptoms and negative affect in a clinical sample. The results showed that metacognitive beliefs predict negative affect over and above the topological characteristics of positive symptoms. The findings highlight the influence of metacognitive beliefs in negative affective states when the contribution of psychotic symptoms is controlled. In a similar design, chapter 6 (study 4) examines the relationships between unhelpful coping strategies and positive and negative outcomes in a clinical sample. The results revealed that coping strategies did not predict positive symptoms, negative affect, quality of life or recovery. However, metacognitive beliefs emerged as consistent and unique predictors of these variables when the comorbidities were controlled. The findings further highlight the influence of metacognitive beliefs on subjective wellbeing.

Chapters 7 and 8 examine the relationship between metacognitive beliefs, paranoia and negative affect. Chapter 7 (study 5) tested whether experimental manipulation of negative metacognitive beliefs could increase paranoid intrusions and negative affect. The study utilised a fake-EEG paradigm, whereby metacognitive beliefs were manipulated with the suggestion that detection of a paranoid thought by the EEG would result in a loud noise. The findings were not statistically significant, but demonstrated the manipulations worked and the experimental paradigm is feasible. Chapter 8 (study 6) explored the combined role of cognition (i.e. schemas) and metacognition in non-clinical paranoia. The findings suggest that schemas predict paranoia frequency whilst metacognitive beliefs moderate distress.

This thesis has extended current research by demonstrating novel links between metacognition and negative affect in the context of experiences of psychosis. The findings have relevance for psychological approaches as they support the investigation of both cognitive and metacognitive factors. The findings also have relevance for psychological intervention as they support the consideration of metacognitive approaches.

Declaration

No portion of the work referred to in this thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

Data

The author was not involved in the collection of data used in study 3. The study used baseline data from 74 participants that took part in a trial of cognitive behaviour therapy for people with psychosis that were not taking antipsychotic medication. The trial was funded by the National Institute for Health Research (NIHR) under the Research for Patient Benefit program (grant reference number PB-GB-1208-19053). Baseline data was also used from ten participants that took part in an open trial of metacognitive therapy for psychosis. This feasibility trial received no external funding. Both of these trials were conducted at the Psychosis Research Unit, Greater Manchester West NHS Foundation Trust. The final 75 participants were recruited from an inpatient and outpatient clinic in Warsaw by the second author on the paper (Dr. Lukasz Gaweda). Dr. Gaweda is financed by the Polish Ministry of Science and Higher Education (0295/E-393/STY/10/2015 and MOBILITY PLUS program 1258 /MOB/IV/2015/0). The author was independently responsible for the design, analysis and write-up of this study.

The author was directly involved with data collection for study 4. Baseline data was used from a sample of people with psychosis that took part in an attention training intervention ($n=29$) and a sample recruited specifically for the study ($n=40$). The author worked as a research assistant and trial therapist on the attention training trial and was jointly responsible for recruitment and assessment of trial participants, alongside a wider research team. The author was independently responsible for the design, analysis and write-up of this study.

The author was independently responsible for data collection for study 5 and 6, as well as the design, analysis and write-up of these studies.

Published work

This thesis is presented in alternative format with six papers. Study 1 has been published in *Schizophrenia Research*. Study 2 has been re-submitted to the *Journal of Clinical Psychology and Psychotherapy* following revisions. Study 3 has been published in *Psychiatry Research*. Study 4 has been submitted and is under review at *Psychiatry Research*. Study 5 has been submitted and is under review at the *Journal of Experimental Psychopathology*. Study 6 has been submitted and is under review at *Psychology and Psychotherapy: Theory, Research and Practice*.

Authorship and contributions from collaborators

Professor Anthony Morrison and Professor Adrian Wells supervised the design, conduct, analysis and write-up of the studies in this thesis. Therefore, they are listed as co-authors on all six of the papers. Dr. Filippo Varese is a co-author on study one. He provided methodological and statistical advice for the meta-analysis and provided comments on the manuscript. Dr. Lukasz Gaweda is a co-author on study three. He provided a proportion of the data used for analysis and provided comments on the manuscript. Dr. Sophie Parker is a co-author on study 4. She was the chief investigator of the attention training research trial from which a proportion of the data was used for analysis. Professor Richard Emsley is a co-author on study 6. He consulted on the data analysis plan, provided support with statistical analysis and provided comments on the manuscript.

Analysis and write-up

The candidate led the study design, conduct and preparation of manuscripts for the studies conducted in this thesis. Professor Anthony Morrison and Professor Adrian Wells

supervised the study design and data analysis. Additional statistical expertise was provided for study 1 by Dr. Filippo Varese and for study 6 by Professor Richard Emsley.

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The author

After finishing my Bachelor's and Master's degree in psychology, I worked as an assistant psychologist for two years on mental health inpatient wards. I subsequently joined the National Health Service (NHS) in 2013 as a research assistant psychologist at the Psychosis Research Unit (PRU). I feel fortunate to have worked on several different projects at PRU and to have the opportunity to complete this PhD. My role for the past four years has involved working on National Institute for Health Research (NIHR) funded randomised controlled trials of Cognitive Behaviour Therapy (CBT) for psychosis, a pilot trial of attention training for psychosis, and a systematic review and meta-analysis of CBT for psychosis with the National Collaborating Centre for Mental Health Research (NCCMH).

Context

Recent decades have seen a significant change in the way psychosis is understood.

Initially considered a disorder of biological origin with a severe and enduring trajectory, the role of psychosocial factors have been given increased precedence, and the prognosis for recovery considered more likely and more positive. Whilst identifying the physiological aetiology of psychosis remains the goal of a large body of research, there is also a rapidly growing and increasingly influential body of research investigating social and psychological mechanisms involved in the development, maintenance and treatment of psychosis.

In particular, three significant shifts in the conceptualisation of psychosis underpin this thesis. First is the increased recognition that psychosis is not a discrete diagnostic category that is entirely independent of other psychological difficulties that are considered to occur more commonly, such as emotional disorders (e.g. Freeman & Garety, 2003). Second is the growing influence of a normalising approach to psychosis, based on the evidence that experiences associated with psychosis are more common than initially thought (Van Os, Hanssen, Bijl, & Ravelli, 2000), may arise from everyday misjudgements of internal events (Garety, Kuipers, Fowler, Freeman, & Bebbington, 2001) and can be measured on a continuum of severity in the general population (Johns & Van Os, 2001). The third is the acknowledgement that transdiagnostic processes traditionally associated with emotional disorders may also have a significant role in psychosis (e.g. A. G. Harvey, Watkins, Mansell, & Shafran, 2004). Metacognitive beliefs (i.e. positive and negative beliefs about particular thoughts or intrusions) and metacognitive coping responses (i.e. worry, rumination, threat monitoring and thought control) have been highlighted as such transdiagnostic factors. These beliefs and processes have gained influence through the Self-Regulatory Executive Function (S-REF) model (Wells & Matthews, 1994, 1996).

Currently, the application of this model to psychosis is underdeveloped. Whilst individual components incorporated in this model (such as metacognitive beliefs, worry and rumination) have been evidenced as having relationships with experiences of psychosis, there is limited consensus of what the model of this relationship is. In the introduction, a comprehensive overview of psychosis and metacognition is provided followed by the rationale for the two systematic reviews and four empirical papers that comprise the remainder of this thesis.

1 Chapter 1: Introduction

1.1 Overview

The aim of this chapter is to provide a comprehensive overview of the relevant psychological theory and evidence that supports the development of the hypotheses investigated in this thesis. The chapter will begin with a general introduction to psychosis and metacognition, and will proceed to focus on the specific theoretical approaches that informed the aims and objectives (i.e. cognitive models of psychosis (Garety et al., 2001; Morrison, 2001) and the transdiagnostic Self-Regulatory Executive Function (S-REF) model (Wells & Matthews, 1994, 1996)). The current empirical position of the application of the S-REF model to emotional disorder will be summarised by drawing on relevant research evidence, and the need for clarification of the applicability of the model to psychosis will be introduced. Finally, the aims and objectives of the thesis, constituting two systematic reviews and four empirical studies, will be presented.

1.2 An overview of psychosis

1.2.1 Definition of psychosis

In modern psychiatry, the term psychosis refers to a cluster of major psychiatric disorders in which a person's perception, thoughts, mood and behaviour are significantly altered (National Institute for Health and Care Excellence, 2014). There is a long history of debate regarding the definition and causes of psychosis. Different approaches have had different implications for prognosis and treatment.

Initially introduced in the nineteenth century (Feuchtersleben, 1845), the term psychosis referred to a range of presentations including melancholia, mania, dementia and idiocy (Beer, 1996). The term created a sub-category of the neuroses, and throughout the twentieth century psychotic and neurotic (or emotional) disorders were studied and treated separately (Freeman & Garety, 2003). Fundamental to this separation was the belief that psychosis had an organic aetiology.

There has been a long-standing tendency to view the prognosis for people with psychosis as poor (Calabrese & Corrigan, 2005). However, the gradual shift from purely biological perspectives and increased acknowledgement of the importance of psychosocial factors has paved the way for alternative treatment approaches (see Approaches to understanding and treating psychosis on page 31). Commensurate with this, the definition of recovery from psychosis has continued to evolve. Within the psychological literature, there is increased emphasis on service user defined recovery which highlights the importance of hope, empowerment and rebuilding life (e.g. Pitt, Kilbride, Nothard, Welford, & Morrison, 2007). However, this remains discrepant with service-defined recovery that tends to focus on symptom remission (Wood, Price, Morrison, & Haddock, 2013).

Experiences of psychosis can be present within the context of different diagnoses of psychological disorder, such as depression, bipolar disorder and post-traumatic stress disorder (Dunayevich & Keck, 2000; Sareen, Cox, Goodwin, & Asmundson, 2005; Varghese et al., 2011). However, schizophrenia is the diagnostic term most commonly associated with psychosis (National Institute for Health and Care Excellence, 2014). The symptoms of schizophrenia are commonly categorised into two distinct groups, positive symptoms and negative symptoms (Andreasen, 1995).

Positive symptoms are considered an exaggeration of normal functions and refer to anomalous experiences such as delusional beliefs or extra-sensory perceptions such as hallucinations. Delusions are defined as “a false personal belief based on an incorrect inference about external reality” (American Psychiatric Association, 2000). The most common delusional beliefs in psychosis are delusions of reference, delusions of persecution and delusions of control (Garety & Hemsley, 1994). Hallucinations are defined as “a sensory perception that has the compelling sense of reality of a true perception but that occurs without external stimulation of the relevant sensory organ” (American Psychiatric Association, 2000). Auditory hallucinations are the most common

and have been estimated to occur in up to 60% of people with psychosis (Slade & Bentall, 1988).

Negative symptoms are defined as deficits to normal function; they refer to social and functional difficulties, such as diminished expression, anhedonia, avolition and social withdrawal (Blanchard & Cohen, 2006). It has been noted that two people who share the diagnosis of schizophrenia may have little or nothing in common; this has led to questions of the usefulness and the validity of the diagnostic term (Bentall, 1993). Within this thesis, the term psychosis is predominantly used and refers to psychotic disorders defined by the DSM-IV (American Psychiatric Association, 2000) that include diagnoses such as schizophrenia.

1.2.2 Prevalence of psychosis

The estimated prevalence of psychosis varies depending on its definition and measurement. It is reported that 1% of the population are likely to receive a diagnosis of schizophrenia using medical definitions (Johns & Van Os, 2001). This translates to an occurrence of schizophrenia in up to 500,000 people in the UK (British Psychological Society, 2000). Schizophrenia ranks amongst the top ten causes of disability in developed countries worldwide (Murray & Lopez, 1996) and costs the UK an estimated 2.2 billion pounds every year (McCrone, Dhanasiri, Patel, Knapp, & Lawton-Smith, 2008).

However, official statistics operationalised using medical definitions may only represent a small number of people affected by psychotic experiences. For example, some research has suggested that up to 5.5% of people may experience symptoms of psychosis in the absence of a psychotic disorder (Johns et al., 2004). It has become recognised that experiences of psychosis are more common than first thought, and the British Psychological Society has stated: “although the risks might vary, psychotic experiences may happen to anyone in circumstances of extreme stress” (British Psychological Society, 2000).

1.2.3 Approaches to understanding and treating psychosis

1.2.3.1 Biological approaches

Biological approaches typically assume that psychosis is a disease of the brain with a physical origin. The search for the physical aetiology of psychosis is complex, and often multiple factors are implicated. Several avenues have been investigated; amongst those more extensively researched are genetic heritability, abnormalities in brain structure and function, and differences in levels of particular neurotransmitters.

Genetic studies have found clear evidence of a hereditary or genetic risk factor. Family studies suggest that first-degree relatives of people with a diagnosis of schizophrenia are ten times more likely to also receive a diagnosis (Craddock, O'Donovan, & Owen, 2005). A review of twin studies found 41-65% concordance for monozygotic twins, 0-28% concordance for dizygotic twins and an overall heritability estimate of 80-85% (Cardno & Gottesman, 2000). However, these studies also highlight the importance of environmental factors since heritability and monozygotic concordance rates are not 100%.

Brain imaging studies have investigated possible structural abnormalities in people with psychosis using Magnetic Resonance Imaging (MRI), and functional abnormalities using Positron Emission Tomography (PET). However, despite extensive research spanning over twenty years, reviews have conceded that studies using PET have produced conflicting results involving both hyper- and hypo-frontality of the frontal lobe (Glahn et al., 2005) and many findings are small and not replicated (Beck, Rector, Stolar, & Grant, 2009, p. 42). Structural imaging using MRI suggests people with schizophrenia may have enlarged lateral ventricles and reduced grey matter compared to those without a diagnosis. However, systematic reviews of this evidence suggest that whilst these findings are replicable, they are often small and the degree of enlargement may still fall within the normal range (Chua & McKenna, 1995; Steen, Mull, McClure, Hamer, & Lieberman,

2006). In addition, it is uncertain whether the observed differences may be attributable to the degenerative effects of antipsychotic medications (Moncrieff & Leo, 2010).

The discovery that certain drugs, known as antipsychotic medications, had a therapeutic effect on symptoms of psychosis led to the development of the dopamine hypothesis (Chua & McKenna, 1995). It was observed that Chlorpromazine could reduce psychotic experiences by reducing dopaminergic activity, whilst illicit substances that stimulate the dopaminergic system could induce psychotic-like experiences (British Psychological Society, 2000). This discovery transformed the treatment of schizophrenia, allowing for the eradication of practices such as psychosurgery, insulin coma therapy and electroconvulsive therapy (Bentall, 2009, p. 42).

Over the past 50 years, several variants of the dopamine hypothesis have been formulated and tested. A review of six variants of this hypothesis concluded that, as a scientific theory, the hypothesis lacks specificity and the evidence is inconclusive (Kendler & Schaffner, 2011). Moreover, whilst the different approaches all point towards a final mesolimbic dopamine dysregulation, they fail to account for how this manifests in the personal and idiosyncratic experience of symptoms (Kapur, 2003). The aberrant salience model outlined by Kapur (2003) has provided a promising bridge between the biological effects of antipsychotics on dopamine and the psychological experience of symptoms. The model suggests the dysregulation of dopamine mediates the attribution of salience to internally or externally generated stimuli. That is, heightened levels of dopamine lead to a state whereby events or thoughts are given particular attention or meaning. The person's association of the stimulus with reward or punishment, their schematic beliefs, and their cultural context subsequently drives the experience of a symptom (i.e. a delusional belief or hallucination).

In this model, it is proposed that dopaminergic treatments dampen the salience given to stimuli. However, Kapur and Mamo (2003) outline several therapeutic limitations to this

approach. First, antipsychotic treatments are symptomatic and neglect other important difficulties that a person with psychosis may have relating to functioning and cognition. Second, these medications only lead to gradual improvements in symptoms despite immediate effects on dopamine levels. Finally, the side effects of antipsychotic medications make their continued usage undesirable to some people with psychosis.

Overall, a purely biological approach is not sufficient to explain the variability in the course of psychosis between people with the diagnosis, and the characteristic fluctuation of symptoms within people with a diagnosis. These shortcomings led to the popularity of stress vulnerability models.

1.2.3.2 Stress vulnerability approaches

Stress vulnerability models describe an interaction between a biological predisposition to psychosis and life stressors (Myin-Germeys, van Os, Schwartz, Stone, & Delespaul, 2001). This approach assumes that a vulnerability to schizophrenia is inherited rather than schizophrenia itself (Meehl, 1962). Zubin and Spring (1977) suggested that everybody has a degree of trait vulnerability to psychological disorder that is determined by biological factors. Under circumstances of stressful or traumatic life events, and in the absence of adaptive coping strategies, the underlying vulnerability is proposed to manifest in an episode of psychosis. This model appeared to address some of the shortcomings of purely biological approaches to psychosis. In particular, the approach facilitated a better understanding of the apparent waxing and waning of symptoms observed across the lifespan of people with psychosis. Consistent with the assumptions of the stress-vulnerability model, research has demonstrated that stressors which anybody could be exposed to over a lifetime, such as daily hassles, life events and hostile family environments, appear to precede the onset and relapse of an episode of psychosis (Lukoff, Snyder, Ventura, & Nuechterlein, 1984; Myin-Germeys et al., 2001). The rise in popularity of the stress-vulnerability model provided hope for alternative treatments to

medication, such as family intervention and coping skills (Lukoff et al., 1984). However, this approach continued to emphasise an underlying biological process, and offered little insight into the specific psychological mechanisms that contribute to the content of positive symptoms, which often reflect a person's underlying beliefs about themselves, the world and others, and their affect (Morrison, Renton, Dunn, Williams, & Bentall, 2004, p. 16).

1.2.3.3 Psychological approaches

Psychological approaches offer a holistic approach to understanding the onset and maintenance of symptoms associated with psychosis. Cognitive models have been particularly influential. They suggest the way a person interprets events affects the way they feel and behave, and unhelpful interpretations are maintained by unhelpful thinking biases and behavioural responses (Morrison, 2013).

The cognitive model proposed by Garety et al. (2001) integrates biological predisposition, environmental factors, and cognitive and emotional changes. The model suggests an underlying vulnerability to psychosis is activated by adverse experiences, such as perceived social stress, a traumatic event or illicit substance use. These experiences cause disruptions or biases to cognitive processes, such as attention, perception, reasoning and judgement. As a result, anomalous thoughts or perceptions are misinterpreted or misattributed to an external source. Exposure to adverse experiences may also cause emotional changes, such as low self-esteem and negative self-schemas. These changes are proposed to influence the content of intrusions resulting in a more threatening or personally salient experience, and an increase in arousal and stress response.

The cognitive perspective offered by Morrison (2001) draws parallels between the misinterpretation of cognitive and body state information observed in people with anxiety disorders and the misinterpretations that drive and maintain positive symptoms of psychosis. The model suggests that paranoid thoughts, voices in the absence of stimuli and

delusional beliefs, are normal intrusions into awareness that are subsequently misinterpreted in a catastrophic, and often, culturally unacceptable way. It is believed that such misinterpretations stimulate physiological arousal and increase negative mood states. As a result, a cycle develops in which misinterpretations are maintained by the presence of counterproductive cognitive-behavioural responses in the form of safety-seeking behaviours, biased information processing, and faulty self and social knowledge.

1.2.3.4 The role of emotion

Despite a long-standing distinction between the diagnostic categorisation and treatment of emotional disorders and psychosis (Freeman & Garety, 2003), the psychological literature has increasingly acknowledged that emotion may have a significant role in experiences of psychosis. Cognitive models of psychosis have outlined different possibilities regarding the direction of this relationship.

In the model proposed by Garety et al. (2001) emotion is proposed to have a direct and normal relationship in the development of positive symptoms. The model suggests that emotional changes are initially driven by anomalous perceptions or adverse life experiences. As emotional responses increase, the experience of psychosis is thought to worsen. In this approach, emotional processes operate in the same way as they would on psychological symptoms of non-psychotic disorders (i.e. exacerbation).

In the model proposed by Morrison (2001), negative emotional states are primarily influenced by appraisals of cognitive or body state information as somehow threatening. These misinterpretations are subsequently maintained by negative mood states and physiological arousal. As such, a cycle develops in which mood and positive symptoms influence and maintain each other.

In the models outlined by Garety et al. (2001) and Morrison (2001), emotion is intrinsic to the development and maintenance of psychosis. Emotional responses occur in the context

of anomalous perceptions or faulty misinterpretations, and negative affect and positive symptoms subsequently have a bidirectional and exacerbating effect on each other. An alternative possibility is that emotional comorbidities are a psychological reaction to psychosis (Birchwood, 2003). This approach suggests that negative affective states emerge in response to the trauma and challenges of an episode of psychosis. It is proposed that depression is driven by feelings of loss, shame and entrapment that occur in response to major life and functional changes after an episode of psychosis (Birchwood, Iqbal, Chadwick, & Trower, 2000). Comorbid anxiety disorders are proposed to be driven by feelings of stigma, shame and social marginalisation (Birchwood et al., 2007).

Consistent with the proposal that emotional changes occur within the context of symptom onset, research has indicated that negative emotional states increase during the psychosis prodrome (e.g. Debbane, Van der Linden, Gex-Fabry, & Eliez, 2009; Yung & McGorry, 1996). The psychosis prodrome is considered a critical period that precedes the onset of psychosis during which changes in a person's behaviour and functioning are observed (Yung & McGorry, 1996). Further, cross-sectional evidence indicates that high rates of affective symptoms (such as anxiety and depression) are a common comorbidity of psychosis (Hartley, Barrowclough, & Haddock, 2013; Marwaha, Broome, Bebbington, Kuipers, & Freeman, 2014). This is consistent with the suggestion that emotional problems and psychosis co-occur. Moreover, a recent review found substantial evidence that negative affect may influence the content of auditory hallucinations and delusional beliefs (e.g. Freeman & Garety, 2003). This suggests that emotion and positive symptoms may not simply exist in parallel, but may share important relationships. Longitudinal analysis suggests that negative emotion most likely influences the formation of psychotic symptoms rather than the reverse (e.g. Fowler et al., 2012; Krabbendam et al., 2005), and this effect is bi-directional and follows a dose-response relationship (Van Rossum,

Dominguez, Lieb, Wittchen, & Van Os, 2011). As such, understanding the factors that influence emotion in experiences of psychosis is an important area of enquiry.

1.2.3.5 The psychosis continuum

The idea that experiences of psychosis are continuous, rather than dichotomous, is not recent but has become increasingly influential in the psychological literature. The approach is underpinned by the assumption that people may experience symptoms of psychosis (such as hallucinations or unusual beliefs) at differing levels of severity in the absence of a psychiatric disorder (Van Os, Linscott, Myin-Germeys, Delespaul, & Krabbendam, 2009). Consistent with this, a systematic review and meta-analysis found substantial evidence of sub-clinical symptoms of psychosis in the general population. The findings indicated that such experiences are mostly transitory, and just a small proportion develop a clinical psychotic disorder (Van Os et al., 2009).

The continuum approach has been particularly influential in the psychological investigation of paranoia. A large epidemiological survey found the distribution of paranoid thoughts in the general population resembles the distribution of affective symptoms (Bebbington et al., 2013): specifically, many people have few paranoid thoughts and few people have many. Paranoid thoughts are estimated to occur regularly in 20-30% of people, and range hierarchically from social evaluative concerns and feelings of vulnerability, to fears of significant social, physical or psychological harm (Freeman, Garety, et al., 2005). Moreover, evidence suggests that paranoid ideation may precede delusion formation (Kaymaz et al., 2012; Poulton et al., 2000). An important implication of these findings is that a person may move along the continuum. At the severe end, persecutory delusions are considered a hallmark symptom of psychosis.

Commensurate with the increased influence of the continuum approach, the factors that predict transition to clinically relevant symptoms of psychosis has become an important

area of enquiry. Emotion and metacognitive beliefs have shown promise in predicting this transition (e.g. Morrison et al., 2015).

1.2.3.6 The role of transdiagnostic factors

Similar to there being a high degree of comorbidity of affective symptoms in clinical psychosis, symptoms typically associated with psychosis, such as auditory hallucinations and delusional beliefs, are not exclusive to disorders defined as psychotic. For example, symptoms of psychosis are often reported in disorders such as depression, bipolar disorder and post-traumatic stress disorder (Dunayevich & Keck, 2000; Sareen et al., 2005; Varghese et al., 2011). Furthermore, research suggests that people rarely present with one pure form of psychological disorder (Kessler et al., 1994). It has been argued that this complexity is minimised in the categorical approach to psychological disorders that is prominent in the modern psychiatric diagnostic systems (A. G. Harvey et al., 2004, p. 4).

Psychological treatments that appear to be effective in reducing symptoms and distress associated with psychosis, such as cognitive behaviour therapy (Wykes, Steel, Everitt, & Tarrier, 2008), are underpinned by advances in treating disorders such as obsessive-compulsive disorder, panic and depression (e.g. Morrison, Renton, et al., 2004). Some psychological models have considered how these common cognitive and behavioural processes might fit together whilst accounting for the diversity of presentations they underpin (A. G. Harvey et al., 2004, pp. 13-15). The metacognitive approach set out by the Self-Regulatory Executive Function (S-REF) model (Wells & Matthews, 1994, 1996) has been particularly influential (see 1.4 The Self-Regulatory Executive Function (S-REF) model on page 42).

1.2.4 Summary

The definition, prognosis and treatment of psychosis continue to evolve. Psychological models have been at the forefront of emphasising psychosocial factors, reconceptualising

recovery and providing alternative treatment approaches. The psychiatric categorical model remains the dominant approach to conceptualising and treating psychosis in research and clinical practice, however, there is increased advocating of a dimensional model (Esterberg & Compton, 2009). Changes to the way psychosis is understood have seen increased acknowledgement that symptoms of psychosis may lie on a continuum of severity within non-clinical and clinical populations, may share important relationships with emotional comorbidities and may be influenced by common underlying or transdiagnostic factors. The metacognitive model may provide a promising basis for understanding transdiagnostic factors, mechanisms of transition and heightened emotional responses.

1.3 An overview of metacognition

1.3.1 Definition of metacognition

The concept of metacognition initially gained popularity in developmental psychology. Flavell (1979) used the term to describe the judgements children made about their cognitive abilities (e.g. memory, comprehension and learning) and their competence to carry out simple cognitive tasks. Metacognition is described in basic terms as “thinking about thinking” or “cognition about cognition” (Papaleontiou-Louca, 2003). The term covers a spectrum of mental abilities involved in self-reflection and captures the processes that evaluate cognitive effectiveness and strategically control performance. This is reflected in the definition offered by Wells (2000), who states that metacognition refers to “any knowledge or cognitive process that is involved in the appraisal, monitoring or control of cognition”.

The idea that metacognition controls and monitors general cognition led to the proposal that cognitive processes operate on two levels, an object level and a meta level (Nelson & Narens, 1990). Information passed from the object level to the meta-level is called monitoring because it feeds back information on what is happening at the cognitive level.

Information passed from the meta-level to the object level is called control because it manipulates cognition at the object level in an attempt to maintain or enhance performance.

1.3.2 Models of metacognition in psychosis

Within the psychosis literature, metacognition has been investigated in different ways. The approach described by Lysaker and colleagues focuses on a person's ability to make sense of their own mental states and the mental states of others, and to use this awareness to cope with distress and handle relational problems (MacBeth et al., 2016). This aspect of metacognition can be measured using the Metacognition Assessment Scale (Lysaker et al., 2005). The scale broadly captures a person's understanding of their own mind, others minds and mastery of coping and problem-solving. It also yields information relating to a person's capacity to synthesise and integrate information into complex representations. Without these skills, it is thought that a person might struggle to make sense of, or desire, social interactions; and may find it difficult to express and cope with emotions (Lysaker, Kukla, et al., 2015).

This aspect of metacognition has particular relevance to negative symptoms of psychosis, however, relationships with positive symptoms have also been observed (Lysaker et al., 2005). Several studies have demonstrated that metacognitive deficits are associated concurrently with negative symptom severity (Lysaker et al., 2005; Nicolo et al., 2012) and appear to predict worsening of negative symptoms prospectively (Hamm et al., 2012; Lysaker, Kukla, et al., 2015). This relationship appears to be consistent in people with first episode psychosis (MacBeth et al., 2016; Trauelsen et al., 2016) and people with enduring psychosis (Vohs et al., 2014). These metacognitive deficits have also been associated with poorer functional and vocational outcome (Bell, Tsang, Greig, & Bryson, 2009; Davies, Fowler, & Greenwood, 2016; Lysaker et al., 2010).

The metacognitive training approach described by Moritz and colleagues focuses on remediating cognitive biases that are especially relevant to delusional beliefs (Moritz,

Woodward, & Balzan, 2016). This approach is based on evidence from the psychological literature that suggests people with psychosis present with cognitive biases that lead to distortions in the appraisal and processing of information. Such biases include a tendency to jump to conclusions with limited evidence (Dudley, Taylor, Wickham, & Hutton, 2015), a bias against disconfirming evidence of unusual beliefs (Garety et al., 2005; Woodward, Moritz, Menon, & Klinge, 2008), and an inclination to make external attributions of negative events (Janssen et al., 2006). The goal of metacognitive training is to raise awareness of these biases in order to reduce the positive symptoms they underpin. As such, the intervention focuses on thinking and reasoning, rather than core delusional beliefs. Currently, evidence for the efficacy of metacognitive training in reducing positive symptoms and reasoning biases is mixed (Eichner & Berna, 2016; van Oosterhout et al., 2016).

Another influential line of research has focused on the metacognitive factors implicated in the Self-Regulatory Executive Function (S-REF) model (Wells & Matthews, 1994, 1996). This approach emphasises metacognitive beliefs and coping strategies that are proposed to maintain unhelpful thinking styles and distress across disorders. Consistent with cognitive approaches, the metacognitive model assumes that unhelpful changes or biases in thinking are intrinsically linked to psychological disorder. However, the perspective offered by Wells and Matthews (1996) places greater emphasis on broader aspects of cognition such as attention, and the processes that monitor and control it. The model proposes that unhelpful emotional and behavioural responses observed in psychological disorders can be better understood in terms of biases in information processing. The focus of this thesis is solely on those metacognitive factors implicated in the Wells and Matthews (1996) S-REF model because these are the transdiagnostic factors that are closely related to emotional regulation.

1.4 The Self-Regulatory Executive Function (S-REF) model

The S-REF model is based on a theoretical architecture comprised of three interacting levels of cognition. This includes automatic and reflexive processing that functions outside conscious awareness; conscious and voluntary processing that appraises events, guides thoughts and initiates actions; and a network of stored knowledge and self-beliefs that are the product of life experiences. The model stipulates information-processing biases that prioritise threat-related information lead to a state of enhanced self-regulation. The continuation of heightened self-regulation is thought to underpin the prolongation of psychological distress (Wells, 2000, chapter 2).

Self-regulatory processing is activated when an intrusion from automatic processing generates a negative or threat-related thought. The source of threat may be internal (e.g. an intrusive thought) or external (i.e. something threatening within the environment) and is appraised by long-term knowledge and beliefs. Consequently, a state of heightened self-awareness is initiated and attention is directed towards the source. A safety behaviour or coping strategy may be implemented to reduce discomfort or remove the threat. With repeated activation and reinforcement of negative appraisals, processing becomes primed toward the detection of information consistent with these beliefs (Wells & Matthews, 1996).

Wells and Matthews (1996) propose that everybody engages in some degree of voluntary self-regulatory processing. For the majority of people, this is transitory and subject to conscious control. However, psychological problems are proposed to occur when a person cannot exercise this control and they begin to engage in excessive cognitive-attentional processing. Enhanced cognitive processing takes the form of worry and rumination that is predominantly verbal thoughts. Enhanced attentional processing involves an unmodulated focus on sources of perceived threat, also known as threat monitoring or hyper-vigilance.

When these responses become fixed and a person is unable to disengage from them, this is referred to as the Cognitive Attentional Syndrome.

1.4.1 The Cognitive Attentional Syndrome (CAS)

The CAS is a term used to describe a locked-in style of negative processing that is driven by maladaptive coping strategies and underpinned by unhelpful metacognitive beliefs.

These responses are not uncommon and may differ from person to person. They include attentional biases (i.e. enhanced self-focused attention or environmental threat-monitoring), perseverative processing (i.e. worry and rumination) and unhelpful attempts to control threat (e.g. thought control strategies or experiential avoidance) (Wells, 2000).

The CAS is problematic because repeated processing of negative thoughts or threat means that negative evaluations and emotions are strengthened and persist. Furthermore, enhanced processing places considerable demand on cognition; this reduces overall cognitive effectiveness and limits capacity for feedback of information incompatible with unhelpful threat beliefs.

1.4.2 Metacognitive beliefs

Maladaptive coping strategies are supported by the beliefs a person holds about the usefulness of particular thought processes (such as worry and rumination), and the importance of monitoring and controlling others. These beliefs are referred to as metacognitive beliefs and can be positive or negative in content. Positive metacognitive beliefs reflect beliefs about the need to engage in aspects of the CAS (i.e. worry, rumination, threat monitoring, and other similar strategies) (Wells, 2009, p. 10). They include beliefs such as “focussing on danger will keep me safe” or “if I worry I will be prepared”. Negative metacognitive beliefs reflect the danger or uncontrollability of thoughts and feelings (Wells, 2009, p. 10). They include beliefs such as “thoughts can make bad things happen” or “my worrying is uncontrollable”.

The metacognitive beliefs implicated in the S-REF model can be measured using the metacognitions questionnaire (MCQ-65: Cartwright-Hatton & Wells, 1997) and its short version (MCQ-30: Wells & Cartwright-Hatton, 2004). Interpretation of the questionnaire yields five sub-scales of beliefs that are proposed to underpin unhelpful coping responses transdiagnostically. A greater endorsement of negative metacognitive beliefs is thought to be especially relevant to the prolongation of distress (Wells, 2009, p. 17).

Metacognitive beliefs specific to experiences of psychosis can also be measured. The Beliefs about Paranoia Scale (Gumley, Gillan, Morrison, & Schwannauer, 2011; Morrison et al., 2005) assesses four domains that capture negative beliefs about paranoia, beliefs about paranoia as a survival strategy, general positive beliefs about paranoia and normalising beliefs. The Interpretation of Voices Inventory (IVI: Morrison, Nothard, Bowe, & Wells, 2004) measures three sub-sets of beliefs relating to auditory hallucinations. This includes metaphysical beliefs, positive beliefs and beliefs relating to loss of control.

Symptom specific metacognitive beliefs are proposed to manifest in a similar pattern to the generic beliefs captured by the MCQ. In the cognitive model outlined by Morrison (2001), positive beliefs about unusual experiences (such as auditory hallucinations) or unusual beliefs (such as persecutory delusions) are thought to influence engagement with such intrusions, whilst appraisals of such phenomena as uncontrollable or dangerous are considered to be potential determinants of distress (see Metacognitive beliefs and psychosis on page 49).

1.5 Application of the S-REF model to emotional disorder

A significant body of research has investigated the metacognitive beliefs and processes that comprise the S-REF model in relation to emotional disorder. Evidence to support the underlying assumptions of the model has been systematically reviewed elsewhere (Wells,

2000, pp. 34-54). A brief summary of the literature is provided below to set the context for the current status of research in psychosis.

1.5.1 Metacognitive beliefs and emotional disorder

Cross-sectional research has consistently demonstrated that a greater endorsement of unhelpful positive and negative metacognitive beliefs is associated with vulnerability to negative emotion. Metacognitive beliefs appear to predict increased levels of depression (Papageorgiou & Wells, 2003), obsessive-compulsive symptoms (Wells & Papageorgiou, 1998), health anxiety (Bailey & Wells, 2015), and general anxiety (Spada, Georgiou, & Wells, 2010) in non-clinical samples. This relationship appears to be consistent in clinical samples of people with anxiety and depression (e.g. Roelofs, Huibers, Peeters, Arntz, & van Os, 2010; Solem et al., 2015; Wells & Carter, 2001).

Negative metacognitive beliefs have emerged as particularly important in relation to emotional wellbeing. Specifically, they have been found to influence relationships between predisposing factors and more severe or enduring negative affective states. For example, negative beliefs relating to the uncontrollability and danger of thoughts emerged as a significant moderator of the relationship between misinterpretations of body state information and health anxiety over a period of six months (Bailey & Wells, 2016).

Negative beliefs about rumination have been found to mediate the relationship between rumination and symptoms of depression (Papageorgiou & Wells, 2003). Negative metacognitive beliefs also mediate the relationship between experiences of abuse and negative affect (Myers & Wells, 2015).

In metacognitive therapy, the manipulation of unhelpful metacognitive beliefs is associated with positive outcomes. Metacognitive therapy specifically evaluates and questions the positive and negative beliefs that maintain unhelpful thinking patterns and emotional responses (Wells, 2000, p. 51). Several trials have been conducted which demonstrated efficacious results in reducing anxiety, depression and target metacognitions (e.g.

Papageorgiou & Wells, 2015; Wells & Colbear, 2012). Furthermore, comparisons of components of metacognitive therapy and cognitive therapy have suggested that changes in metacognitive beliefs may be a better predictor of outcome than changes in cognitive schemas (e.g. Grøtte et al., 2015; Normann, van Emmerick, & Morina, 2014; Solem, Haland, Vogel, Hansen, & Wells, 2009). These findings suggest that overlooking metacognition in traditional cognitive therapy may fail to address the underlying beliefs that influence the long-term implementation of new adaptive coping responses.

1.5.2 Metacognitive coping strategies (the CAS) and emotional disorder

The processes that are proposed to constitute the CAS (i.e. attentional biases, worry, rumination, and unhelpful attempts to control intrusive thoughts) have been investigated in empirical research spanning several decades. Attentional biases, in particular, are well documented in emotional disorders. An early review by Ingram (1990) concluded that self-focused attention is a non-specific process that is key across a diverse range of presentations including anxiety disorders, depression and schizophrenia. A more recent systematic review and meta-analysis found moderate effect sizes for the relationship between self-focused attention and negative affect (i.e. anxiety, depression and negative mood) in both correlational and experimental designs (Mor & Winquist, 2002). The effect was moderated by clinical status, with clinical samples yielding a stronger effect of self-focus on negative affect. The effect was also moderated by type of self-focus, whereby a focus on negative self-aspects was associated with higher negative affect, and a focus on positive self-aspects was associated with lower levels of negative affect. Moreover, there was some evidence of specificity between the direction of attentional focus and particular negative affective states. Private self-focus was more strongly related to depression, whereas public self-focus had a stronger relationship with social anxiety. This finding is corroborated by a detailed narrative review of attentional processes in social anxiety (see Bögels & Mansell, 2004).

Perseverative processing (i.e. worry and rumination) is also well documented in the emotional disorder literature. Early experimental studies demonstrated that the induction of worry leads to an increase in intrusive thoughts, an increase in negative affect and a reduction in task-focussed attention (Borkovec, Elwood, Pruzinsky, & DePree, 1983; Butler, Wells, & Dewick, 1995). Observational research has identified worry and rumination as a dominant processing style in a range of disorders including social phobia (Clark & Wells, 1995; Mellings & Alden, 2000), health anxiety (Bouman & Meijer, 1999), post-traumatic stress (Holeva, Tarrier, & Well, 2001), and depression (Nolen-Hoeksema, 1991). Longitudinally, the frequency of worry and rumination has been found to predict the severity of symptoms in people with anxiety and depression (Borkovec, Shadick, & Hopkins, 1991; Nolen-Hoeksema, Morrow, & Fredrickson, 1993; Roemer, Molina, & Borkovec, 1997; Vasey & Borkovec, 1992).

A final coping response considered central within the S-REF model is the utilisation of thought control strategies. Particular strategies are proposed to be associated with emotional vulnerability due to either incubation, whereby target thoughts are repeatedly processed voluntarily; or rebound effects, whereby target thoughts increase involuntarily. Specifically, strategies relating to thought suppression, punishment and worry are considered particularly problematic, whilst strategies involving distraction and reappraisal are considered more adaptive. Consistent with this, a recent meta-analysis found that thought suppression is effective for a limited time (i.e. over several minutes), however beyond this, there is a resurgence or rebound effect in the target thought (Abramowitz, Tolin, & Street, 2001). Several studies have found that clinical populations tend to use significantly more worry and punishment strategies, and significantly less distraction and reappraisal compared to non-clinical controls (e.g. Amir, Cashman, & Foa, 1997; Anbari, Mohammadkhani, & Rezaei Dogaheh, 2014). Furthermore, use of these strategies appears

to predict symptoms of anxiety and depression (e.g. Coles & Heimberg, 2005; Warda & Bryant, 1998; Wells & Davies, 1994).

1.5.3 Summary

Metacognitive beliefs and coping strategies have been influential in understanding the onset and maintenance of negative affect (i.e. anxiety and depression) in emotional disorders. The factors incorporated in this model provide a theoretical mechanism from which to consider how some intrusive experiences become more distressing, enduring and clinically relevant for some people. Moreover, the theory appears to be supported transdiagnostically by empirical research (i.e. cross-sectional, longitudinal and clinical trials).

Given the links between emotional dysregulation and experiences of psychosis, if metacognitive beliefs are associated transdiagnostically with emotional regulation then it is reasonable to suggest that people with psychosis may present with similar patterns of unhelpful metacognitive beliefs to people with emotional disorder. Furthermore, if metacognitive beliefs moderate distress in psychosis in a similar way to the relationship observed in emotional disorders, we might also expect to see a similar set of coping responses. As such, investigation of metacognitive beliefs and coping strategies in psychosis may be a useful area of enquiry to understand the maintenance of distressing positive symptoms.

1.6 Application of the S-REF model to psychosis

The focus of this thesis is on the application of the S-REF model to distressing experiences of psychosis. Cognitive approaches to psychosis have incorporated particular components of this model, and there is an expanding evidence base relating to a role for metacognitive beliefs and unhelpful coping strategies. At present, much of this work is taking place in parallel. This thesis will endeavour to investigate the application of the model

comprehensively by including and integrating both metacognitive beliefs and coping strategies.

1.6.1 Metacognitive beliefs and psychosis

The investigation of metacognitive beliefs in psychosis gained momentum following the suggestion they may have a causal role in positive symptoms (e.g. Morrison, 2001; Morrison, Haddock, & Tarrier, 1995). Morrison (2001) suggested that positive beliefs about intrusive experiences (e.g. auditory hallucinations or paranoid thoughts) may lead to an increase in such phenomena, and negative beliefs about intrusive experiences (e.g. being uncontrollable or dangerous) may be associated with increased distress.

Numerous studies have indicated that experiences of psychosis are associated with a greater endorsement of the generic metacognitive beliefs captured by the MCQ. For example, research using non-clinical samples found that people with higher proneness to hallucinations and delusions have an increased number of both positive and negative metacognitive beliefs (Laroi & Van der Linden, 2005; Morrison, Wells, & Nothard, 2000). Further along the continuum, research suggests that at-risk mental state for psychosis (Morrison et al., 2006) and subsequent transition to first episode psychosis (Barbato et al., 2013; Morrison, Bentall, et al., 2002) is associated with a greater endorsement of negative metacognitive beliefs. In clinical samples, people with psychosis have more co-occurring positive and negative metacognitive beliefs than people with at-risk mental state and non-psychiatric controls (Morrison, French, & Wells, 2007).

Several studies have indicated that positive symptoms and distress are also associated with symptom-specific metacognitive beliefs. Research using the BaPS has found the frequency of paranoid ideation is associated with the positive beliefs a person holds about paranoia as a survival strategy (Morrison et al., 2005; Murphy et al., 2017). Negative beliefs about paranoia, on the other hand, appear to be related to negative affect and clinical status (Gumley et al., 2011; Morrison et al., 2011). Similarly, research using the

IVI has found that positive beliefs about voices appear to predict hallucinations, whilst negative beliefs are associated with emotional or troublesome dimensions (Morrison, Nothard, et al., 2004; Morrison, Wells, & Nothard, 2002; Varese et al., 2016).

A systematic review and meta-analysis found limited evidence the generic transdiagnostic metacognitive beliefs captured by the MCQ have a causal role in positive symptoms (Varese & Bentall, 2011). The findings suggested that once affective comorbidities were controlled (i.e. levels of anxiety and depression), the relationship between metacognitive beliefs and psychosis was no longer significant. Instead, it appears these metacognitive beliefs may influence symptom maintenance, help seeking and distress (Hill, Varese, Jackson, & Linden, 2012; Varese, Barkus, & Bentall, 2011). Consistent with this, a recent longitudinal study found that higher levels of unhelpful metacognitive beliefs predicted a more severe and chronic course of illness in people with psychosis (Austin et al., 2015).

The emerging view is general metacognitive beliefs do not have a direct causal relationship with specific positive symptoms of psychosis, but may have a predisposing or maintaining role in relation to symptoms and emotional response. However, this requires further clarification and will form the basis of the first piece of work conducted for this thesis. A systematic review and meta-analysis will investigate whether metacognitive beliefs underlie a general vulnerability to psychological disorder, or whether they have specific relationships with psychosis (see chapter 3). This review will extend the findings of Varese and Bentall (2011) by comparing levels of metacognitive beliefs in people with psychosis to people with emotional disorder and people with no psychiatric diagnosis.

1.6.2 The CAS and psychosis

The psychological investigation of coping strategies associated with the CAS has developed in parallel with the investigation of metacognitive beliefs. The cognitive models outlined by Garety et al. (2001) and Morrison (2001) both suggest the continued use of unhelpful coping strategies may contribute to the maintenance of symptoms. In

particular, Morrison (2001) suggests the misinterpretations of intrusions that underpin positive symptoms are maintained by counterproductive cognitive behavioural responses. Some of these responses include elements of the CAS, such as biased attention towards the detection of threat and thought control strategies.

The cognitive model of delusional beliefs proposed by Freeman, Garety, Kuipers, Fowler, and Bebbington (2002), on the other hand, prioritises coping strategies dominated by worry. The model proposes that anxiety is central to the development and maintenance of persecutory delusions, which are compared to threat beliefs in emotional disorders. Commensurate with this, there has been a recent surge of interest in the relationship between worry and delusional ideation. This expanding evidence base has led to the development of new therapeutic interventions that focus on disrupting and modifying negative perseverative processing (e.g. Freeman et al., 2015).

Currently, the literature concerning CAS processes in psychosis is somewhat disconnected. The second piece of work conducted in this thesis will attempt to synthesise this research. In particular, the extent to which these coping strategies relate to symptoms and/or distress will be explored. A comprehensive and systematic review will investigate the extent to which experiences across the continuum of psychosis are related to CAS coping strategies in specific relation to the assumptions of the S-REF model (see chapter 4).

1.6.3 Summary

The application of the S-REF model to experiences of psychosis has gained recent momentum. In particular, the role of metacognitive beliefs has been well researched. Despite this, the relationship between metacognitive beliefs, symptoms and distress is unclear and requires further investigation. The investigation of metacognitive coping strategies in relation to experiences of psychosis is less developed. Whilst individual components proposed to constitute the CAS have been investigated, limited research has explored these responses in the specific context of the S-REF model and its hypotheses. It

is currently unclear the extent to which metacognitive variables predict, or interact, with anomalous experiences, and the extent to which they influence psychotic symptoms and/or distress.

1.7 Aims of the thesis

The purpose of this thesis is to investigate the application of the S-REF model to distressing experiences of psychosis. The first aim is to establish the current empirical position of research in this area. In order to achieve this, two comprehensive and systematic reviews will be conducted, and where possible meta-analysis will be used to quantify the magnitude of the relationships between metacognitive beliefs and coping strategies, and experiences of psychosis.

The first review will test the prediction metacognitive beliefs are associated with psychological disorder and unhelpful thinking styles in general, rather than specific diagnoses. The review will use quantitative methods (i.e. meta-analysis) to compare levels of unhelpful metacognitive beliefs in people with clinical psychosis, people with emotional disorder and people with no psychiatric diagnosis. The following research questions will be addressed: (1) Do people with psychosis have elevated levels of unhelpful metacognitive beliefs compared to non-psychiatric controls? (2) Do people with psychosis have elevated levels of unhelpful metacognitive beliefs compared to people with emotional disorder? This paper has been published in *Psychiatry Research* (Sellers, Varese, Wells, & Morrison, 2017).

The second review will use a mixed methods approach to explore three predictions relating to the CAS outlined by Wells (2000, p. 34) in clinical and non-clinical experiences of psychosis. The following research questions will be addressed: (1) Are experiences of psychosis associated with an increase in self-focused attention? (2) Are experiences of psychosis associated with negative perseverative thinking (worry and rumination)? (3) Are experiences of psychosis associated with counterproductive thought control strategies?

Specifically, the relationships between symptoms and distress will be examined. This paper has been re-submitted to the *Journal of Clinical Psychology and Psychotherapy* following reviewer feedback.

The second aim of this thesis is to understand the specific influence of metacognitive beliefs and coping strategies on distressing experiences of psychosis. In order to achieve this, a further four studies will be conducted that will test specific hypotheses based on the S-REF model and evidence summarised in the systematic reviews.

Study 3 will test the hypothesised relationship between metacognitive beliefs, positive symptoms and negative affect in a clinical sample. The following research questions will be addressed: (1) Are unhelpful metacognitive beliefs associated with positive symptoms of psychosis? (2) Are unhelpful metacognitive beliefs associated with negative affect? (3) Do metacognitive beliefs predict negative affect over and above symptom frequency, and other dimensions of psychotic symptoms captured by the Psychotic Symptoms Rating Scale (Haddock et al., 1999)? This paper has been published in *Psychiatry Research* (Sellers, Gawęda, Wells, & Morrison, 2016).

Study 4 will explore the cognitive attentional syndrome, and test the hypothesised relationships, in a clinical sample of people with psychosis. In addition, the validity of a specific measure of cognitive-attentional responses will be investigated. This will provide the first empirical investigation of metacognitive coping strategies operationalised using a measure designed to capture multiple coping responses utilised within a specific period (i.e. the past week). The following research questions will be addressed: (1) Is the CAS-1 (Wells, 2009, p. 268) a valid assessment of metacognitive coping strategies in psychosis? (2) Are higher levels of metacognitive beliefs associated with increased use of metacognitive coping strategies as measured by the CAS-1? (3) Do higher levels of CAS processing predict negative outcomes (i.e. positive symptoms and negative affect)? (4) Do

lower levels of CAS processing predict positive outcomes (i.e. quality of life and recovery)? This paper has been submitted to *Psychiatry Research*.

Study 5 will empirically test the effect of experimentally manipulating metacognitive beliefs (specifically uncontrollability and danger beliefs) on paranoid thoughts and negative affect. Metacognitive beliefs will be manipulated using a novel fake-EEG paradigm in a sample of students with frequent paranoid ideation. The following hypotheses will be tested: (1) Participants allocated to the belief manipulation condition will experience a higher number of intrusive threat-related thoughts; (2) Participants allocated to the belief manipulation condition will experience greater discomfort in response to a threatening thought; (3) Participants allocated to the belief manipulation condition will experience higher levels of state anxiety. This paper has been submitted to the *Journal of Experimental Psychopathology*.

Study 6 will investigate the combined role of cognitive and metacognitive beliefs in relation to a non-clinical experience of psychosis (i.e. paranoia in the general population). A series of structural equation models will be estimated drawing on the cognitive and metacognitive approach to paranoia. Specifically, the study will investigate whether metacognitive beliefs and/or schemas moderate negative affect in non-clinical paranoia. First, a baseline model will test the hypothesis that paranoia predicts negative affect. Second, the moderating role of both metacognitive beliefs and schemas on the relationship between paranoia and negative affect will be tested. A final model will test a series of exploratory hypotheses based on the cognitive and metacognitive approaches. This paper has been submitted to *Psychology and Psychotherapy: Theory, Research and Practice*.

2 Chapter 2: Methodology

Chapter 1 provided an outline of the theory and evidence that informed the hypotheses investigated within this thesis. This chapter will provide an overview of the methods utilised and present a detailed rationale for these. The six studies conducted in this thesis have either been published or submitted to peer review journals. Therefore, each study has its own method section that contains sufficient detail to understand and replicate the research. However, commensurate with the required word counts of academic journals the method sections are brief. This chapter will expand on matters of recruitment and sampling procedures, statistical analyses, ethical considerations and methodological strengths and limitations, with greater rigour. Where there appear to be gaps in the methodology in this chapter, this is because the study manuscript contains sufficient detail. An overview of the aims, research questions and design of each study is presented in Table 1.

2.1 Systematic review and meta-analysis

2.1.1 Overview and rationale

A systematic review attempts to collate all empirical evidence that fits pre-specified eligibility criteria in order to answer a specific research question (Higgins & Green, 2011, section 1.2.2). Many systematic reviews also contain meta-analysis. Meta-analysis is the use of statistical methods to combine and summarise the results of independent studies or datasets (Glass, 1976). Systematic reviews and meta-analyses have been described as essential tools for summarising evidence accurately and reliably (Liberati et al., 2009). Their uses include providing evidence for policy makers to judge the risks, harms and benefits of interventions; summarising related research for patients and carers; and providing summaries of previous research to support new research (Liberati et al., 2009). The rationale for carrying out a systematic review and meta-analysis in this thesis was to establish the current empirical position of the application of the Self-Regulatory Executive

Table 1

Overview of the studies conducted in this thesis

Study	Aim	Research questions/hypotheses	Sample	Design
Study 1: A meta-analysis of metacognitive beliefs as implicated in the Self-Regulatory Executive Function model in clinical psychosis	To test the prediction that metacognitive beliefs are associated with psychological disorder and unhelpful thinking styles in general rather than specific diagnoses	(1) Do people with psychosis have elevated levels of unhelpful metacognitive beliefs compared to non-psychiatric controls? (2) Do people with psychosis have elevated levels of unhelpful metacognitive beliefs compared to people with emotional disorder?	$k=11$	Systematic review and meta-analysis
Study 2: Are experiences of psychosis associated with unhelpful metacognitive coping strategies? A review of the evidence	To provide an exploratory investigation of metacognitive coping strategies in relation to experiences of psychosis	(1) Are experiences of psychosis associated with an increase in self-focused attention? (2) Are experiences of psychosis associated with negative perseverative thinking (worry and rumination)? (3) Are experiences of psychosis associated with counterproductive thought control strategies?	$k=51$	Systematic review and meta-analysis
Study 3: The role of unhelpful	To test whether metacognitive beliefs predict negative affect	(1) Are unhelpful metacognitive beliefs associated with positive symptoms of psychosis?	$n=159$ (clinical sample with	Cross-sectional (correlation and

metacognitive beliefs in psychosis: relationships with positive symptoms and negative affect	over and above topological characteristics of positive symptoms (e.g. symptom frequency) in people with psychosis	(2) Are unhelpful metacognitive beliefs associated with negative affect? (3) Do metacognitive beliefs predict negative affect over and above symptom frequency, and other dimensions of psychotic symptoms captured by the Psychotic Symptoms Rating Scale (Haddock et al., 1999)?	psychosis)	regression)
Study 4: Do people with psychosis engage in unhelpful metacognitive coping strategies? A test of the validity of the Cognitive Attentional Syndrome (CAS) in a clinical sample	To provide the first empirical investigation of metacognitive coping strategies operationalised using the CAS-1 measure (Wells, 2009, p. 268) which assesses multiple components of the CAS and beliefs within a specific time frame (the last week)	(1) Is the CAS-1 a valid assessment of metacognitive coping strategies in psychosis? (2) Are higher levels of metacognitive beliefs associated with increased use of metacognitive coping strategies as measured by the CAS-1? (3) Do higher levels of CAS processing predict negative outcomes (i.e. positive symptoms and negative affect) on a state rather than trait-basis? (4) Do lower levels of CAS processing predict positive outcomes (i.e. quality of life and recovery) on a state rather than trait-basis?	<i>n</i> =120 (60 clinical sample with psychosis; 60 non-clinical controls)	Cross-sectional (correlation, regression and scale validation)

<p>Study 5: An experimental manipulation of negative metacognitive beliefs in non-clinical paranoia: effects on intrusions and state anxiety</p>	<p>To test the effect of an experimental manipulation of metacognitive beliefs on paranoid intrusions and state anxiety in a non-clinical population</p>	<p>(1) Participants allocated to the belief manipulation condition will experience a higher number of intrusive threat-related thoughts (2) Participants allocated to the belief manipulation condition will experience greater discomfort in response to a threatening thought (3) Participants allocated to the belief manipulation condition will experience higher levels of state anxiety</p>	<p><i>n</i>=76 (non-clinical)</p>	<p>Experimental</p>
<p>Study 6: A test of cognitive and metacognitive factors in paranoia and negative affect using structural equation modelling</p>	<p>To explore the contribution of cognitive and metacognitive beliefs to paranoid ideation and distress.</p>	<p>(1) A baseline model will test the hypothesis that paranoia predicts negative affect. (2) The moderating role of both metacognitive beliefs and schemas on the relationship between paranoia and negative affect will be tested (3) A final model will test a series of exploratory hypotheses based on the cognitive and metacognitive models</p>	<p><i>n</i>=227 (non-clinical)</p>	<p>Structural Equation Modelling</p>

Function (S-REF) model (Wells & Matthews, 1996) to experiences of psychosis, and to inform the aims and hypotheses of four empirical studies. Two reviews followed the guidance set out in the Preferred Reporting Items for Systematic reviews and Meta-Analyses (Moher, Liberati, Tetzlaff, & Altman, 2009).

In the first systematic review (see chapter 3), statistical meta-analysis was used to test a specific prediction (i.e. metacognitive beliefs are related to psychological disorder in general, rather than specific diagnoses). This prediction was derived from a combination of theory (i.e. the transdiagnostic S-REF model) and existing evidence (e.g. Varese & Bentall, 2011) that suggest unhelpful metacognitive beliefs are not associated with specific symptoms of psychosis but may be a general vulnerability factor for psychological distress.

In the second systematic review (see chapter 4) a mixed methods approach was used. This review aimed to explore the evidence to-date of coping strategies implicated in the S-REF model, and their relationships with experiences of psychosis. The research questions were theory driven and derived from the specific assumptions of the S-REF model outlined by Wells (2000, p. 34).

2.1.2 Identification of search terms and the search strategy

Search terms were constructed in consultation with the supervisors of this thesis. Professor Anthony Morrison is an expert in the field of cognitive behaviour therapy for psychosis and provided assistance with identifying search terms relating to experiences of psychosis. Professor Adrian Wells co-developed the S-REF model and provided assistance with identifying search terms relating to metacognitive beliefs and the CAS. Search terms were also corroborated with previous reviews of a similar nature (e.g. Varese & Bentall, 2011). The search terms were combined following guidance received in training attended by the thesis author at the National Collaborating Centre for Health Mental Health GRADE centre. The search terms and strategy used for review 1 is available in the published

manuscript (see Search strategy on page 104). The search terms and strategy used for review 2 is available in the submitted manuscript (see Search strategy on page 131).

2.1.3 Eligibility and screening procedures

For both reviews, eligibility was assessed according to a pre-defined protocol agreed in collaboration with all contributors. The screening was conducted in three stages by the first author (first by title, then by abstract and finally by full text). Ambiguities in eligibility were resolved by consultation with the senior authors. The eligibility criteria for each review is detailed in the respective manuscript (see Eligibility screening on page 105 for review 1 and Eligibility screening on page 133 for review 2). An overview of the screening procedure is also provided diagrammatically in each manuscript (Figure 1 on page 108 for review 1 and Figure 4 on page 134 for review 2).

2.1.4 Quality assessment and risk of bias

A common criticism of meta-analyses is the reliability of the results is contingent on the studies utilised. Therefore, if the review contains low-quality studies then this will affect the overall quality of the meta-analysis, where errors or design flaws in the included studies may be overlooked (Borenstein, Hedges, Higgins, & Rothstein, 2009).

The studies used in the reviews in this thesis were predominantly cross-sectional. There is no single recommended tool for evaluating the quality of observational studies (Sanderson, Tatt, & Higgins, 2007). Consensus statements, such as MOOSE (Stroup, Berlin, Morton, & et al., 2000) and STROBE (von Elm et al., 2007), tend to focus on the quality of reporting rather than the quality of the design, conduct and analysis. Sanderson et al. (2007) suggest that checklists with summary judgements may be preferable to scales that produce a numerical summary score, as they are less prone to inappropriate analysis. Moreover, they recommend three fundamental domains for consideration (appropriate selection of participants; appropriate measurement of variables; and appropriate control of confounds).

The tool selected to assess study quality was adapted from the Agency for Healthcare Research and Quality (Williams, Plassman, Burke, Holsinger, & Benjamin, 2010). The tool has previously been used in a published systematic review of observational studies for people with psychosis at risk of self-harm and suicide (Taylor, Hutton, & Wood, 2015). The tool uses a four point rating system (meets, partially meets, does not meet or unclear) with summary judgements to grade ten criteria (see appendix 1). Key criteria relate to sampling (methods and size), measurement of constructs (e.g. determination of clinical status; measurement of metacognition) and appropriateness of the statistical analyses. The first author assessed quality ratings and discussed ambiguities with collaborators.

2.1.5 Statistical procedures

In study 1, statistical methods were considered appropriate because there was little methodological heterogeneity across the included studies (i.e. study design and construct measurement), and the optimal information size was met (i.e. there was sufficient power across the group of studies for a single adequately powered study) (Pogue & Yusuf, 1997).

In study 2, there was greater methodological heterogeneity in the eligible studies.

Statistical meta-analysis was only considered appropriate for one of the three research questions (Are experiences of psychosis associated with negative perseverative thinking (worry and rumination)?) due to issues of methodological heterogeneity. For this reason, narrative synthesis was used to address the other two research questions (Are experiences of psychosis associated with an increase in self-focused attention? Are experiences of psychosis associated with counterproductive thought control strategies?).

Traditional methods for meta-analysis involve pooling aggregate study level summary data (i.e. the average or estimated effect across all individuals in a study) obtained from study publications or study authors (Riley, Lambert, & Abo-Zaid, 2010). Alternative methods include individual participant data (IPD) meta-analysis, whereby individual level data from each study is obtained and analysed; and network analysis whereby three or more

comparisons are made. IPD meta-analyses tend to require close collaboration between research groups, additional statistical expertise and are considerably more time consuming (Stewart & Tierney, 2002). Network meta-analysis is used to simultaneously analyse direct comparisons within studies and indirect comparisons across studies based on a common comparator (Li, Puhan, Vedula, Singh, & Dickersin, 2011). For the purpose of the reviews in this thesis, a traditional meta-analysis of aggregated effects was considered the most appropriate due to time and resources.

All analyses were carried out using Comprehensive Meta-analysis version 3. Hedges' *g* was selected as the effect size metric for the analyses and was calculated using sample means, standard deviations and sample sizes extracted from eligible studies. Hedges' *g* is a measure of standardised mean difference that is used by the Cochrane collaboration. It is used as a summary statistic in meta-analyses where the same outcome may have been measured in different ways across studies (Higgins & Green, 2011). This is the appropriate metric in the meta-analyses conducted in this thesis whereby metacognitive beliefs were measured using different variants of one scale in review 1 (i.e. the metacognitions questionnaire 30 and 65); and where sensitivity analyses compared summary effect sizes using different scales of measurement of worry in review 2. Hedges' *g* is a small adjustment of Cohen's *d*, based on a different formula for the pooled standard deviation; therefore, the same effect size criteria were applied. Cohen (1988) suggests that an effect size of ≥ 0.20 is small, ≥ 0.50 is moderate and ≥ 0.80 is large.

All analyses were carried out under the random-effects model. This was selected due to the likelihood of methodological and sampling variation in the different studies included. The random effects model assumes there is no common effect for all included studies and that the included studies represent a random sample from a larger population of all possible studies (Liberati et al., 2009). The alternative is the fixed effects model, which assumes the true effect is the same across all studies. However, the fixed effects model assumes a

greater degree of consistency across the studies (i.e. that all factors which could influence the effect are the same in all the study populations) which is often considered implausible (Borenstein & Hedges, 2007, p. 11).

2.1.6 Strengths and limitations

As discussed above, systematic reviews have a number of uses for summarising evidence, producing clinical recommendations and supporting areas of further research. A thorough and systematic search should identify all studies that meet the pre-defined criteria. This strength allows for a comprehensive investigation of the research questions. Furthermore, systematic reviews also allow for the validity of the included studies to be critically analysed and summarised (i.e. risk of bias).

Meta-analysis is unique because it has the potential to produce a more precise estimate of an effect than any individual study in the pooled analysis (Haidich, 2010). It also allows for the studies to be weighted in terms of their contribution to the overall effect, often using the inverse of their variance (Haidich, 2010). Moreover, the summary of effect across studies can help to settle controversies arising from apparently conflicting findings within the literature.

However, the integration of research evidence from different studies and datasets also has limitations. Generally, these limitations can be grouped into issues of heterogeneity and study quality (including the risk of bias) (Ioannidis, 2008).

In study 1, methodological heterogeneity was limited by pre-specifying the eligibility criteria for each sample (i.e. the psychosis, emotional disorder and non-clinical groups) and by limiting the measurement of metacognitive beliefs to those specifically implicated in the S-REF model (i.e. using the metacognitions questionnaire). However, the summary statistics indicated the presence of statistical heterogeneity, suggesting there is poor consistency across studies in the estimated effect sizes (i.e. interpretation of the I^2 statistic).

The I^2 statistic provides a percentage of variability in point estimates that is due to “true” heterogeneity rather than chance (Higgins & Thompson, 2002). Given that meta-analysis concerns the integration of potentially conflicting results, the examination of variability between studies can be an important outcome. Unfortunately, there was not sufficient data to explore the observed heterogeneity in this review (i.e. meta-regression to test for moderators). This is an important area of future development and the speculative reasons for this heterogeneity can be used to generate new hypotheses.

In study 2, there was a high level of methodological heterogeneity in the studies (i.e. samples, research designs and measures). As such, the review utilised a mixed methods approach, and so not all the conclusions are supported by appropriate statistical analysis. In addition, approximately half of the studies investigated experiences of psychosis in non-clinical samples. Therefore, the generalizability of these findings to clinical psychosis populations is uncertain.

There are also some common limitations across the two reviews. A critical concern of systematic reviews is the studies that are missed in the searches (Haidich, 2010). In particular, smaller studies with negative findings are less likely to be published. As such, investigation of publication bias is essential. Another common concern across the two reviews is the assessment of study quality. Both of the reviews predominantly relied on cross-sectional research. This prevents the possibility of establishing any causal association between the variables. For this reason, the overall quality of the studies included in the reviews was low. However, the findings were interpreted with this important limitation in mind, and the conclusions were made with caution. Despite these limitations, the two reviews have valuable theoretical and clinical implications that are discussed in the respective manuscripts (see chapter 3 and chapter 4). They also highlight areas of importance for future research.

2.2 Cross-sectional designs

2.2.1 Overview and rationale

A cross-sectional study is a type of observational study that analyses data collected at a single specific time-point. A cross-sectional design can be used to measure variables of interest within a particular population (or a representative sample of a population) or to compare variables of interest between two or more populations (or representative samples of populations). Cross-sectional studies tend to use data from questionnaires or interviews to make inferences about the relationship between the variables of interest. The data can be analysed using statistical tests to examine the extent to which two constructs are associated. The rationale for conducting cross-sectional research in this thesis was to investigate the concurrent relationship between metacognitive variables, experiences of psychosis and negative affect.

In study 3 (see chapter 5), statistical methods (i.e. correlation and regression) were used to investigate the extent to which metacognitive beliefs predict negative affect over and above the characteristics of positive symptoms of psychosis. The research questions were derived from previous research that suggests metacognitive beliefs may be an important transdiagnostic determinant of negative affect. Data were used from a semi-structured interview of psychotic symptoms and validated questionnaires of anxiety and depression.

In study 4 (see chapter 6), statistical methods (i.e. scale validation, correlation and regression) were used to test whether variations in the use of unhelpful metacognitive coping strategies (i.e. the CAS) are associated with positive and negative outcomes in people with psychosis. The research questions were derived from the predictions of the S-REF model and evidence from the emotional disorder literature that suggest enhanced CAS processing is related to poorer outcomes. Data were used from a semi-structured interview of psychotic symptoms and validated questionnaires of negative affect, quality of life and recovery.

2.2.2 *Sample size calculation*

2.2.2.1 *Study 3*

Study 3 involved secondary analysis of existing data. After excluding those participants that had not completed the necessary measures, the final sample for statistical analysis consisted of 154 participants with psychosis. A power calculation was conducted using GPower3 (Faul, Erdfelder, Lang, & Buchner, 2007) to ensure the feasibility of the proposed analyses. The calculation confirmed that the study had sufficient power: a linear multiple regression analysis assuming a medium effect size with an error probability of 0.05 and a sample of 154 participants would provide power of 0.93 (based on the maximum of nine predictors).

2.2.2.2 *Study 4*

In study 4, baseline data was used from a sample of people with psychosis that took part in an attention training intervention ($n=29$) and a sample recruited specifically for the study ($n=40$). After excluding those participants that had not completed the necessary measures, the final sample for statistical analysis consisted of 60 participants with psychosis. An a priori power calculation was conducted using GPower3 (Faul et al., 2007).

A linear multiple regression analysis assuming a large effect size, with an error probability of 0.05 to provide power of 0.80 would require 49 participants (based on the maximum of seven predictors). Therefore, the final sample size of 60 was adequate for the analysis performed. Assuming a large effect size might be considered a limitation of this study. However, this was informed by the effects obtained in the preceding study (Sellers et al., 2016). Furthermore, all analyses were exploratory and would require further extension and replication.

2.3 Recruitment

2.3.1.1 Study 3

The author was not involved in the recruitment of participants for study 3. Baseline data was used from 74 participants that took part in a trial of cognitive behaviour therapy for people with psychosis that were not taking antipsychotic medication. The trial was funded by the National Institute for Health Research (NIHR) under the Research for Patient Benefit program (grant reference number PB-GB-1208-19053). Baseline data was also used from ten participants that took part in an open trial of metacognitive therapy for psychosis. This feasibility trial received no external funding. Both of these trials were conducted at the Psychosis Research Unit, Greater Manchester West NHS Foundation Trust. The final 75 participants were recruited from an inpatient and outpatient clinic in Warsaw by the second author on the paper (Dr. Lukasz Gaweda). Dr. Gaweda is financed by the Polish Ministry of Science and Higher Education (0295/E-393/STY/10/2015 and MOBILITY PLUS program 1258 /MOB/IV/2015/0).

The author worked in close collaboration with the data custodians (i.e. Professor Anthony Morrison and Dr. Lukasz Gaweda) and discussed the recruitment and assessment of participants. All participants were recruited through contact with mental health professionals (e.g. care coordinators and psychiatrists) within inpatient services, community mental health teams and early intervention services. All participants had either a diagnosis of psychotic disorder according to the Diagnostic Statistical Manual of Mental Disorders fourth edition (American Psychiatric Association, 2000) or met threshold for early intervention in psychosis using the Positive and Negative Syndrome Scale (PANSS: Kay, Fiszbein, & Opler, 1987). Early intervention criteria are defined as a score of four on hallucinations or delusional beliefs or a score of five on paranoid ideation.

A trained researcher administered all semi-structured interviews and questionnaires. Semi-structured interviews were conducted using the Psychotic Symptoms Rating Scales (i.e. the PSYRATS: Haddock, McCarron, Tarrier, & Faragher, 1999). The PSYRATS has a clear coding structure, and the factor solution has been previously validated in a large multi-site study (Woodward et al., 2014). This study also represented a diverse sample in terms of culture and demographics and used data pooled from different research groups. This suggests that pooling PSYRATS data from different samples is acceptable and reliable. However, the Manchester and Warsaw samples were checked for cultural confounds prior to proceeding with the analysis plan (see Statistical procedures on page 73).

2.3.1.2 Study 4

The author was directly involved in all aspects of recruitment for study 4. The author worked as a research assistant and trial therapist on the attention training trial and was jointly responsible for recruitment and assessment of trial participants alongside a wider research team. The author independently recruited and assessed the additional 40 participants (total independent recruitment $n=43$, [72%]). All 60 participants were recruited from early intervention in psychosis and community mental health teams within Greater Manchester West NHS Foundation Trust.

Teams were made aware of the study by researchers delivering formal presentations in the team meetings and informally visiting the offices. Care coordinators were asked to identify potential service users that may be interested in participating and were responsible for approaching the service user. Once verbal consent to be contacted by the researcher was agreed, the researcher obtained all the relevant information (including any potential risks). The researcher then contacted the service user to discuss the study, ensure they had received a copy of the participant information sheet and arrange an appointment with them.

Service users were also able to refer themselves to the study. They could self-refer through contact numbers provided on participant information sheets left in waiting areas of early intervention services and community mental health teams. In this instance, the researcher asked the potential participant some preliminary questions related to the inclusion/exclusion criteria. Following this, permission was sought from the service user for the researcher to contact their care coordinator to advise them of their involvement in the study. Any further information regarding the potential participant's eligibility was also taken from the care coordinator or relevant mental health professional.

All participants met the following inclusion criteria: aged above 18 years; in contact with mental health services; had a psychotic disorder according to the Diagnostic and Statistical Manual of Mental Disorders fourth Edition (American Psychiatric Association, 2000) or met threshold for early intervention in psychosis using the Positive and Negative Syndrome Scale (Kay et al., 1987).

Participants were not included if they: had moderate to severe learning disability (as defined by their care team); had organic impairment (as defined by their care team); were non-English speaking (this would prevent the use of standardised assessment instruments); were an inpatient or had acute psychiatric care needed; did not have a care coordinator or responsible clinician; had substance dependency.

2.3.2 *Ethical considerations*

All the data used in study 3 and 4 was obtained following appropriate ethical approval. In study 3, the ACTION (Assessment of Cognitive Therapy instead of Neuroleptics) trial was granted ethical approval by the National Research Ethics Service of the National Health Service (reference 09/H1014/53); the metacognitive therapy feasibility trial was granted ethical approval by the National Research Ethics Service of the NHS (reference 09/H1011/64) and the Warsaw data was collected following ethical approval by the Medical University of Warsaw (reference KB/8/2012; KB/215/2009).

In study 4, the IACT (Investigating Attention Control Training) trial was granted ethical approval by the National Research Ethics Service of the NHS (reference 14/NW/0043); the additional 40 participants were recruited following ethical approval from the National Research Ethics Service of the NHS (reference 16/NW/0091).

2.3.2.1 Consent

Participation in all research from which the data for study 3 and 4 was used was voluntary and participants were not made to feel under pressure to take part. This was facilitated by the primary mode of recruitment being through care coordinators or other relevant mental health professionals involved in their care. Participants had a minimum of 24 hours to read and consider the participant information sheet prior to giving their consent to take part. However, participants were encouraged to take as much time as they felt they needed. They also had the opportunity to ask any questions before consent was taken.

Participants were asked to complete a consent form to confirm they had the opportunity to read the information sheet, consider the information and agree to take part. Participants were also reminded that even though they signed the consent form they could still withdraw their data.

2.3.2.2 Confidentiality

Minimal personal information was taken about each participant. Participants were asked to provide basic demographic information that is within the standard remit for describing sample characteristics (e.g. age, gender, and ethnicity). In addition, the relevant mental health professional (e.g. care coordinator) was asked for risk information about the participant (e.g. previous and current risk to self, others and environmental). All the information collected about participants is strictly confidential. This has been ensured by pseudo-anonymisation of the data. Any personally identifiable information about participants (such as their name and contact details) is not stored with research data,

instead, an ID number and this alone is stored with the data. Any personally identifiable data is held in a separate locked filing cabinet at a secure NHS or University site.

All participants were made aware that although their data is strictly confidential, this confidentiality could be broken if they were deemed to be at risk to themselves or others.

2.3.2.3 *Withdrawal*

Participants were informed of their right to withdraw their data without giving a reason. This was stated on the participant information sheet and the consent form. Participants that wished to withdraw their data would have their decision respected without consequence. Information and data they provided would continue to be stored and managed as per the University's policy and guidelines for the storage of confidential research data, but would not be included in any analyses or disseminations.

2.3.2.4 *Distress*

Neither study 3 or 4 used especially intrusive procedures. However, it was acknowledged that some participants might find completing some of the assessments distressing. In order to minimise this, participants were offered choice regarding the length of the appointment, including the option of breaks and completing the assessment across multiple sessions.

Research conducted at the Manchester site followed a standardised protocol for managing distress that has been developed with the Psychosis Research Unit Service User Reference Group (PRU-SURG). The protocol includes providing a crisis card listing relevant phone numbers and offering standardised telephone contact within 48 hours of contact. In addition, if a participant showed signs of distress during an assessment the researcher was trained to discuss this with the participant, have a break or stop the assessment. With the participant's consent, the researcher would liaise with the care coordinator. Furthermore, the researcher would report this to their supervisor and take any appropriate action to minimise the participant's distress.

The researcher allowed sufficient time at the end of the assessment for a brief discussion of the interview. This focussed on whether the participant was experiencing any distress after disclosing sensitive or upsetting information. The participant was also given contact details of support/crisis services or appropriate mental health professionals on a card (e.g. their care coordinator's name and service telephone number and The Samaritans).

2.3.2.5 Risks to the researchers and safe-working

At the Manchester site, any potential risks to the researcher were minimised by adhering to the safe visiting policy. Prior to all visits, the researcher obtained an up-to-date risk assessment from the participant's care coordinator or a mental health professional that knew the service user well. The researcher utilised a "safe phone" system whereby she contacted a member of staff when she arrived and left the appointment. This was adhered to regardless of whether the assessment took place in the participant's home or in a community venue.

2.3.2.6 Service user involvement

At the Manchester site, a service user reference group was involved in the design of the trials from which the data was used. Therefore, a panel of service users reviewed all participant materials and assessments. The author personally attended the service user consultation for the IACT trial. The additional 40 cases for study 4 used information sheets adapted from IACT and the appointments followed exactly the same schedule as the baseline assessment, therefore, this aspect of the research was not presented at the reference group. Service users were also involved in producing the policies for safe visiting and managing distress.

2.3.2.7 *Expenses*

All participants recruited at the Manchester site received a payment of £10 for taking part. The purpose of this was to compensate the participant for their time, effort and any expenses incurred in travel costs.

2.3.3 *Measures*

An overview of the measures used in study 3 is available in the published manuscript (see Measures on page 178). An overview of the measures used in study 4 is available in the submitted manuscript (see Outcome measures on page 203). Both of the measures sections provide information relating to the validation of the scales. In addition, the reliability of the measures is quantified using Cronbach's alpha.

2.3.4 *Statistical procedures*

Study 3 and 4 were statistically analysed using correlation and multiple regression analyses. The term correlation refers to a test of the extent to which an independent variable and dependent variable are linearly associated, whilst regression is used to test the extent to which independent variables predict a dependent variable (Tabachnick & Fidell, 2007, p. 117). Data were analysed using the Statistical Package for Social Sciences (SPSS) version 22.

2.3.4.1 *Data screening*

Prior to analysis, all data were screened to ensure the appropriate assumptions were met. Statistical analysis using regression assumes that the dependent variables are normally distributed, have multivariate normality, have a linear relationship, there is little or no multicollinearity and the data is homoscedastic (Tabachnick & Fidell, 2007, pp. 123-128).

All data screening and any subsequent imputations or transformations followed the guidance set out by Tabachnick and Fidell (2007). In both studies, the percentage of missing data was calculated to ensure this did not exceed 20%. Missing values analysis

used the MCAR (Missing Completely at Random) test to assess if the data were missing completely at random. If this assumption is met, there is no relationship between the missingness of the data and any values, observed or missing. Missing item scores were prorated using the relevant scale or subscale mean. Normality tests for dependent variables included visual checks of normality plots and statistical tests for skew and kurtosis (e.g. computation of z-scores). Univariate outliers were adjusted to the next extreme score plus one so they remained extreme but had a reduced impact on the distribution. Multivariate outliers were identified using Mahalanobis distance with a conservative probability (i.e. $p < 0.001$) for the χ^2 value with degrees of freedom based on the number of dependent variables. Multivariate outliers were excluded from analyses.

2.3.4.2 Correlation

Pearson's r is the most frequently used measure of linear association between variables. However, when violations of normality occur, a non-parametric measure Spearman's r_s is used instead. The value of r ranges from -1.00 to +1.00 where a value of +/-1.00 indicates perfect predictability of one score when the other is known (Tabachnick & Fidell, 2007, p. 56). The strength of a correlational relationship is typically referred to as small (0.1), medium (0.3) or large (0.5).

In study 3, correlations were conducted to test the extent to which the dependent and independent variables were related. This information was used to inform entry of the independent variables into the regression. The sub-scales of the psychotic symptoms rating scales were negatively skewed; therefore, analyses using these variables were conducted using Spearman's r_s . Normally distributed variables were tested using Pearson's r .

Before proceeding with the main analysis, the relationships between the independent and dependent variables were tested for possible cultural confounds. This was done by

comparing bivariate correlations between the Manchester and Warsaw participants. A calculation for the test of the difference between two independent correlation coefficients was used (Preacher, 2002), and is available in appendix 4. Fisher's *r*-to-*z* transformation converted each correlation coefficient to a *z*-score. The *z*-scores were then compared taking into account the sample size (Cohen & Cohen, 1983, p. 54).

In study 4, Pearson's correlations were used to test the concurrent validity of the CAS-1. The aim was to test whether participant scores on this scale were significantly related to participant scores on validated measures of constructs the scale is hypothesised to predict (e.g. negative affect). Correlations also tested the extent to which the dependent and independent variables were related, and to inform entry of the independent variables into the subsequent regression analyses.

2.3.4.3 Regression

The primary analyses in study 3 and 4 used multiple regression models. Tabachnick and Fidell (2007) outline three major types of multiple regression analysis. In standard linear regression, all independent variables are entered into the equation at once and each is evaluated in terms of what it adds to the prediction of the dependent variable. In hierarchical multiple regression, the order of entry of the independent variables is specified by the researcher. Typically, variables with greater theoretical importance are entered earlier in the model (either at once or in blocks). In stepwise multiple regressions, the order of entry of the independent variables is determined by the statistical significance of the variables themselves.

In study 3, hierarchical multiple regression was conducted. The rationale was to statistically control for one set of independent variables (i.e. psychotic symptoms) whilst testing the predictive ability of another (i.e. metacognitive beliefs) on the dependent variable (i.e. negative affect). At step one, psychotic symptoms were entered as one block.

At step two, the metacognitive beliefs that had significant correlations with the dependent variable were added using stepwise entry. Stepwise entry was selected because there were no a priori hypotheses about the relative contribution of the metacognitive belief subscales to the dependent variable in this sample. Given that stepwise regression can be considered controversial because it is based purely on statistical criteria, the model was repeated using forward selection, which uses a slightly different computation to verify the result.

Study 4 also used hierarchical multiple regression. Again, this was selected because the aim was to statistically control for one set of independent variables (i.e. comorbid symptoms) whilst testing the predictive ability of another (i.e. metacognitive beliefs and coping strategies). At each step, the predictors were entered as one block to investigate metacognitive beliefs and the CAS as a set of predictors, rather than to test the importance of the individual elements. The variables in each block were informed by initial correlations. The order of entry of the blocks was informed by relevant theory (i.e. the S-REF model).

2.3.4.4 Scale validation

The usefulness of a scale can be analysed using tests of validity and reliability. Tests of validity refer to the extent to which a scale measures what it is intended to measure. This can be assessed based on the content (i.e. face validity), its relationships with measures of a similar construct (i.e. concurrent and predictive validity) and the relevant theory (i.e. construct validity). Tests of reliability are concerned with the ability of a scale to create replicable results. This can be tested by analysing the extent to which all items on the scale appear to measure the same underlying construct (i.e. internal consistency) and the stability of the scale to predict its intended construct over time (i.e. test re-test ability).

In study 4, the reliability and validity of the CAS-1 (Wells, 2009, p. 268) were explored in a psychosis sample. Internal consistency was measured using Cronbach's alpha.

Unfortunately, it was not possible to investigate test re-test ability because this study was cross-sectional and repeat testing of the measures was not possible. Predictive was tested using correlation analyses with related construct measures. Finally, concurrent validity was investigated using an independent samples t-test. An independent samples t-test is a test of whether the mean scores of two independent groups are statistically different. This tested whether the scale could reliably differentiate between a clinical and non-clinical sample.

2.3.5 Strengths and limitations

The predominant advantage of cross-sectional studies is they can identify associations that can be investigated further with a methodology that is more rigorous. Furthermore, with appropriate statistical analysis, multiple independent variables can be studied (Mann, 2003).

The cross-sectional studies described in this thesis have a number of methodological strengths. First, the clinical samples were assessed using validated tools and diagnostic criteria. Second, all variables were measured using validated scales, or an attempt was made to validate the new scale (i.e. the CAS-1). Third, the studies utilised appropriate statistical analyses and were adequately powered. The selection of variables was informed by theory and previous research, and potential confounds (e.g. comorbidities) were controlled where appropriate. Finally, the opportunity for observer bias was reduced in study 3 where the author was not involved with data collection.

However, some general criticisms can be applied to study 3 and 4. First, regression analyses quantify relationships between variables but cannot deduce whether this relationship is causal (Tabachnick & Fidell, 2007, p. 122). Therefore, the direction of the observed relationships is based on the researchers' interpretation and typically led by theory. Inferences of causality require more rigorous investigation using longitudinal or experimental designs. Second, the magnitude of the relationships observed in these studies

may have been influenced by some other unmeasured confounding variable. Third, recruitment for both studies was predominantly determined by the selection of service-users by their care coordinator or a relevant mental health professional. This could lead to a form of selection bias where only particular sub-groups of service users were approached. For example, care coordinators may be more likely to refer people they believe to be more appropriate, higher functioning, more actively engaged with the team and more motivated. This could affect the generalizability of the results. During liaison with clinical teams, referrers were encouraged to offer the research even to those people that they thought might decline.

There are also some study specific limitations. For instance, study 3 involved secondary analyses of data from different sources. The merging of data from independent projects may be considered a methodological limitation. Recruitment methods may have differed which could mean that different sub-groups of the desired population may be sampled (e.g. inpatient vs. outpatient; first episode vs. chronic). In addition, each study utilised different inclusion and exclusion criteria (e.g. medication use, comorbidities or previous therapy) which could increase heterogeneity in the sample. This could be seen as a limitation as the final sample was a heterogeneous one; however, this may also improve the generalizability of the findings. Study 4 was powered to detect a large effect size. However, the practicalities of independently recruiting and assessing a large clinical sample are limited within the remit of this thesis, and findings of a previous study supported the power calculation (Sellers et al., 2016).

2.4 Experimental designs

2.4.1 Overview and rationale

In an experimental study, a specific hypothesis is scientifically tested. Experimental methods allow for the direct manipulation of one or more independent variables to investigate the effect on the dependent variable. Experiments can use an independent

measures design, whereby different participants are used in each condition of the independent variable; or a repeated measures design, whereby the same participants take part in each condition.

Experimental studies tend to use statistical analyses that test for significant differences between two scores. Analysis of variance compares the difference between two or more means and allows for the analysis of main effects and interactions between independent variables (Field, 2009, p. 350). Analysis of covariance is an extension of analysis of variance which allows for analysis of main effects and interactions between independent variables after dependent variable scores are adjusted for the effect of one or more covariates (Tabachnick & Fidell, 2007, p. 195).

The rationale for using an experimental design in this study was to test the effect of direct manipulation of an independent variable (i.e. metacognitive beliefs) on a dependent variable (e.g. anxiety). This permitted further scrutiny of the relationships observed in study 3 and 4, as well as previous cross-sectional research that has established a positive relationship between higher levels of negative metacognitive beliefs and negative emotional states. This study sought to test this relationship with a method allowing for the direction of causality to be ascertained with greater confidence.

The experiment was conducted as a randomised group comparison. The independent variable (group) had two levels (belief manipulation vs. control). The dependent variables were intrusive thoughts and anxiety.

2.4.2 Sample size calculation

A power calculation utilising www.sealedenvelope.com was carried out to advise sampling. Seventy-six participants were required to have a 90% chance of detecting, as significant at the 5% level, an increase in the primary outcome measure of intrusions and discomfort from 15 in the control group to 30 in the experimental group. This calculation

was advised using data from Myers and Wells (2013) which used a similar experimental paradigm.

2.4.3 Recruitment

The author was solely responsible for recruitment and carrying out the experiment. The primary method of recruitment was through advertisement on the School of Psychological Sciences participant recruitment announcement. This weekly email is circulated to undergraduate and postgraduate students that are registered in the school. The study was also advertised on the university volunteer service. Participants were able to express their interest in taking part by signing-up via an online course credits system available to undergraduate students or by emailing the researcher. Undergraduate psychology students received four course credits for taking part.

Participants that expressed an interest in the study were emailed a copy of the participant information sheet and then pre-screened for eligibility. Participants were eligible for the study if they reported paranoid ideation in the last week. This was operationalised as a rating of “sometimes” in response to at least one item on the Paranoia Checklist (Freeman, Garety, et al., 2005). Freeman, Garety, et al. (2005) found the one-week prevalence of the individual thoughts ranged from 3% to 52% in their non-clinical sample.

Participants were not eligible for the study if they: had a history of severe mental health problems (e.g., schizophrenia, bipolar disorder, affective psychosis); were using secondary mental health services (e.g., community mental health teams or early intervention services); were taking psychiatric medication; or had a sight or hearing impairment that would prevent engagement with video stimuli. In order to screen for the criteria, participants were asked the following questions. Anyone who responded ‘yes’ was deemed ineligible to participate in the study:

1. Have you ever been hospitalised for assessment and/or treatment of schizophrenia, bipolar disorder or a psychosis-related problem (e.g. depression with psychosis, etc.)?
2. Have you ever been given a diagnosis for any of the above?
3. Have you ever been advised to take medication for hearing voices, paranoia or unusual thoughts?
4. Was there ever a period in your life when you were receiving support from an Early Intervention Service?
5. Do you have a sight or hearing impairment that is not corrected (i.e. with glasses, contact lenses or hearing aids)?

2.4.4 Ethical considerations

The data used in study 5 was obtained following appropriate ethical approval from the University Ethics Committee 1 (UREC-1; reference: 15455).

2.4.4.1 Consent

Participation in the study was voluntary and participants were not under pressure to take part. The participants were responsible for signing up or contacting the researcher by email.

All participants had a minimum of 24 hours to read the participant information sheet prior to commencing the study. The information sheet had contact details for the researcher so participants could ask any questions they might have. All participants were required to complete a consent form before taking part and were informed this would not affect their right to withdraw.

2.4.4.2 Confidentiality

Minimal personal information was recorded about each participant. Participants were asked to provide basic demographic information that is within the standard remit for

describing sample characteristics (e.g. age, gender, and ethnicity). All the information collected about participants is strictly confidential. This has been ensured by pseudo-anonymisation of the data. Any personally identifiable information about participants (such as their name and email address) is not stored with research data; instead, an ID number is stored with the data. Any personally identifiable data is held in a separate locked filing cabinet at a secure NHS site.

2.4.4.3 Deception

The deception used in this study (i.e. the fake EEG) is within the British Psychological Society (BPS) and American Psychological Association (APA) guidelines on deception. The researcher followed both of their protocols in dealing with deception by including a debrief and having each participant re-consent to the study after the debrief. It was not anticipated that the study would cause lasting distress to participants. This paradigm has been used previously with students meeting the clinical threshold for obsessive compulsive disorder, and no adverse effects were reported (Myers & Wells, 2013). However, a robust protocol for managing distress was prepared in advance of recruitment.

2.4.4.4 Distress

The study used a standardised protocol for managing distress that was developed in collaboration with PRU-SURG. The protocol includes providing a crisis card listing relevant phone numbers, and offering telephone contact within 24 hours of participation. In addition, if a participant were to show signs of distress, the researcher would discuss this with the participant, have a break or stop the experiment. The researcher also allowed time at the end of the experiment to check for distress. Any participant who reported distress would be encouraged to contact their GP and the researcher would provide them with a summary letter, but the decision regarding whether or not they access help would remain theirs. The debrief contained the following helpful phone numbers:

- Student health
- Support Line
- NHS direct
- The Samaritans

If a participant were to experience continued distress during the telephone contact 24 hours later, the researcher would sign-post the participant to their GP and to the telephone numbers above. Again, the decision regarding whether or not they access help would remain theirs.

2.4.4.5 *Debrief*

The debrief was developed in collaboration with a service user researcher. All participants were given a standard verbal debrief that provided an overview of the study, the aims and hypotheses. Participants were then given the choice of either a further verbal debrief plus the written debrief to take away, or just the written debrief to take away. The written debrief gave further detail regarding the purpose of the experiment, the reasons for the fake EEG and why the research is important. The additional verbal debrief gave participants opportunity to talk about their experience of the study. Participants were asked:

- How they felt during the EEG
- How they felt at the present moment
- If they understood how taking part can help us to understand distress associated with paranoia
- If they understood how this could help people in the future

The written debrief also detailed the local A&E department and the aforementioned helpline numbers.

After the study, participants were able to contact the researcher if they had any further questions about the reason for carrying out the study, if they wished to make a complaint

or if they experienced distress. The researcher received regular supervision from an experienced clinician.

2.4.4.6 Re-consent

Following the verbal debrief, all participants were asked for their consent for the researcher to use the information and data they had provided. Participants were also reminded of their right to withdraw from the study. It was not expected that participants would choose to withdraw from the study following the debrief, however, anybody that did choose to would have their decision respected.

2.4.4.7 Withdrawal

Participants were reminded of their right to withdraw their data without giving a reason. This was stated on the participant information sheet, the consent form and the debrief. Participants that wished to withdraw their data would have their decision respected without consequence. Information and data they had provided would continue to be stored and managed as per the University of Manchester's policy and guidelines for the storage of confidential research data but would not be included in any analyses or subsequent disseminations.

2.4.4.8 Service User involvement

A service user researcher was consulted in the development of the protocol and participant materials. The key points were as follows:

- In terms of methodology, the instructions were changed slightly from the original methodology quoted in Myers and Wells (2013) to be more easily understood.
- In terms of the video stimuli, it was felt the three videos were relevant to the proposed sample. It was also felt the videos would induce some paranoid ideas without causing enduring distress.

- In terms of distress, it was felt that some people may feel slightly annoyed at being told there was no actual EEG reading and that the EEG had not been able to detect their thoughts. It was proposed that this could be reduced by reinforcing how the research could help other people; the debrief was designed to reflect this.
- It was felt that some people may want to leave straight after being told there was no actual EEG reading and the EEG could not detect their thoughts, whilst other people might like the alternative of a longer explanation. Therefore, each participant was asked whether they would like the written debrief to take away with them or whether they would like to stay and have a verbal debrief. All participants were offered a telephone call within 24 hours.

2.4.5 Measures

An overview of the measures used in study 5 is available in the submitted manuscript (see Measures on page 235). The measures section provides information relating to the reliability of the validated scales.

2.4.6 Statistical procedures

Data were analysed using analysis of variance and analysis of covariance in the Statistical Package for Social Sciences (SPSS) version 22. This allowed to test for significant differences in mean scores between the experimental and control group, whilst also controlling for covariates that may be predictive of outcome.

2.4.6.1 Data screening

Prior to analysis, all data were screened to ensure the appropriate assumptions were met. Statistical analysis using ANOVA assumes the dependent variables are normally distributed and the variance within each sample is equal (i.e. homogeneity of variance) (Tabachnick & Fidell, 2007, p. 238).

Missing values analysis was not necessary, as there were no missing values in the dataset. Normality tests for dependent variables included visual checks of normality plots and statistical tests for skew and kurtosis (e.g. computation of z-scores). Multivariate outliers were identified using Mahalanobis distance with a conservative probability (i.e. $p < 0.001$) for the χ^2 value with degrees of freedom based on the number of dependent variables. One dependent variable (number of intrusions) demonstrated positive kurtosis and this was corrected using bootstrapping. Bootstrapping is a computer based method of resampling that can be used to correct violations of sphericity (or homogeneity) in repeated measures designs (Berkovits, Hancock, & Nevitt, 2000).

2.4.6.2 Baseline and manipulation checks

Prior to the main analyses, a number of preliminary tests were conducted. First, baseline balance between the two samples was analysed by comparing summary statistics on age, gender, and baseline anxiety, paranoia and metacognitive beliefs. Any variables with a chance imbalance were entered as covariates in subsequent analyses.

Second, the validity of the fake EEG paradigm was tested using between subjects ANCOVA. The independent variable was group (experimental vs control), the dependent variables were ratings on the three beliefs that constitute the experimental validity measure, and the covariate was gender.

Third, the paranoia and metacognitive belief manipulations were tested. The paranoia manipulation was tested using repeated measures ANOVA. The within-subjects factor was time (pre- and post-video stimuli) and the dependent variable was the threat belief “I need to be on my guard against others”. The metacognitive belief manipulation was tested using a mixed factor ANOVA. The dependent variable was negative beliefs relating to the uncontrollability and danger of thoughts, with a between-subjects factor of group (experimental vs control) and a within-subjects factor of time (pre- and post-manipulation).

2.4.6.3 Primary analyses

The primary outcomes were tested using a series of one-way ANCOVAs where the independent variable was group (experimental vs. control) and the dependent variables were the items on the measures of experiences questionnaire. Gender and belief that the EEG was working were entered as covariates in order to statistically control for their effect on the dependent variables.

2.4.6.4 Secondary analyses

The secondary outcomes (i.e. STAI scores and GSR readings) were tested using one-way ANCOVA where the covariates were baseline anxiety, gender and belief that the EEG was working. As above, the between-subjects factor was group (experimental vs control).

2.4.7 Strengths and limitations

The design and statistical analyses used in this study have a number of methodological strengths. The main strength of this study is the direct manipulation of the variables allows for greater certainty regarding the direction of causality. This provided a more rigorous test of the relationships observed in previous studies. Second, the experiment was conducted with rigorous control. The author carried out the experiment on all 76 participants with strict adherence to protocol. All instructions to participants were standardised and read aloud by the researcher. As such, the participants within each condition received exactly the same instructions delivered by the same person. This reduced the possibility of variation in the conduct of the study across participants. Furthermore, the physical environment was tightly controlled. During the recruitment phase, no other students or researchers had access to the testing room. Therefore, the layout of the room and set-up of the apparatus was consistent. Moreover, attempts were made to maintain a consistent temperature in the room as this could affect the Galvanic Skin Response.

A third strength of this study is that allocation to the control and experimental group followed a randomisation list. This eliminated the possibility of the researcher using selection bias to allocate participants to the conditions. Fourth, the study had adequate statistical power. An a priori sample size calculation was conducted to inform recruitment, and this was based on previous research using a similar paradigm. Fifth, the integrity of the experimental paradigm was tested using statistical analysis of changes in the variables that were manipulated (i.e. paranoia and metacognitive beliefs). The results of these tests confirmed that both manipulations were effective. This suggests that the experiment had good internal validity.

This study also had several methodological weaknesses. A general criticism of experimental studies is they create artificial environments that do not always represent real life situations. The present study is not immune from this criticism where paranoia and metacognitive beliefs were manipulated in a very specific and controlled environment. Therefore, the external validity of the findings to real-world situations is questionable. Second, the sample was exclusively comprised of undergraduate students and was predominantly female. Therefore, the generalizability of this sample to both a wider non-clinical population and people with clinical paranoia is uncertain. In terms of conduct, the researcher was not blind to the aims or predictions of the experiment. Whilst attempts were made to reduce researcher bias where possible (i.e. randomisation and standardised instructions), the fact the researcher was still aware of the purpose of the study and the manipulation is a limitation. Finally, a number of human variables can affect the findings. For example, some participants tried to interact with the researcher during measurement periods (i.e. during the GSR baseline or during the four-minute window after the manipulation instruction). These interactions could have confounding effects. Furthermore, some participants may have tried to guess the aims of the study or may have tried to be helpful in their participation (e.g., one participant reported trying to think

paranoid thoughts so the EEG would be more useful for the researcher). These kinds of demand characteristics are difficult to control and may influence the results.

2.5 Structural Equation modelling

2.5.1 Overview and rationale

Structural equation modelling (SEM) refers to a collection of related statistical techniques that is used to analyse a hypothesised pattern of directional and non-directional relationships between variables (MacCallum & Austin, 2000). SEM is comprised of two main elements; observed variables and latent variables. Observed variables are the variables that were directly measured or observed (i.e. the data) and latent variables are hypothetical constructs (or factors) that are not directly observable (Kline, 2011, p. 9). The rationale for using SEM was to analyse the pattern of relationships between a set of variables that have demonstrated associations in previous research (i.e. paranoia, negative affect, metacognitive beliefs and schemas), and to test the fit of the hypothesised relationships against theoretically driven models (i.e. the cognitive and metacognitive model). The alternative is to conduct a series of independent regressions. However, the advantage of SEM is it allows for the estimation of multiple structural relationships simultaneously and tests relationships amongst constructs that can be represented by multiple measures (i.e. latent variable modelling). As such, it includes confirmatory factor analysis as well as regression in one approach, and measurement error is also modelled by default. Latent variable modelling is considered preferable to testing models that include constructs with single indicators, as it reduces bias that may occur as a result of measurement error (MacCallum & Austin, 2000). SEM tests whether the set of hypothesised measurement and structural relationships are consistent with the observed data, and can provide measures of model fit based on these.

2.5.2 *Sample size calculation*

There is no single rule for determining sample size in SEM (Kline, 2011, p. 11). As a general rule of thumb, several researchers have proposed that above 200 is sufficient (e.g. Barrett, 2007; Hoe, 2008; Shah & Goldstein, 2006). An alternative method is to calculate the sample size based on the ratio of cases to model parameters that require estimates; Kline (2011, p. 12) recommends a ratio of 20 cases per parameter estimates. The study aimed to recruit 200 and had a final sample of 227, which was sufficient for the planned SEM analyses.

2.5.3 *Recruitment*

The study aimed to recruit 200 people from the general population with no history of severe mental health problems. Recruitment for the study was exclusively online. The study was advertised on the University of Manchester School of Psychological Sciences participant recruitment announcement; the University of Manchester volunteer service; a Greater Manchester West NHS Research and Development email circular and social media (Facebook and Twitter). The lower age limit for the study was 18 years. Participants were not eligible for the study if they: have a history of severe mental health problems (e.g., schizophrenia, bipolar disorder, affective psychosis); currently use secondary mental health services (e.g., community mental health teams or early intervention services); are currently taking psychiatric medication. In order to screen for the above criteria, participants were asked the following questions. Anyone who responded 'yes' was deemed ineligible to participate:

1. Have you ever been hospitalised for assessment and/or treatment of schizophrenia, bipolar disorder, or a psychosis-related problem (e.g. depression with psychosis, etc.)?
2. Have you ever received a diagnosis for any of the above?

3. Have you ever been advised to take medication for hearing voices, paranoia or unusual thoughts?
4. Was there ever a period in your life when you were receiving support from an Early Intervention Service?

2.5.4 Ethical considerations

The data used in study 5 was obtained following appropriate ethical approval from the University Ethics Committee 2 (UREC-2; reference: 15458).

2.5.4.1 Consent

Participation in this research was voluntary and participants were not under pressure to take part. As an incentive for taking part, participants were asked to provide their email address so they could be entered into a prize draw with the chance to win a £50 Amazon voucher.

The link to the survey took participants to the participant information sheet. There was no minimum or maximum time given for participants to read the information; it was their choice how much time they spent reading it. However, participants were encouraged to take as much time as they felt they needed. They also had the opportunity to ask any questions they might have using the contact details provided (telephone and email).

Participants were required to complete a consent form confirming that they had the opportunity to read the information, consider the information and ask questions, and also that they give their consent to take part in the study. Participants were reminded that even though they have completed the consent form they could still withdraw at any time.

2.5.4.2 Confidentiality

Minimal personal information was taken about each participant. Participants were asked to provide basic demographic information that is within the standard remit for describing

sample characteristics (e.g. age, gender, and ethnicity). In addition, they were asked to provide an email address so they could be entered into the prize draw. All the information collected about participants is strictly confidential. This has been ensured by pseudo-anonymisation of the data. Any personally identifiable information about participants (such as their name and email address) is not stored with the research data; instead, an ID number is stored with the data. Any personally identifiable data is held in a separate locked filing cabinet at a secure NHS site.

2.5.4.3 Withdrawal

Participants were reminded of their right to withdraw their data without giving a reason. This was stated on the participant information sheet and consent form. Participants that wished to withdraw their data would have their decision respected without consequence. Information and data they provided would continue to be stored and managed as per the University of Manchester's policy and guidelines for the storage of confidential research data but would not be included in any analyses or subsequent disseminations.

2.5.4.4 Distress

It was not anticipated that participants taking part in this study would experience significant distress. However, some people may find completing some of the questionnaires upsetting (e.g. questions about paranoia and emotion). Therefore, the debrief contained the following helpful phone numbers for people that felt they might need to talk to somebody:

- NHS Direct
- The Samaritans
- Student health
- Support Line

Participants were also able to contact the researcher if they had any further questions about the reason for conducting the study.

2.5.4.5 Debrief

All participants were provided with an online written debrief that detailed the purpose of the study and why the research is important. Participants were also provided with the aforementioned helpline numbers. In addition, participants were able to contact the researcher if they had any further questions about the reason for carrying out the study, if they wished to make a complaint or if they experienced distress. The researcher received regular supervision from an experienced clinician.

2.5.5 Measures

An overview of the measures used in study 6 is available in the submitted manuscript (see Measures on page 256). The measures section provides information relating to the validation of the scales and the scale reliability using Cronbach's alpha.

2.5.6 Statistical procedures

The hypothesised SEM's were pre-specified prior to analysis. The model specification was planned in collaboration with the supervisors of this thesis and consistent with the assumptions of the S-REF model. A statistician was consulted and provided assistance at each step of the planning and analysis. The aim of the study was to test the moderating effect of cognitive and metacognitive factors on the relationship between paranoia and negative affect. A moderator is defined as a variable that affects the direction and/or strength of the relationship between two variables (Baron & Kenny, 1986). The focus of the models was, therefore, latent variable by latent variable interactions.

2.5.6.1 Data screening

Prior to analysis, the data was screened to ensure the appropriate assumptions were met. Screening procedures followed the guidance set out in Kline (2011; chapter 3). Data

screening was conducted in the Statistical Package for Social Sciences (SPSS) version 22 and tested for collinearity, homoscedasticity and normality.

First, the percentage of missing data was calculated to ensure this did not exceed 20%. Missing values analysis used the MCAR test to assess if the data were missing completely at random. Missing item scores were prorated using the relevant scale or subscale mean. Normality was tested by visual checking of distribution curves and stem and leaf plots and corroborated with statistical tests for skew and kurtosis (e.g. computation of z-scores). There was evidence of positive skew in the negative affect, metacognitive belief and negative schema variables. However, the planned analyses accounted for non-normality by using robust model estimation methods, therefore outliers were retained and data transformations were not applied. Assumptions of linearity and homoscedasticity were tested by visual checks of scatterplots. Finally, score reliability on the measures was tested using Cronbach's alpha. The measures used in the study were carefully selected based on whether they were a state or trait measure, and whether they had been previously validated.

2.5.6.2 Structural equation modelling

The main analyses were conducted using Mplus version 7.31 (Muthén & Muthén, 1998-2015), a latent variable modelling package. The analysis was performed in two stages. First, the measurement models were fitted. Measurement models concern the relationships between the observed variables and the latent variable, and the degree to which a set of observed variables are consistent with the theoretical construct. The paranoia latent variable was comprised of the three sub-scales of the PCL; the negative affect latent variable was comprised of the three DASS subscales; and the metacognitive beliefs latent variable was comprised of the five sub-scales of the MCQ-30.

Second, based on the separate hypothesis under investigation, the theoretically hypothesised SEMs were formed and fitted to the data. The SEMs were estimated

sequentially in order of the hypotheses by maximum likelihood estimation with robust standard errors using a numerical integration algorithm to account for non-normality in any dependent variables (Kline, 2011, p. 117). Mplus provides several tests of model fit, which are often used to assess the agreement between the hypothesised model and the observed data. However, these are not calculated in models containing latent variable by latent variable interactions, which is the focus of the hypothesised models and so only AIC and BIC values were reported.

2.5.7 Strengths and limitations

The use of SEM has considerable strengths. First, SEM allowed for tests of direct and indirect effects between multiple pre-specified models. As such, it was possible to test both direct and moderating effects of the variables simultaneously. This cannot be achieved as reliably or easily with several regressions. Moreover, the use of latent variables permitted multiple observed measures of the constructs to be tested. This is considered more reliable than modelling constructs using single indicators that may not provide an accurate representation of the construct and may be less reliable in measurement (MacCallum & Austin, 2000). The test of multiple models in this study offered a novel insight into the comparative and combined role of cognitive and metacognitive factors in paranoia.

A general criticism of SEM is the models are susceptible to researcher confirmation bias (MacCallum & Austin, 2000). Whilst SEMs can test for direct and indirect effects, this does not determine the direction of effects (i.e. causality). However, the models tested in this study were pre-specified and theoretically derived to reduce this. Furthermore, whilst latent variable modelling has advantages, the SEMs in this study used latent variable by latent variable interactions, which does not allow model fit statistics to be computed. Therefore, the overall model fit between cognitive and metacognitive models could not be directly compared.

In terms of general limitations, the data used in this study was cross-sectional. Therefore, the direction of the observed relationships is based on researcher interpretation and further replication with longitudinal data is required. Second, the sample was a self-selecting non-clinical sample and was not epidemiologically representative of the general population. Therefore, the generalizability of the results to both the wider non-clinical population and to clinical samples is spurious. Further exploration of these relationships is required in a clinical population utilising a validated clinician-led interview of persecutory delusions.

3 Chapter 3: A meta-analysis of metacognitive beliefs as implicated in the Self-Regulatory Executive Function model in clinical psychosis

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A meta-analysis of metacognitive beliefs as implicated in the Self-Regulatory Executive Function model in clinical psychosis

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3.1 Abstract

This meta-analysis investigated whether the five metacognitive beliefs implicated in the Self-Regulatory Executive Function (S-REF) model (Wells & Matthews, 1994, 1996) are elevated in people with clinical psychosis compared to people with emotional disorder and non-psychiatric controls. The review followed the guidance set out in the PRISMA statement. Primary analyses compared summary effect sizes on each sub-scale of the Metacognitions Questionnaire (MCQ) for people with psychosis and non-psychiatric controls; and people with psychosis and people with emotional disorder. Eleven eligible studies were identified comprised of 568 psychosis participants, 212 emotional disorder participants and 776 non-psychiatric controls. Findings indicated that people with psychosis had higher scores on all subscales of the MCQ compared to non-psychiatric controls, and higher scores on the positive beliefs about worry sub-scale compared to people with emotional disorder. This suggests metacognitive beliefs may be associated with the presence of psychological disorder and distress in general, rather than specific diagnoses. Implications for models of psychosis and treatment are discussed.

Keywords: Metacognition; psychosis; negative affect

3.2 Introduction

In recent years, there has been an increase in research investigating metacognition in psychosis. The term metacognition describes “thinking about thinking” (Papaleontiou-Louca, 2003) and refers to “any knowledge or cognitive process that is involved in the appraisal, monitoring or control of cognition” (Wells, 2000, p. 6). Within the psychosis literature, metacognition has been investigated in different ways. Lysaker and colleagues use of the term metacognition reflects an individual’s ability to form and understand complex representations about themselves, others, and the world (Lysaker et al., 2010). Moritz and colleagues have carried out numerous studies investigating metacognitive training that focuses on cognitive biases associated with attributional style and jumping to conclusions (Moritz, Vitzthum, Randjbar, Veckenstedt, & Woodward, 2010). There have been previous reviews relating to these definitions (Lysaker et al., 2013; van Oosterhout et al., 2016). Another influential line of research has focused on the metacognitive factors implicated in the Wells and Matthews Self-Regulatory Executive Function (S-REF) model (Wells & Matthews, 1994, 1996). This approach emphasises metacognitive beliefs and strategies that are proposed to maintain unhelpful thinking styles and distress across disorders, and there is accumulating evidence that the metacognitive beliefs implicated in this model may be related to distressing experiences of psychosis. Currently, the specific nature of this relationship requires further clarification.

The S-REF model (Wells & Matthews, 1996) focuses on unhelpful metacognitive beliefs and emotional self-regulation strategies that lead to biased information processing of threatening stimuli. Such strategies include enhanced verbal processing in the form of worry and rumination, attentional biases in the form of threat monitoring, and attempts to control thoughts and other internal events. These responses constitute a style of thinking known as The Cognitive Attentional Syndrome (CAS) that is proposed to maintain unhelpful thinking patterns and distress. The CAS arises from unhelpful metacognitive

beliefs that are positive and negative in content. Positive metacognitive beliefs reflect the usefulness of worry, rumination, threat monitoring, and other similar strategies (Wells, 2009). They include beliefs such as “focussing on danger will keep me safe” or “if I worry I will be prepared” and promote the implementation of unhelpful coping responses. Negative metacognitive beliefs reflect beliefs concerning the danger or uncontrollability of particular thoughts and affect how thoughts and thought processes are appraised (Wells, 2009). They include beliefs such as “thoughts can make bad things happen” or “my worrying is uncontrollable”. The co-occurrence of positive and negative metacognitive beliefs is thought to be related to greater pathology (Wells, 2000).

Consistent with these assumptions, research has found evidence of a positive relationship between unhelpful metacognitive beliefs and emotional disorder. A greater endorsement of negative metacognitive beliefs has been associated with anxiety (Davis & Valentier, 2000; McEvoy & Mahoney, 2013), depression (Papageorgiou & Wells, 2001) and obsessive compulsive disorder (Wells & Papageorgiou, 1998). In addition, prospective cohort studies have found that higher levels of unhelpful metacognitive beliefs at baseline predict the subsequent severity of anxiety and depression (Hjemdal, Stiles, & Wells, 2013; Papageorgiou & Wells, 2009; Yilmaz, Gencoz, & Wells, 2011). Metacognitive beliefs have also been found to mediate relationships between symptoms and distress (Dragan & Dragan, 2014; Irak & Tosun, 2008).

The application of the metacognitive model to psychosis has also received support from cross-sectional and cohort studies. For example, research using non-clinical samples suggests that people with higher proneness to hallucinations and delusions tend to have an increased number of both positive and negative metacognitive beliefs (Laroi & Van der Linden, 2005; Morrison et al., 2000). Research using samples of people at risk of developing psychosis suggests that at-risk mental state (Morrison et al., 2006) and subsequent transition to first episode psychosis (Barbato et al., 2013; Morrison, Bentall, et

al., 2002) is associated with a greater endorsement of negative metacognitive beliefs. A higher number of negative beliefs has also been related to increased distress (Barbato et al., 2013; Brett, Johns, Peters, & McGuire, 2009; van Oosterhout, Krabbendam, Smeets, & van der Gaag, 2013) and a more severe and chronic course of illness (Austin et al., 2015).

Currently, the specific role of metacognitive beliefs in psychosis is unclear. A previous meta-analysis (Varese & Bentall, 2011) found limited evidence that metacognitive beliefs have a causal role in specific symptoms of psychosis (i.e. auditory hallucinations) as previous models suggested (Morrison et al., 1995). Instead, there is emerging evidence that metacognitive beliefs may be a general vulnerability factor to psychological disorder and metacognitive beliefs (and associated CAS activity) may influence symptom maintenance, help-seeking, and distress (Hill et al., 2012; Varese et al., 2011).

To test the prediction metacognitive beliefs are associated with psychological disorder and unhelpful thinking styles in general rather than specific diagnoses, this meta-analysis will use quantitative methods to compare levels of unhelpful metacognitive beliefs in people with clinical psychosis, people with emotional disorder and people with no psychiatric diagnosis. The following research questions will be addressed: (i) Do people with psychosis have elevated levels of unhelpful metacognitive beliefs compared to non-psychiatric controls? (ii) Do people with psychosis have elevated levels of unhelpful metacognitive beliefs compared to people with emotional disorder?

3.3 Method

The review followed the guidance set out in the Preferred Reporting Items for Systematic reviews and Meta-Analyses (Moher et al., 2009).

3.3.1 Operationalization of concepts

To minimise ambiguity in study inclusion the following operationalization of key concepts were used:

Psychosis: A diagnosis of psychotic disorder according to the Diagnostic Statistical Manual of Mental Disorders fourth edition (American Psychiatric Association, 2000) or International Classification of Diseases tenth edition (World Health Organisation, 1993); or meets threshold for early intervention in psychosis using the Positive and Negative Syndrome Scale (Kay et al., 1987) defined as a score of four on hallucinations or delusional beliefs or a score of five on paranoid ideation. People with a diagnosis of Bipolar Disorder were not considered eligible.

Emotional Disorder: A diagnosis of a depression or anxiety disorder (such as panic disorder, generalised anxiety disorder, obsessive-compulsive disorder) according to the Diagnostic Statistical Manual of Mental Disorders fourth edition (American Psychiatric Association, 2000) or International Classification of Diseases tenth edition (World Health Organisation, 1993). The emotional disorder groups were extracted from eligible studies that included a psychosis sample.

Non-psychiatric controls: No formal diagnosis of a psychiatric disorder. The non-psychiatric controls were extracted from eligible studies that included a psychosis sample.

Metacognitive beliefs: Metacognitive beliefs were restricted to those captured by the Meta-Cognitions Questionnaire (MCQ) and its variants (Cartwright-Hatton & Wells, 1997; Wells & Cartwright-Hatton, 2004). The MCQ was designed specifically to measure the five metacognitive beliefs implicated in the S-REF model. Previous studies have identified alternative measures of metacognitive beliefs specific to experiences of psychosis, such as the Beliefs about Paranoia Scale (Morrison et al., 2005) and the Interpretation of Voices Inventory (Morrison, Wells, et al., 2002). However, given that the present review aims to quantify the magnitude of the relationship between those beliefs implicated in emotional regulation across a range of psychological disorders, metacognitive beliefs were restricted to those central to this model. In addition, these alternative measures may be less relevant to our control groups.

The MCQ-65 (Cartwright-Hatton & Wells, 1997) and MCQ-30 (Wells & Cartwright-Hatton, 2004) yield five subscales consisting of “positive beliefs about worry” reflecting the belief that worry can help to solve problems; “negative beliefs including the uncontrollability and danger of thoughts” reflecting the belief that thoughts must be controlled in order to function well; “cognitive confidence” capturing the extent to which an individual has confidence in their memory and attentional capabilities; “negative beliefs including responsibility and superstition” reflecting superstitious themes that certain thoughts can cause negative outcomes, and feelings of responsibility for preventing these outcomes; and “cognitive self-consciousness” reflecting the extent to which an individual engages in monitoring their own thought processes. Higher scores on each subscale indicate a greater endorsement of unhelpful beliefs. The MCQ-SAM (Lobban, 1998) is a modified and shortened version of the MCQ-65 that contains two additional sub-scales. Factor analysis indicates that the first four sub-scales reliably capture positive beliefs about worry, negative beliefs including uncontrollability and danger, cognitive confidence and cognitive self-consciousness. The two remaining subscales of the MCQ-SAM will be excluded from analyses because they do not form part of the S-REF model.

3.3.2 *Search strategy*

A comprehensive and systematic review of the literature was carried out in three stages. First, studies were identified by searching PsychInfo, PubMed and EMBASE. Medical Subject Headings (MeSH) “psychosis” and “metacognition” were supplemented with text word searches (psychos* or psychoti* or schizo* or paranoi* or delu* or hallucinat*) and (metacog* or self-focus* or “cognitive attentional syndrome” or worry or ruminat* or “thought suppress*” or “thought control” or “meta-worry”) and combined. Second, an inspection of eligible study reference lists was carried out to identify any relevant studies missed through database searching (forward and backward tracking). Finally, citations of the original validation papers of the MCQ-30 and MCQ-65 were identified using SCOPUS

and cross-checked against our database search results. Searches were updated and completed in September 2015.

3.3.3 Eligibility screening

Studies were eligible for the meta-analysis if (i) the study investigated the relationship between metacognitive beliefs and psychosis; (ii) participants met diagnostic or early intervention criteria for a psychotic disorder; (iii) the study utilised a comparison group of people with a diagnosis of emotional disorder or non-psychiatric controls; (iv) the study contained sufficient statistical information for extraction or sufficient data could be retrieved from authors. Studies were not included in the review if they were not reported in English. Eligibility was assessed in a three-stage procedure by the first author (first by title, then by abstract and finally by full text). Ambiguities in study eligibility were resolved by consultation with the senior authors.

3.3.4 Methodological quality

Methodological quality of included studies was assessed independently by two raters using a tool for assessing the quality of observational studies. Disagreements in quality ratings were resolved through consultation with the senior authors. This tool has been adapted from the Agency for Healthcare Research and Quality (Williams et al., 2010) and has previously been applied to assessing the methodological quality of observational studies for people with psychosis at risk of self-harm and suicide (Taylor et al., 2015). The tool uses a four point rating system (meets, partially meets, does not meet or unclear) to grade ten criteria concerned with the methods used to select the sample, the adequacy of the sample size, the methods used to ascertain non-clinical/clinical status and the appropriateness of the statistical analyses.

3.3.5 Data extraction

Data extraction was carried out by the first author following a pre-defined coding protocol agreed by all four authors. The extraction of study characteristics included the sample

characteristics, the research design, the instruments used to assess symptoms, and the instruments used to assess metacognitive beliefs. The extraction of study data included the sample means and standard deviations reported for psychosis groups, emotional disorder groups and non-psychiatric control groups on each sub-scale of the MCQ. When such descriptive statistics were not available, authors were contacted for this information.

3.3.6 Effect size calculations and data analysis

All analyses were carried out using Comprehensive Meta-analysis version 3. Hedges' g was selected as the effect size metric for the analyses and was calculated using sample means, standard deviations and sample sizes extracted from eligible studies. All analyses were carried out under the random-effects model. This was selected due to the likelihood of methodological and sampling variation in the different cross-sectional studies included. The random effects model assumes there is no common effect for all included studies and that the included studies/effect sizes represent a random sample from a larger population of studies/effect sizes (Liberati et al., 2009).

Two sets of effects (and associated variances) were calculated based on the statistical information extracted from the primary studies. To examine the first research question (i.e. whether people with psychosis have elevated levels of unhelpful metacognitive beliefs compared to non-psychiatric controls), standardised mean difference effects were calculated for comparisons between psychosis participants vs non-psychiatric controls. To examine the second research question (i.e. whether people with psychosis have elevated levels of unhelpful metacognitive beliefs compared to people with emotional disorder), standardised mean difference effects were calculated for comparisons between psychosis participants vs emotional disorder participants on the five MCQ sub-scales. Where separate means were reported for sub-groups of psychosis within a study (e.g. those people with auditory hallucinations and those without auditory hallucinations) a combined effect size was calculated (Borenstein, Hedges, Higgins, & Rothstein, 2011).

3.4 Results

3.4.1 Literature search results

A total of 2427 articles were retrieved through the search strategy; 249 duplicates were removed resulting in 2178 papers for screening. Eligibility was assessed in a three-stage procedure (first by title, then by abstract and finally by full text). An overview of the screening procedure is provided in Figure 1. Fifteen articles were considered eligible for the analysis; four further articles were removed due to reporting secondary analyses from which the primary paper was included. The remaining eligible articles consisted of eleven clinical studies with a total of 568 psychosis participants, 212 emotional disorder participants (Adjustment Disorder= 8; Anxiety= 24; Depression= 44; Dysthymic Disorder= 4; Generalised Anxiety Disorder= 3; Obsessive-Compulsive Disorder= 78; Panic Disorder= 51) and 776 non-psychiatric controls. Participants that did not meet PANSS criteria for early intervention in psychosis were excluded from the sample extracted from Hill et al. (2012). A summary of eligible studies can be found in table 2.

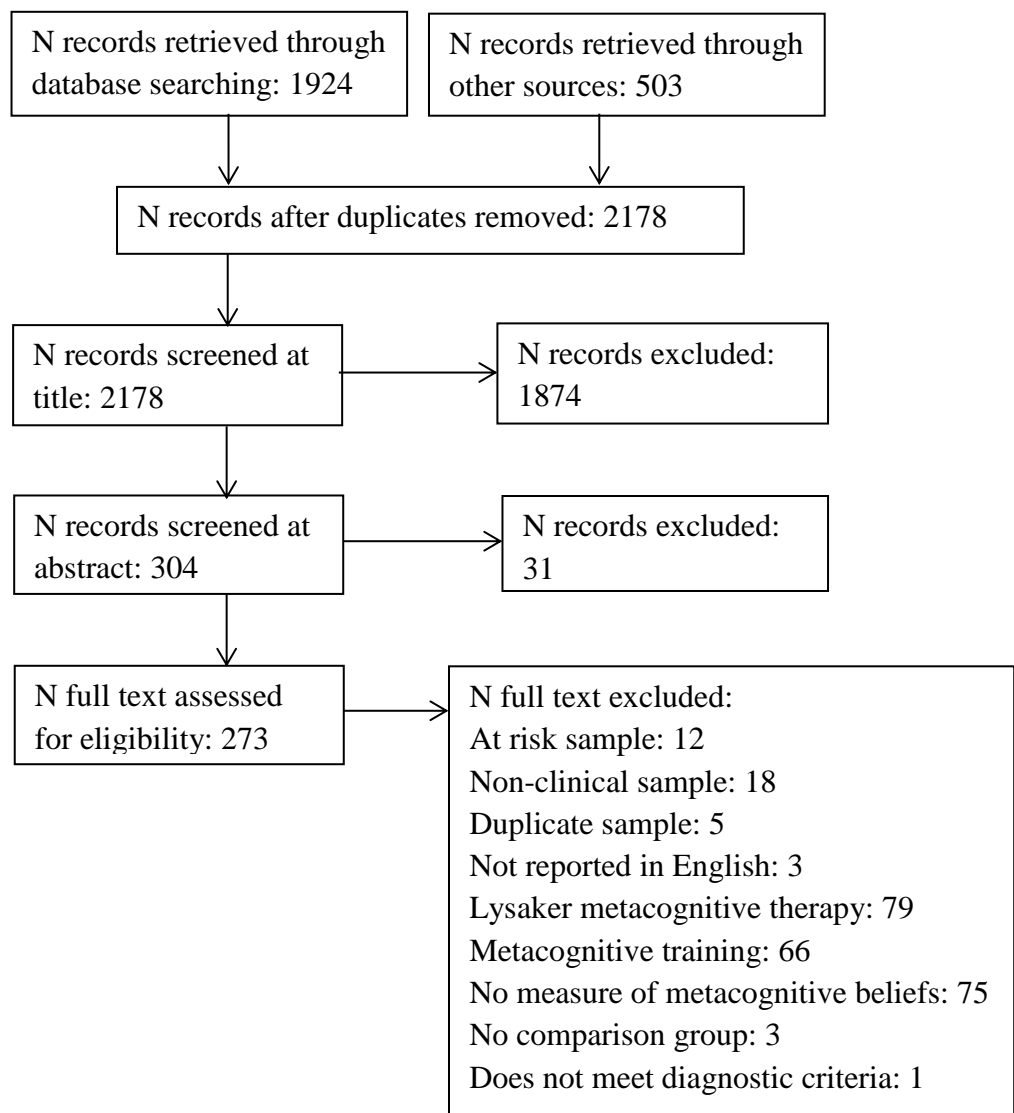


Figure 1. PRISMA diagram summarising the screening process for studies included in the meta-analysis

Table 2

Summary of study characteristics for studies included in the statistical analyses

Study	Psychosis sample characteristics	N included	Comparator sample characteristics	N included	Diagnostic system	Metacognition measure
Austin et al. 2015	102 psychosis 25 episodic psychosis 214 remitted psychosis	127	496 non-psychiatric	496	ICD-10	MCQ-30
Baker and Morrison 1998	15 psychosis with hallucinations 15 psychosis without hallucinations	30	15 non-psychiatric	15	DSM-IV	MCQ-65
Brett et al. 2009	27 psychosis	27	32 non-psychiatric	32	DSM-IV	MCQ-65
Fraser et al. 2006	15 psychosis with persecutory delusions	15	15 Panic Disorder 15 non-psychiatric	15 15	DSM-IV	MCQ-65
Garcia-Montes et al. 2006	21 psychosis with hallucinations 22 psychosis without hallucinations 16 psychosis recovered from hallucinations	59	23 Obsessive Compulsive Disorder	23	DSM-IV	MCQ-65
Hill et al. 2012	20 psychosis with hallucinations	13	20 non-psychiatric	20	PANSS	MCQ-30
Lobban et al. 2002	32 psychosis with hallucinations	55	24 Anxiety	24	DSM-IV	MCQ-SAM

	23 psychosis without hallucinations		28 Non-psychiatric	28		
Moritz et al. 2010	39 psychosis	39	55 Obsessive- Compulsive Disorder	55		MCQ-30
			49 non-psychiatric	49		
Morrison and Wells 2003	49 psychosis with hallucinations	73	35 Panic disorder	35	DSM-IV	MCQ-65
	24 psychosis with persecutory delusions		50 non-psychiatric	50		
Perona-Garcelan et al. 2012	27 psychosis with hallucinations	75	22 mixed anxiety	22	DSM-IV	MCQ-30
	20 psychosis with persecutory delusions		27 non-psychiatric	27		
	28 psychosis recovered from hallucinations					
Valiente et al. 2012	55 psychosis with persecutory delusions	55	38 depression	38	DSM-IV	MCQ-30
			44 non-psychiatric	44		

DSM-IV: Diagnostic Statistical Manual of Mental Disorders fourth edition; ICD-10: International Classification of Diseases 10th Edition; PANSS: Positive and Negative Syndrome Scale; MCQ-30: Metacognitions Questionnaire-30; MCQ-65: Metacognitions Questionnaire-65

3.4.2 *Methodological quality assessment and risk of bias*

The data utilised in this review was exclusively cross-sectional. Only a few longitudinal studies have investigated these relationships to date (e.g. Austin et al. 2015; Morrison et al. 2002). Methodological quality has been assessed in this context.

Common methodological weaknesses related to limited detail about recruitment and sampling. Cross-sectional data extracted from clinical trials provided detailed information relating to inclusion criteria, recruitment and sample characteristics. However, approximately half of the studies provided limited descriptions of recruitment methods. In terms of sampling, studies employing non-psychiatric controls tended to rely on self-reporting rather than using a validated tool to screen for previous or current psychiatric disorder. Reporting of sample characteristics was limited and generally restricted to age and gender without additional context (e.g. duration of illness, social-economic status, and ethnicity). These weaknesses could affect the generalizability of findings. They also limit the extent to which confounding variables can be considered at study level. In terms of methodology, the majority of studies did not use assessor blinding or were unclear about whether blinding procedures were implemented. There was also a tendency for power calculations and missing data to be unreported. A summary of the methodological quality of the included studies can be found in table 3.

Due to the measurement of metacognitive beliefs being restricted to those implicated in the S-REF model, there is a possible risk of bias relating to the source of study data. Four of the eleven studies included in the analysis include a primary author of the model being tested (Wells) and a further two studies include an author of this paper (Morrison or Varese). However, the remaining data included in this meta-analysis came from a diversity of research teams and from different countries (i.e. Australia, Denmark, Germany, Spain and the United Kingdom). The description of study weaknesses above and the summary table provided (table 3) indicate the majority of studies did not meet a

number of important quality criteria suggesting all studies have been rated objectively. In addition, visual and statistical methods of publication bias were utilised.

Table 3

Overview of methodological quality assessment for studies included in the statistical analyses

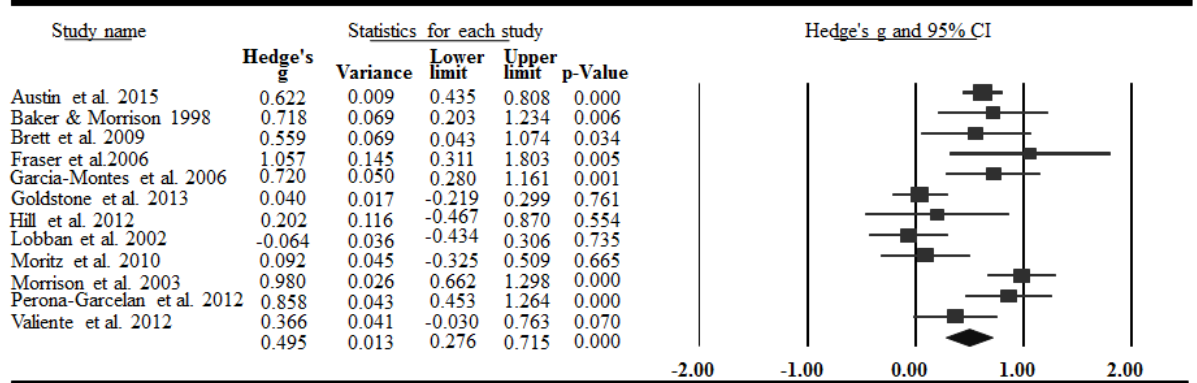
	N studies meet criteria	N studies partially meet criteria	N studies do not meet criteria	N studies unclear
Unbiased selection of sample	3	3	0	5
Unbiased selection of control	1	6	0	4
Sample size calculation carried out and reported	1	0	10	0
Adequate description of the sample	2	9	0	0
Validated measure of psychosis/emotional disorder	11	0	0	0
Validated measure of metacognitive beliefs	11	0	0	0
Assessors blinded	0	0	0	11
Missing data reported and does not exceed 20%	1	0	0	10
Controlled for potential confounds	10	0	2	0
Analyses appropriate for sample size	12	0	0	0

3.4.3 *Do people with psychosis have elevated levels of unhelpful metacognitive beliefs compared to non-psychiatric controls?*

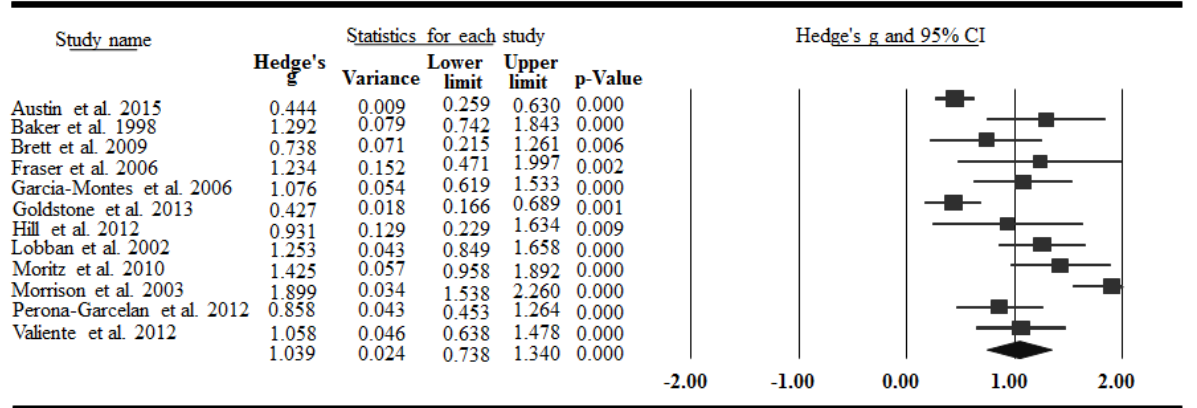
The primary research question was addressed using a series of separate meta-analyses. Analyses compared the effect sizes of each MCQ sub-scale in psychosis to the effect sizes of each sub-scale in non-psychiatric controls ($k= 11$). Figure 2 displays the individual effect size estimates with the variance and 95% confidence intervals for each analysis.

The analyses revealed that scores on the five sub-scales of the MCQ are significantly elevated in psychosis compared to non-psychiatric controls: positive beliefs ($g= 0.50$, variance= 0.01, $CI= 0.28-0.72$, $p<0.001$); negative beliefs including uncontrollability and danger ($g= 1.04$, variance= 0.02, $CI= 0.74-1.34$, $p<0.001$); cognitive confidence ($g= 0.82$, variance= 0.02, $CI= 0.57-1.07$, $p<0.001$); negative beliefs including responsibility and superstition ($g=1.31$, variance= 0.03, $CI= 0.96-1.66$, $p<0.001$); and cognitive self-consciousness ($g= 0.49$, variance= 0.10; $CI= 0.29-0.69$, $p<0.001$). Cohen (1988) effect size criteria traditionally applies to effect size estimates of d , however, Hedges g is a small adjustment of Cohen's d . It is therefore considered reasonable to apply the same conventions. Cohen suggests that an effect size of ≥ 0.20 is small, ≥ 0.50 is moderate and ≥ 0.80 is large. Utilising these criteria, cognitive self-consciousness had a small effect size whilst positive beliefs had a moderate effect, and negative beliefs and lack of cognitive confidence demonstrated large effect sizes.

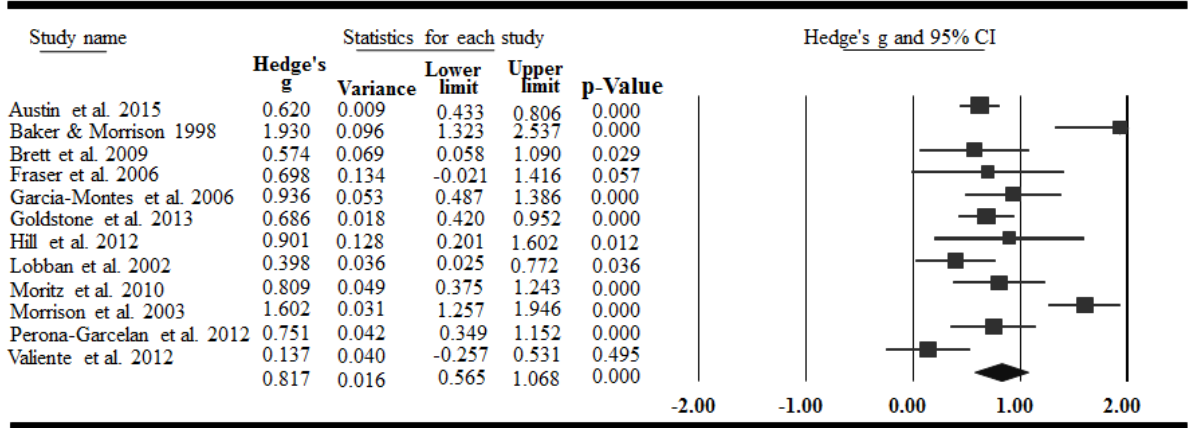
Positive Beliefs about Worry



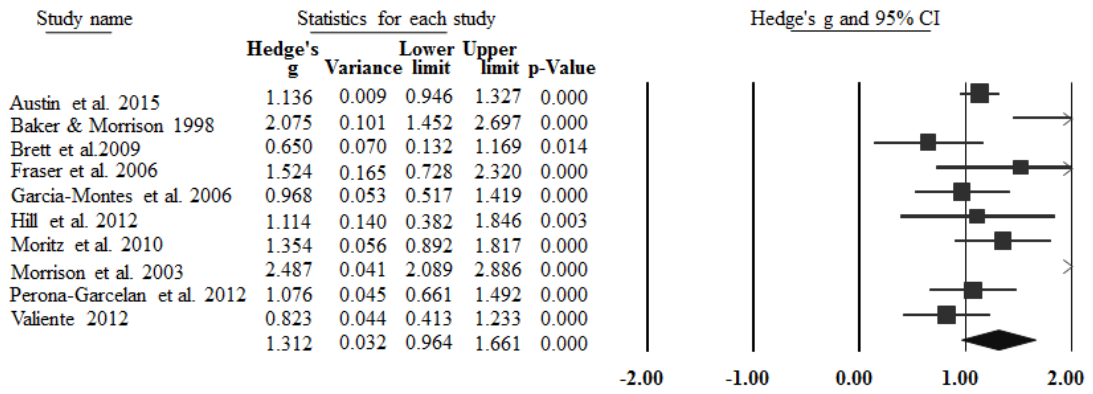
Negative Beliefs Uncontrollability and Danger



Cognitive Confidence



Negative Beliefs Responsibility and Superstition



Cognitive Self-Consciousness

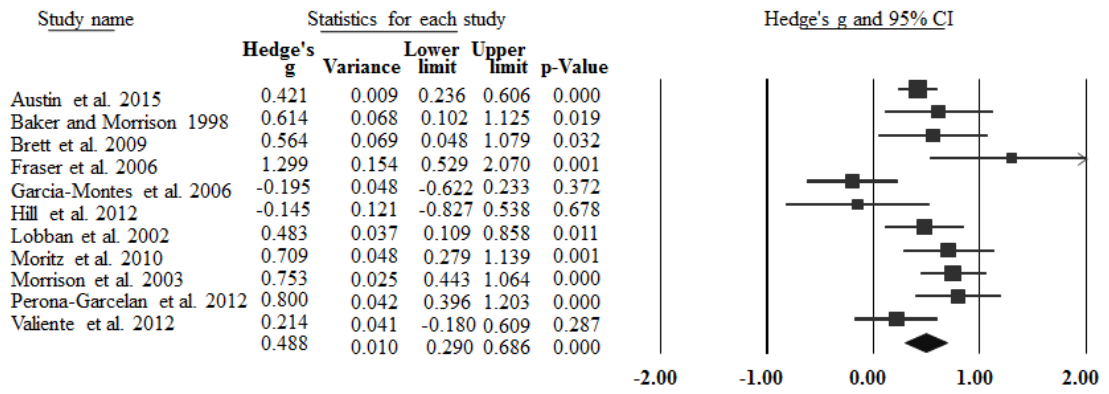


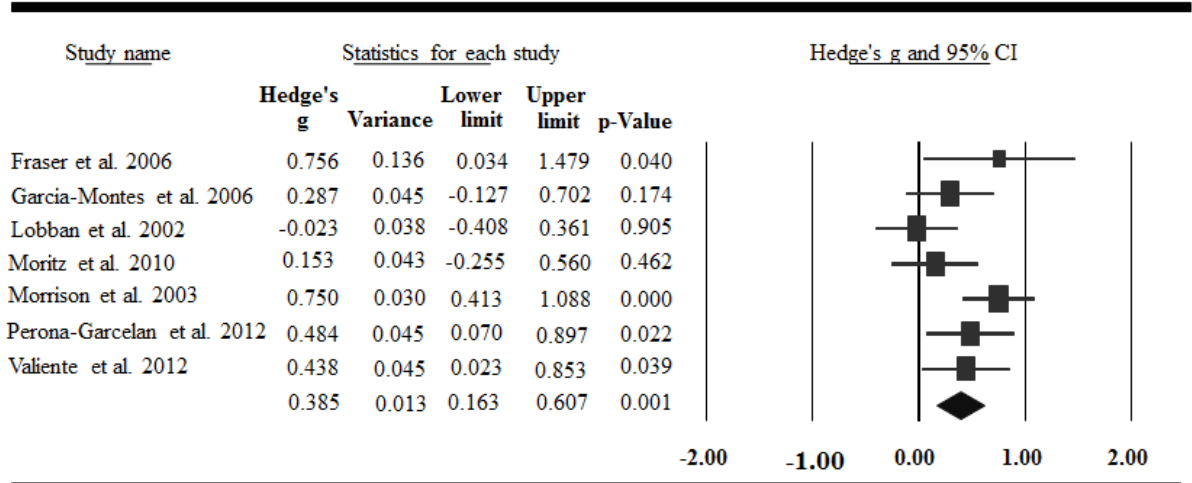
Figure 2. Summary effect sizes for psychosis vs. non-psychiatric control analyses

3.4.4 *Do people with psychosis have elevated levels of unhelpful metacognitive beliefs compared to people with emotional disorder?*

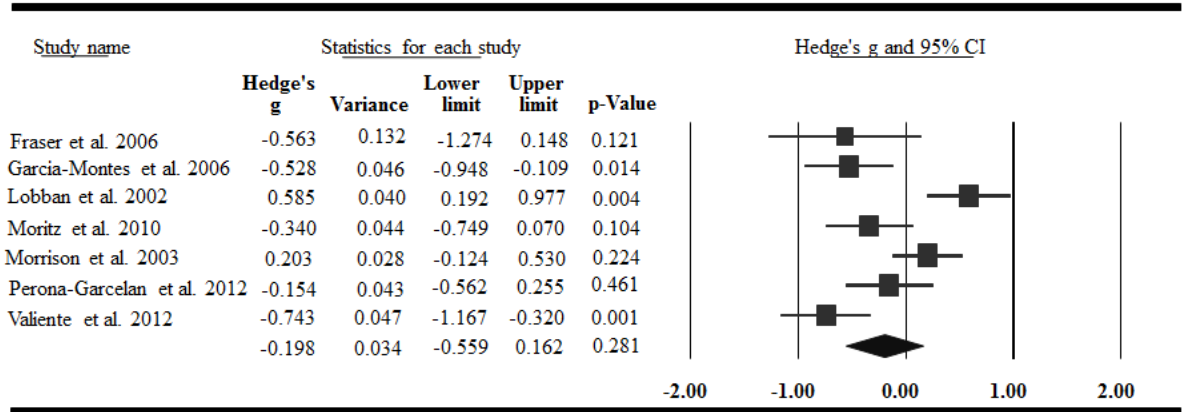
The second research question was analysed by comparing the effect size of each MCQ sub-scale in psychosis to the effect size of each sub-scale in emotional disorder ($k=7$). Figure 3 displays the individual effect size estimates with the variance and 95% confidence intervals for each analysis.

The analyses revealed that positive beliefs about worry were significantly higher in psychosis ($g=0.39$, variance= 0.01, $CI= 0.16-0.61$, $p=0.001$). According to Cohen (1988), this is a small effect size. All other effect sizes between the psychosis and emotional disorder groups failed to reach significance.

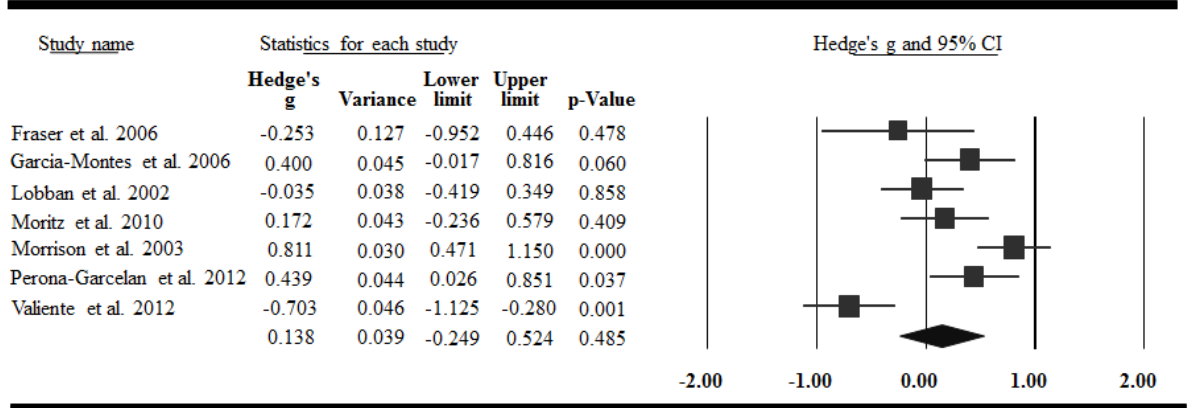
Positive Beliefs about Worry



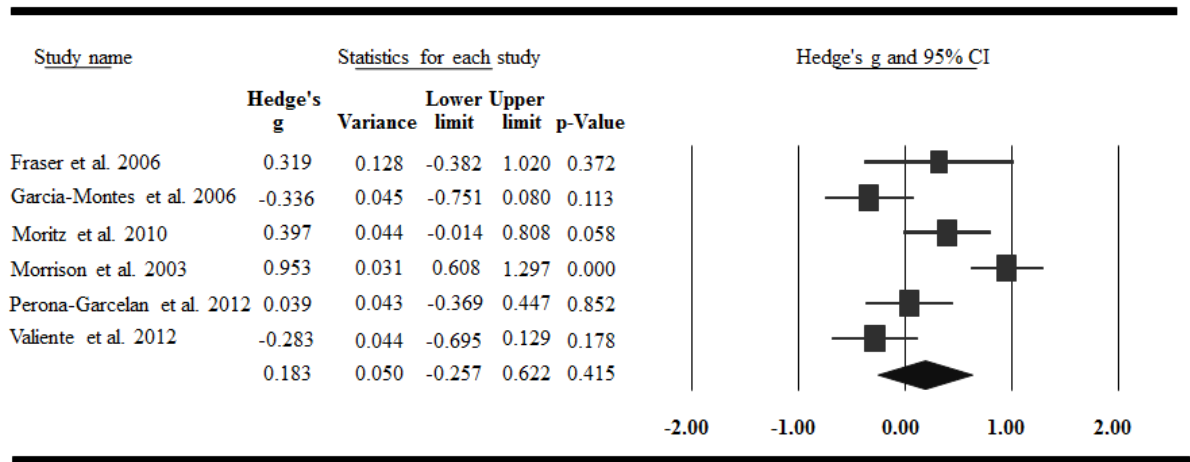
Negative Beliefs Uncontrollability and Danger



Cognitive Confidence



Negative Beliefs Responsibility and Superstition



Cognitive Self-Consciousness

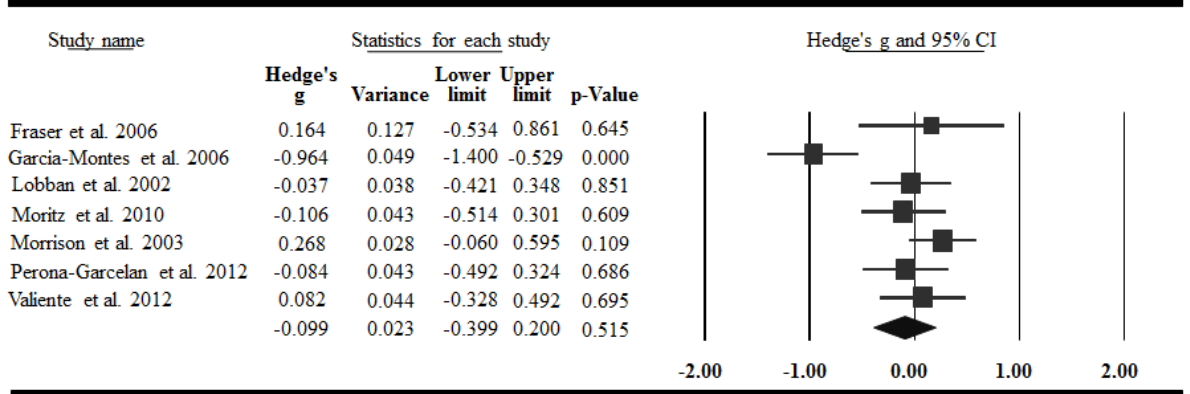


Figure 3. Summary effect sizes for psychosis vs. emotional disorder analyses

3.4.5 Heterogeneity analyses

Heterogeneity was tested using the Q statistic. The results suggest that there is significant heterogeneity in effect size estimates between psychosis and non-psychiatric controls and psychosis and emotional disorder controls on all subscales of the MCQ. Table 4 displays a summary of these results. It should be noted that this test has limited statistical power for meta-analyses with a small number of studies (Higgins & Thompson, 2002). However, if a less conservative p-value of 0.10 is utilised, only the psychosis vs. emotional disorder positive beliefs analysis does not show significant heterogeneity. This indicates that variation in the true effect sizes varies more than would be expected due to sampling error.

Inconsistency in effect sizes across studies was quantified using the I^2 statistic. The I^2 statistic provides a percentage of variability in point estimates that is due to “true” heterogeneity rather than sampling error (Higgins & Thompson, 2002). Examination of I^2 indicates that the majority of estimates of the true effect size in the primary analyses have moderate to high heterogeneity according to Higgins and Thompson (2002). However, the I^2 statistic also suffers uncertainty when only a few studies are available and should be interpreted with caution (Liberati et al., 2009).

Table 4

Summary statistics for heterogeneity analyses

	<i>Q</i> (<i>df</i>)	<i>P</i>	<i>I</i> ² (%)
Psychosis and non-psychiatric control			
PBW	29.11 (10)	0.001	65.65
NBUD	64.46 (10)	0.000	84.49
CC	53.77 (10)	0.000	81.40
NBRS	57.38 (9)	0.000	84.32
CSC	26.11 (10)	0.004	61.70
Psychosis and emotional disorder			
PBW	11.59 (6)	0.072	48.24
NBUD	30.67 (6)	0.000	80.44
CC	35.23 (6)	0.000	82.97
NBRS	31.56 (5)	0.000	84.16
CSC	21.28 (6)	0.002	71.80

PBW: positive beliefs about worry; NBUD: negative beliefs about uncontrollability and danger; CC: cognitive confidence; NBRS: negative beliefs including responsibility and superstition; CSC: cognitive self-consciousness

3.4.6 Publication bias

All primary analyses were tested for publication bias (or other selection bias). Publication bias was assessed through inspection of funnel plots asymmetry, using both visual and statistical (i.e. Egger's test) methods. Inspection of the funnel plots and Eggers test did not indicate the presence of significant publication bias.

3.5 Discussion

This review investigated the relationship between the five metacognitive beliefs implicated in the Self-Regulatory Executive Function (S-REF) model proposed by Wells and Matthews (1994, 1996) and clinical psychosis. Specifically, meta-analysis was used to test whether metacognitive beliefs are elevated in people with psychosis compared to people with emotional disorder and non-psychiatric controls.

The findings indicated that compared with non-psychiatric controls those with psychosis had significantly elevated scores on all five subscales of the Meta-Cognitions Questionnaire (MCQ). When compared to people with emotional disorder those with psychosis showed significantly higher scores on positive beliefs about worry, but not the other MCQ subscales. Our findings suggest that the five metacognitive beliefs implicated in the S-REF model are elevated in people with psychosis compared to people without a diagnosis, and there appears to be a high level of similarity between people with psychosis and those with emotional disorders in their elevated scores. These results support the S-REF model that suggests a common set of metacognitive beliefs may be associated with a vulnerability to psychological disorder, emotional regulation and distress rather than specific diagnoses.

It is possible that our finding of a high level of similarity between psychosis and emotional disorder groups is inflated by comorbid factors. However, it is acknowledged that anxiety and depression commonly occur in people with psychosis and may have a direct influence on the content of symptoms such as delusional beliefs (see Freeman & Garety, 2003). In addition, emotional factors appear to have a pivotal role in the transition from sub-clinical to clinical experiences of psychosis with apparent dose-response relationships (Van Rossum et al., 2011). This has led to the suggestion that anxiety and depression may be considered necessary precursors to the onset of a psychotic disorder (Dominguez, Wichers, Lieb, Wittchen, & van Os, 2011). Therefore, the investigation of common factors associated with emotional dysregulation in psychosis and emotional disorders may have important implications for psychological models and the prevention and treatment of psychosis. Our findings support cognitive models that recognise the importance of pre-morbid and co-occurring emotional factors (e.g. Garety et al., 2001; Morrison, 2001).

Our findings appeared to show some additional influence of positive metacognitive beliefs in psychosis when compared with emotional disorder. Positive metacognitive beliefs are

concerned with the advantages of engaging in enhanced cognitive processing, in particular, they reflect beliefs about the usefulness or worry, rumination and threat monitoring. This may be an important finding if replicated, as strong positive beliefs are likely to underlie particularly inflexible variants of the Cognitive Attentional Syndrome (i.e. repetitive negative thinking). The combination of such beliefs with beliefs about the uncontrollability of thoughts is likely to be especially problematic for attempts to disengage from perseverative forms of processing. However, this requires further investigation.

3.5.1 Clinical implications

The findings of the present review suggest that unhelpful metacognitive beliefs are elevated in psychosis and are similar to those levels observed in emotional disorder. As such, clinical formulations may benefit from the incorporation of metacognitive factors that drive unhelpful cognitive, attentional and behavioural responses. In the S-REF model, metacognitive beliefs are intrinsically linked to unhelpful thinking styles that maintain distress. Metacognitive therapy specifically targets positive and negative beliefs about thinking by evaluating and questioning metacognitive beliefs (Wells, 2009, p.51).

Attention training techniques and detached mindfulness are used to manage intrusions and to help a person to disengage from prolonged processing that is associated with symptom maintenance and distress (i.e. the cognitive attentional syndrome). A recent meta-analysis suggested that metacognitive therapy (Wells, 2000, 2009) is effective in reducing symptoms associated with anxiety and depression (Normann et al., 2014). Given that similar metacognitive processes appear to be implicated in emotional disorder and psychosis there is a rationale to consider metacognitive therapy in psychosis. A recent pilot study of metacognitive therapy in psychosis indicated that the therapy was an acceptable treatment with good adherence and no adverse events (Morrison et al., 2014). Furthermore, two case studies utilising the metacognitive therapy technique of attention

training (Wells, 1990) suggest the technique is useful in increasing the perceived controllability of psychotic experiences and reducing distress (Levaux, Laroi, Offerlin-Meyer, Danion, & Van der Linden, 2011; Valmaggia, Bouman, & Schuurman, 2007). However, the results should be interpreted with caution given the lack of randomisation, the absence of a control condition and the small sample sizes.

3.5.2 *Limitations*

The data in this meta-analysis was exclusively cross-sectional. The synthesis of cross-sectional data has limitations that prevent the possibility of establishing any causal association between the variables considered. Currently, only a small number of longitudinal studies have investigated these relationships. However, findings indicate that an increased number of unhelpful metacognitive beliefs is associated with transition to clinical psychosis in people with at-risk mental state (Morrison, Bentall, et al., 2002) and higher levels of negative metacognitive beliefs predict a more severe and chronic course of illness in people with a diagnosis of psychosis (Austin et al., 2015).

The overall number of studies included was small. Therefore, the lack of significant findings in some analyses may be due to issues of statistical power rather than there being no significant effect (i.e. type-II error). In addition, there was significant heterogeneity observed in the primary analyses. This suggests there is poor consistency in the estimated effect size across studies. For these reasons, confidence in the effect estimate is limited and the true effect may vary from the summary effect we estimated.

Confounds relating to comorbidity cannot be ruled out. For example, it is not clear whether all psychosis samples considered in the primary studies were screened for comorbid emotional disorder. Likewise, it is not clear whether all emotional disorder samples were screened for psychosis. This could reduce the sensitivity and specificity of the between-group comparisons.

Finally, the measurement of metacognition in this analysis was restricted to the Metacognitions Questionnaire and its variants. On the one hand, this may be a confound that introduces a source of bias. For example, several studies in this analysis included a primary author of the model being tested (Wells) or an author of this paper (Morrison or Varese). However, the remaining data included in this meta-analysis came from a diversity of research teams from different countries. In addition, it is not uncommon for researchers involved in a specific field to conduct a review of the literature. On the other hand, restricting the measurement of metacognition to the Metacognitions Questionnaire has allowed us to test one specific and influential model of psychological disorder, and decreased methodological heterogeneity of the studies analysed. It is a common criticism of meta-analysis that researchers often combine different types of studies, in effect “mixing apples and oranges” (Borenstein et al., 2009, p. 379). It is, therefore, a potential strength of the current analysis that the measurement of metacognitive beliefs has been restricted to those most relevant to the S-REF model. However, our quality assessment indicates that the vast majority of studies included in this review received low ratings due to failing to meet a number of key quality criteria, which is not uncommon for studies utilising cross-sectional data.

3.5.3 Future directions

Given that the data in this review was exclusively cross-sectional, there is clearly a need for more longitudinal studies to establish the temporal relationship between metacognition, symptoms and distress. Alternatively, experimental studies might consider methods of manipulating metacognitive beliefs and assessing subsequent experiences of psychosis and/or distress. Previous reviews (Varese & Bentall, 2011) and subsequent empirical studies (Hill et al., 2012) found that once co-variation between different symptoms is controlled for, the apparent association between hallucinations and metacognitive beliefs is considerably reduced, leading to suggestions that metacognitive beliefs might be better

understood as determinants of distress rather than specific symptoms. Further investigation utilising longitudinal or experimental methodologies will allow for more rigorous tests of the prediction metacognitive beliefs may be a general vulnerability factor for emotional dysregulation and distress. Future research could benefit from employing independent assessment of the presence of specific symptoms and distress such as the Psychotic Symptoms Rating Scales (Haddock et al., 1999), rather than generic, single-item measures of symptom severity such as the Positive and Negative Syndrome Scale (Kay et al., 1987), which often confound dimensions such as frequency, conviction, preoccupation and distress. Finally, given that different aspects and measures of metacognition appear to share other important relationships with psychosis and other diagnoses (e.g. Lysaker, Dimaggio, et al., 2015) future research might also consider the transdiagnostic utility of these models.

In summary, this meta-analysis found unhelpful metacognitive beliefs are elevated in people with psychosis compared to people with no psychiatric diagnosis. In addition, people with psychosis have similar levels of unhelpful metacognitive beliefs to people with emotional disorder. This suggests that metacognitive beliefs may be associated with the presence of psychological disorder and distress in general, rather than with specific symptoms or diagnoses. These findings appear to support the basic assumptions of the Self-Regulatory Executive Function model and suggest unhelpful metacognitive beliefs may be a marker for unhelpful thinking styles that maintain symptoms across disorders. However, the extent to which this relationship is influenced by comorbid emotional disorder is unclear. Nevertheless, emotional factors (i.e. anxiety and depression) are an important factor in clinical psychosis (Freeman & Garety, 2003; Freeman et al., 2002) and prodromal states (Yung & McGorry, 1996). Therefore, this limitation does not dismiss the potential involvement of metacognitive beliefs in the development and maintenance of psychosis, which should be carefully examined in future longitudinal research.

4 Chapter 4: Are experiences of psychosis associated with unhelpful metacognitive coping strategies? A systematic review of the evidence

This paper has been re-submitted to the Journal of Clinical Psychology and Psychotherapy following reviewer feedback.

Are experiences of psychosis associated with unhelpful metacognitive coping strategies? A systematic review of the evidence

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4.1 Abstract

This review investigated whether unhelpful metacognitive coping strategies, such as attentional biases, worry, rumination and thought control, are associated with experiences of psychosis. These processes, known collectively as the Cognitive Attentional Syndrome, form a central tenet of the Self-Regulatory Executive Function (S-REF) model (Wells & Matthews, 1994, 1996). Three research questions based on assumptions underlying the CAS were addressed. It was predicted that processes of i) self-focused processing; ii) negative perseverative thinking (worry and rumination); and iii) counterproductive thought control would be associated with experiences of psychosis. A comprehensive search of the literature identified 51 eligible studies: 17 investigated self-focused attention; 25 investigated perseverative processing (worry: $n= 18$; rumination: $n= 10$); and nine investigated thought control strategies. The findings indicated that unhelpful coping strategies associated with the CAS are related to experiences of psychosis, and appear to share important relationships with distress. Implications for future research and clinical practice are discussed.

Keywords: psychosis; metacognition; Cognitive Attentional Syndrome (CAS); attention; worry; rumination.

4.2 Introduction

In recent years the role of metacognition in psychosis has received increased investigation. The term metacognition describes “thinking about thinking” (Papaleontiou-Louca, 2003) and refers to “any knowledge or cognitive process that is involved in the appraisal, monitoring or control of cognition” (Wells, 2000). Within the psychosis literature, metacognition has been investigated in different ways. Lysaker and colleagues have applied metacognition to understanding theory of mind deficits, reflecting a person’s ability to form and understand complex representations about themselves and others (Lysaker et al., 2010). Moritz and Colleagues have investigated metacognitive training that focuses on cognitive biases associated with attributional style and jumping to conclusions (Moritz et al., 2010). Another influential approach is the Wells and Matthews (1994, 1996) Self-Regulatory Executive Function (S-REF) model. This approach focuses on unhelpful metacognitive beliefs and coping strategies that are proposed to maintain psychological distress.

The core strength of the S-REF model is that it emphasises transdiagnostic processes and beliefs. Unhelpful metacognitive beliefs and the coping strategies they guide are proposed to have a central role in all psychological disorders. This means that assessment and intervention based on this model are not restricted to specific symptoms or diagnostic categories. Metacognitive beliefs are proposed to drive unhelpful thinking patterns that prolong negative emotions. They refer to beliefs that support the use of unhelpful coping strategies, such as self-focused attention, worry, rumination and thought control (e.g. “worrying will help me to solve problems” or “I must control my thoughts in order to function”). These strategies are universal and natural responses, however, psychological problems occur when a person is unable to disengage from them. This constitutes a style of thinking called the Cognitive Attentional Syndrome (the CAS). Activation of the CAS

results in an increase in the detection and processing of threat-related information so that negative evaluations and emotions are strengthened and persist.

Research within the emotional disorder literature has supported the assumptions underlying the CAS. Experimental studies have found that the induction of worry can lead to an increase in intrusive thoughts, an increase in negative affect and a reduction in task-focussed attention (Borkovec et al., 1983; Butler et al., 1995). Observational research has identified worry and rumination as a key process in several disorders including social phobia (Mellings & Alden, 2000), health anxiety (Bouman & Meijer, 1999), post-traumatic stress (Holeva et al., 2001), and depression (Nolen-Hoeksema, 1991). Cross-sectional and cohort studies demonstrate that unhelpful thought control strategies are associated with negative emotional outcomes (Reynolds & Wells, 1999) and the frequency of worry and rumination predicts symptom severity (Nolen-Hoeksema et al., 1993; Vasey & Borkovec, 1992). Finally, treatment outcome studies demonstrate that changes in unhelpful metacognitive beliefs are associated with positive outcomes (Normann et al., 2014; Solem et al., 2009).

The growing interest in the commonalities underlying emotional disorder and psychosis, and the increased acknowledgement that negative emotion has an important role in the onset and content of psychotic symptoms (Freeman & Garety, 2003; Yung & McGorry, 1996) has led to an increase in research investigating common contributory and maintaining factors. The role of metacognitive beliefs has received substantial investigation, and there is emerging evidence they may be implicated in symptom maintenance and distress. Recent meta-analyses have found little evidence of a direct causal relationship between metacognitive beliefs and specific symptoms of psychosis (Varese & Bentall, 2011), but have demonstrated a high level of similarity in the elevated levels of metacognitive beliefs reported by people with psychosis and emotional disorder compared to non-psychiatric controls (Sellers et al., 2017). This supports the assumption

that a common set of metacognitions are associated with the prolongation of emotional dysregulation and negative affect across disorders.

Emotional dysregulation is well documented in psychosis. A recent review suggested people with schizophrenia utilise more maladaptive self-regulation strategies compared to non-psychiatric controls (O'Driscoll, Laing, & Mason, 2014). The strategies investigated by O'Driscoll et al. (2014) share some similarities with those implicated in the S-REF model. They both identify underlying processes as central to wellbeing across different symptoms and highlight the importance of broader aspects of cognition, such as attention. However, the focus of this review is specifically on those strategies that are guided by metacognitive beliefs and theoretically grounded in the S-REF model (self-consciousness, perseverative processing and thought control), rather than general coping, dissociation and alexithymia.

Based on three predictions outlined by Wells (2000, p. 34), the following research questions will be addressed: (i) Are experiences of psychosis associated with an increase in self-focused attention? (ii) Are experiences of psychosis associated with negative perseverative thinking (worry and rumination)? (iii) Are experiences of psychosis associated with counterproductive thought control strategies? Specifically, relationships with symptoms and distress will be examined.

4.3 Method

This review followed the guidance set out in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Moher et al., 2009).

4.3.1 Search strategy

Search terms were agreed in consultation with the senior authors (TM and AW). Search terms for psychosis were constructed to capture both clinical and non-clinical experiences, as well as studies that utilised a single symptom-based approach. Search terms for

metacognitive variables were devised to capture those strategies that are explicitly grounded in the S-REF model and guided by metacognitive beliefs.

A systematic review of the literature was conducted in two stages. First, studies were identified by searching PsychInfo, PubMed, EMBASE, WebOfKnowledge and SCOPUS. The Medical Subject Heading (MeSH) “psychosis” was supplemented with text word searches (psychos* or psychoti* or schizo* or paranoi* or delu* or hallucinat*) and combined with the Medical Subject Heading (MeSH) “metacognition” supplemented with text word searches (metacog* or self-focus* or “cognitive attentional syndrome” or worry or ruminat* or “thought suppress*” or “thought control” or “meta-worry”). Second, the reference lists of included studies were inspected to identify relevant studies missed through database searching (forward and backward tracking). Primary searches were completed in September 2014 and updated in December 2016.

4.3.2 Inclusion criteria

Studies were eligible if they were published in a peer review journal and investigated the relationship between (i) self-focused attention; or (ii) negative perseveration (worry and rumination); or (iii) thought control strategies, in relation to experiences of psychosis. Experiences of psychosis included hallucinatory experiences, paranoid and delusional ideation, as well as feelings of detachment from reality (i.e. dissociation and depersonalisation). In order to be inclusive and representative of the literature, a variety of methodologies were considered. Cross-sectional studies were included that utilised validated measures of the constructs of interest. Experimental studies were included that manipulated self-focused attention or response style (i.e. worry, rumination, or thought control). Experience Sampling Methodology (ESM) studies were included if they investigated self-focused attention, perseverative processing or thought control strategies. Studies were not eligible if they were not reported in English.

4.3.3 Eligibility screening

Eligibility was assessed in a three-stage procedure by the first author (first by title, then by abstract and finally by full text). Ambiguities in eligibility were resolved by consultation with the senior authors.

4.3.4 Data extraction

Data extraction was carried out by the first author following a pre-defined coding protocol agreed by all authors. The extraction of study characteristics included the sample (i.e. clinical, non-clinical or at risk), the research design (e.g. experimental, cross-sectional or cohort), the instruments used to assess symptoms, and the instruments used to assess coping strategies. The extraction of study data included aims, hypotheses, and key findings (including correlation coefficients or means and standard deviations).

4.3.5 Methodological quality

Methodological quality of included studies was assessed independently by two raters using a tool for assessing the quality of observational studies. Disagreements in quality ratings were resolved through consultation with the senior authors. This tool has been adapted from the Agency for Healthcare Research and Quality (Williams et al., 2010) and has previously been applied to assessing the methodological quality of observational studies for people with psychosis at risk of self-harm and suicide (Taylor et al., 2015). The tool uses a four-point rating system (meets, partially meets, does not meet or unclear) to grade ten criteria concerned with recruitment methods, sample selection, sample size and the appropriateness of the statistical analyses.

4.4 Results

4.4.1 Literature search results

The search strategy retrieved 4425 peer-reviewed papers; 1018 duplicates were removed. An overview of the screening procedure is provided in Figure 4. Sixty full-text articles

were eligible for analysis; nine secondary analyses were excluded. This resulted in 51 eligible studies.

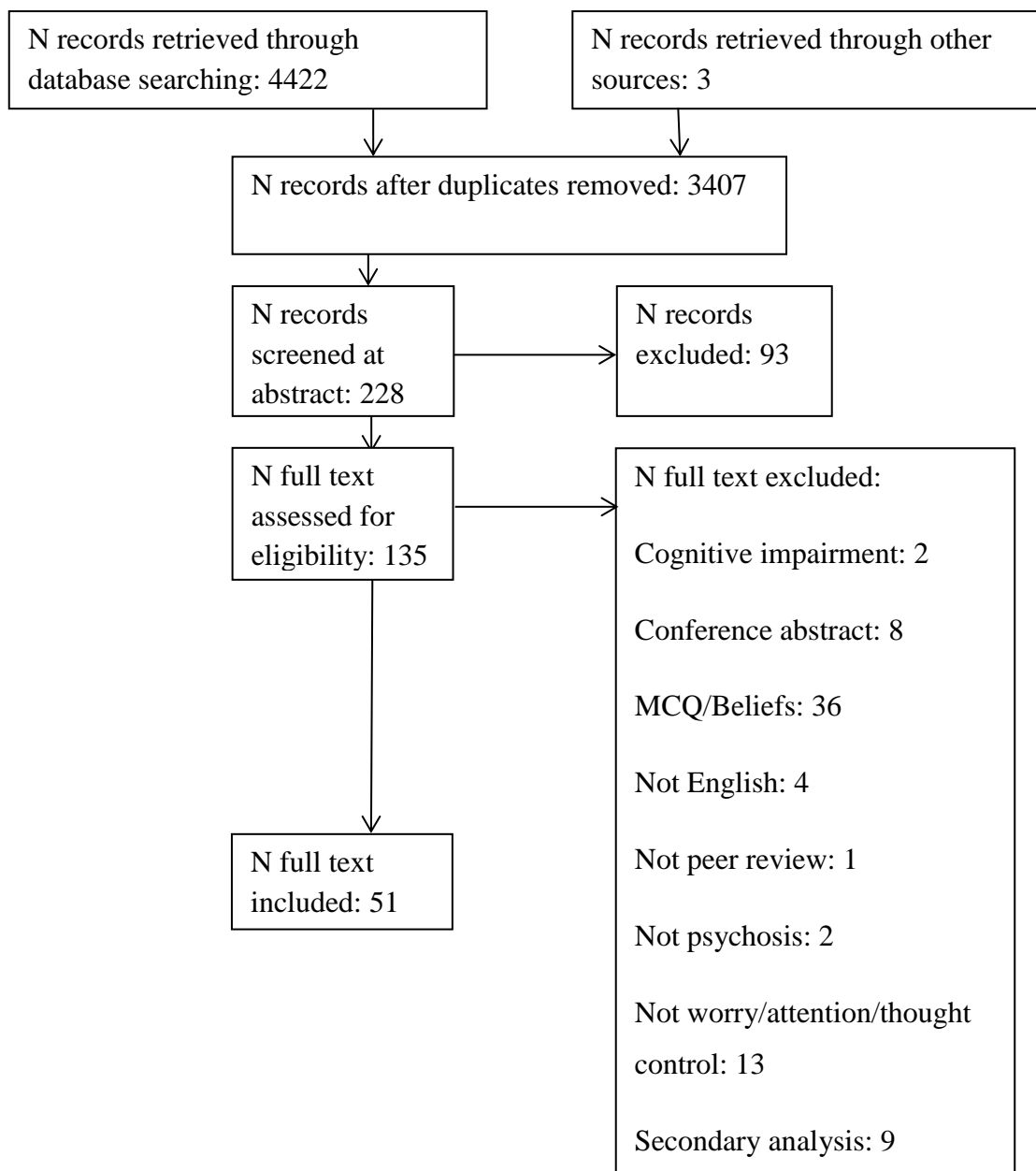


Figure 4. PRISMA diagram summarising the screening process for studies included in the review

4.4.2 Description of included studies

Of the 51 eligible studies 17 investigated self-focused attention; 25 investigated perseverative processing (worry: $n=18$; rumination: $n=10$); and nine investigated thought control strategies. A summary of study characteristics is provided in table 5.

Table 5

Summary of study characteristics for eligible studies

Construct	Sample characteristics			Design characteristics				
	Total studies	<i>N</i> clinical sample	<i>N</i> at risk sample	<i>N</i> non-clinical sample	<i>N</i> experimental	<i>N</i> cross-sectional	<i>N</i> cohort	<i>N</i> ESM
Self-focussed attention	17	8	1	8	5	11	0	1
Perseverative processing	25	17	0	8	2	18	4	1
Thought control	9	1	0	8	2	7	0	0

ESM: Experience Sampling Methodology

4.4.3 Measures

The following validated measures of metacognitive coping strategies were identified in eligible studies:

Self-focused attention: the Self-Consciousness Scale (Fenigstein, Scheier, & Buss, 1975); the Self-Consciousness Scale-Revised (Scheier & Carver, 1985); the Private Self-consciousness Scale (Sedikides, 1992); the Self-Absorption Scale (McKenzie & Hoyle, 2008); and the Situational Self-Awareness Scale (Govern & Marsch, 2001).

Worry and rumination: the Penn State Worry Questionnaire (Meyer, Miller, Metzger, & Borkovec, 1990); the Anxious Thoughts Inventory (Wells, 1994); the Ruminative Response Scale (Treyner, Gonzalez, & Nolen-Hoeksema, 2003); the Rumination and Reflection Questionnaire (Trapnell & Campbell, 1999); the Response Styles Questionnaire (Nolen-Hoeksema, 1991); the Perseverative Thinking Questionnaire (Ehring et al., 2011); and the Cognitive Emotion Regulation Questionnaire (Garnefski & Kraaij, 2007).

Thought control: the Thought Control Questionnaire (Wells & Davies, 1994) and the White Bear Suppression Inventory (Muris, Merckelbach, & Horselenberg, 1996).

4.4.4 Methodological quality assessment

Common methodological weaknesses related to limited detail about recruitment and sampling. Cross-sectional studies that utilised data from clinical trials generally provided detailed information relating to inclusion criteria, recruitment and sample characteristics. However, approximately half of the studies provided partial or unclear descriptions relating to recruitment and eligibility. Studies utilising non-clinical samples tended to employ student populations and were unclear on how they screened for potential mental health problems or did not use a validated measure. Reporting of sample characteristics was good in larger cohort studies and population surveys. However, demographic data from smaller

studies was limited (i.e. age and gender) without additional context (e.g. duration of illness, social-economic status, ethnicity). These weaknesses could affect the generalizability of findings. They also limit the extent to which confounding variables can be considered at study level as well as in future statistical pooling of studies (i.e. meta-analysis).

In terms of methodology, the majority of experimental studies did not use blinding or were unclear about blinding procedures. Finally, only three studies reported power calculations for planned analyses. However, sample sizes were appropriate for the analyses undertaken. There was a tendency for missing data to be unreported. This information could be helpful in ascertaining the applicability of the measures to experiences of psychosis. A summary of methodological quality can be found in table 6.

Table 6

Overview of assessment of study methodological quality

	<i>N</i> studies meet criteria	<i>N</i> studies partially meet criteria	<i>N</i> studies do not meet criteria	<i>N</i> studies unclear if criteria is met	<i>N</i> studies criteria does not apply
Unbiased selection of sample	28	8	0	15	0
Selection of comparison group is appropriate	19	0	0	0	32
Sample size calculation carried out and reported	3	1	47	0	0
Adequate description of the sample	24	23	4	0	0
Validated methodology for ascertaining clinical/at risk/ non-clinical status	31	2	18	0	0
Validated measure of psychotic experiences	50	0	1	0	0
Validated measure of constructs	49	1	1	0	0
Assessors blinded	0	0	0	9	42
Adequate follow-up for longitudinal data	4	0	0	0	47
Missing data reported and does not exceed 20%	9	1	0	41	0
Controlled for anxiety and/or depression	13	0	38	0	0
Analyses appropriate for sample size	51	0	0	0	0

4.4.5 *Data synthesis*

Statistical meta-analysis was not considered appropriate for the first and third research questions due to the variability in the measurement of these variables as well as in methodology and sampling. Pooling studies with clinical and methodological diversity could lead to statistical heterogeneity (Thompson, 1994) and problems identifying and controlling for confounding variables. This could cause difficulty interpreting inconsistencies in effect size (Higgins & Thompson, 2002) and generalizability of the findings (Higgins, Thompson, Deeks, & Altman, 2003).

There was less methodological heterogeneity in studies considered eligible for the second research question. Therefore, statistical meta-analysis, as well as narrative synthesis, was used. This allowed for examination of the extent to which people with psychosis engage in perseveration relative to people with emotional disorder and non-clinical controls.

Standardised mean difference effects were calculated for comparisons between psychosis participants' vs non-psychiatric controls and psychosis participants' vs emotional disorder controls on measures of worry. There were an insufficient number of studies allowing for comparisons of rumination. Primary analyses focussed on studies that utilised the PSWQ as this is the most widely used measure of trait worry. The sole focus of this scale is worry processes, whereas other scales (e.g. the CERQ and AnTI) also tap into alternative processes (such as refocusing, re-appraisal and meta-worry). However, sensitivity analyses were also conducted that included these alternate measures. Where separate means were reported for sub-groups within a study, a combined effect size was calculated (Borenstein et al., 2011).

Analyses were conducted using Comprehensive Meta-analysis version 3. Hedges' g was selected as the effect size metric for the analyses and was calculated using sample means, standard deviations and sample sizes extracted from eligible studies. Hedges' g is a measure of standardised mean difference that is used by the Cochrane collaboration. It is

used as a summary statistic in meta-analyses where the same outcome may have been measured in different ways across studies (Higgins & Green, 2011). All analyses were carried out under the random-effects model. This was selected to allow for some degree of methodological and sampling variation between the studies.

4.5 Findings

4.5.1 Are experiences of psychosis associated with increased self-focused attention?

The S-REF model predicts that psychological disorder is associated with “locked in” negative self-processing. This is marked by an attentional bias towards internal or self-relevant stimuli (Wells & Matthews, 1996). As a result, the detection and processing of threat increases, and cognitive flexibility and efficiency is impaired. Self-focussed processing is predominantly conceptualised in two ways: public self-consciousness refers to a heightened awareness of the self as a social object (Fenigstein, 1984); and private or cognitive self-consciousness refers to an enhanced awareness of inner events and thoughts (Palmier-Claus, Dunn, Taylor, Morrison, & Lewis, 2013). A summary of eligible studies is provided in table 7.

Table 7

Studies analysing the relationship between self-focused attention and psychosis

Study ID	Sample	Design	Measure	Key findings
Allen et al. 2005	327 non-clinical	Cross-sectional	SCS	Multiple regression revealed anxiety ($\beta = 0.40, p < 0.01$) and private self-consciousness ($\beta = 0.12, p = 0.04$) predicted hallucinatory experiences.
Cangas et al. 2006	81 non-clinical	Cross-sectional	-	Correlations suggested high levels of cognitive self-consciousness were associated with poorer performance on the attention task ($r = 0.25, p < 0.05$).
Ensum & Morrison 2003	30 psychosis (with hallucinations)	Experimental	PSC	Analysis of variance revealed those allocated to the internal focus manipulation performed significantly poorer on a source monitoring task than those allocated to the external focus manipulation ($F(1, 29) = 14.07, p < 0.005$).
Fenigstein 1984	233 non-clinical	Experimental	SCS	Analysis of variance revealed students with high public self-consciousness were more likely than those with low public self-consciousness to perceive themselves as a target ($F(1, 56) = 8.28, p < 0.01$).
Fenigstein & Venable 1992	40 non-clinical	Experimental	SCS	Analysis of variance revealed students with high public self-consciousness were more likely than those with low public self-consciousness to report feeling watched ($F(1, 36) = 8.10, p < 0.01$).
Flower et al. 2013	56 non-clinical	Experimental	SSAS	Between group t-tests revealed no significant differences on measures of situational ($t(54) = 1.40, p > 0.05$), private ($t(54) = 0.83, p > 0.05$) or public ($t(54) =$

				-0.76, $p>0.05$) self-consciousness following the threat task.
Freeman et al. 2005	327 non-clinical	Cross-sectional	SCS	Multiple regression indicated hallucination proneness ($\beta=2.95$, $p<0.001$), discomfort with ambiguity ($\beta=2.59$, $p<0.001$), anxiety ($\beta=1.14$, $p=0.038$), depression ($\beta=3.76$, $p<0.001$), stress ($\beta=2.38$, $p<0.001$), separation anxiety ($\beta=4.51$, $p<0.001$), fragile inner self ($\beta=3.40$, $p<0.001$) and private self-consciousness, ($\beta=2.26$, $p<0.001$) predicted paranoid ideation.
Freeman et al. 2013	130 psychosis (with persecutory delusions)	Cross-sectional	SCS	Correlations suggested higher levels of paranoid ideation was associated with private self-consciousness ($r=0.21$, $p=0.021$), public self-consciousness ($r=0.23$, $p=0.009$), attention to inner thoughts and feelings ($r=0.24$, $p=0.007$), attention to appearance ($r=0.31$, $p<0.001$), and attention to surroundings ($r=0.19$, $p=0.027$); however, only public self-consciousness ($r=0.20$, $p=0.029$) and attention to appearance ($r=0.26$, $p=0.003$) remained significant when controlling for anxiety.
McKie et al. 2017	32 non-clinical	Experimental	-	Analysis of variance revealed a significant condition x time interaction ($F(1,31)=14.67$, $p<0.001$). Post-hoc tests revealed ruminative self-focus maintained paranoia ($t(30)=1.39$, ns $d=0.24$) whilst mindful self-focus significantly reduced paranoia ($t(31)=7.49$, $p<0.001$).
Morrison & Haddock 1997	30 psychosis (15 with hallucinations; 15 without	Cross-sectional	SCS	Analysis of variance revealed significant between-group differences in private self-consciousness ($F(2,42)= 7.97$, $p<0.002$). Post-hoc tests indicated people with psychosis with hallucinations had greater levels than people with

	hallucinations) 15 non-clinical			psychosis without hallucinations ($p<0.05$). Correlations suggested that self-focus was associated with hallucination loudness ($r=0.78, p<0.001$).
Newman-Taylor and Stopa 2012	13 social phobia 13 psychosis (with persecutory delusions) 10 panic Disorder 12 non-clinical	Cross-sectional	SCS-R	Analysis of variance revealed significant differences between groups on levels of anxiety ($F(1,42)=11.32, p<0.001$), depression ($F(1,42)=9.44, p<0.001$), negative beliefs about oneself ($F(1,42)=9.17, p<0.001$) and self-consciousness ($F(1,42)=5.62, p<0.05$). Post-hoc tests revealed that psychosis and anxious groups were similar in their responses but both had greater levels than non-clinical controls across these variables.
Palmier-Claus et al. 2013	27 ultra-high risk of psychosis	ESM	CSC	Cognitive self-consciousness predicted hallucinations at the subsequent time point in individuals with negative beliefs about the need to control thoughts ($OR=2.023, p=0.007$); and predicted hallucinations at the same time point ($OR=5.868, p<0.001$).
Perona-Garcelan et al. 2008	51 psychosis (17 with hallucinations; 16 recovered from hallucinations; 18 without hallucinations) 17 non-clinical	Cross-sectional	SCS-R	Analysis of variance revealed significant differences in levels of private self-consciousness between groups ($F(3,64)=3.094, p=0.033$). Post-hoc tests indicated that people with hallucinations had higher levels than non-clinical controls ($t=5.471, p=0.008$) but did not differ from other psychosis groups (i.e. those recovered from hallucinations or those that had never experienced hallucinations).
Perona-Garcelan et	59 psychosis	Cross-sectional	SCS-R	Multiple regression revealed that self-consciousness predicted

al. 2011				depersonalisation ($\beta=.35, p=0.006$) and hallucinations ($\beta=0.29, p=0.024$). Depersonalisation mediated the relationship between self-consciousness and hallucinations ($\beta=0.15, p=0.222$).
Perona-Garcelan et al. 2013	318 non-clinical	Cross-sectional	SAS	Correlations suggested hallucination proneness was associated with absorption ($r=0.572, p<0.01$), depersonalization ($r=0.430, p<0.01$) and self-focus ($r=0.332, p<0.01$). Multiple regression revealed self-focus did not predict hallucination proneness ($\beta=0.06, p=0.271$) when absorption ($\beta=0.08, p<0.001$) and depersonalisation ($\beta=0.10, p<0.001$) were included in the model.
Perona-Garcelan et al. 2016	60 psychosis (with hallucinations)	Cross-sectional	SAS	Multiple regression revealed that voice dominance predicted both public self-absorption ($\beta=0.744, p<0.001$) and private self-absorption ($\beta=0.59, p=0.012$); public self-absorption partially mediated the relationship between voice dominance and anxiety ($R^2=0.54, F(5,54)=12.8, p<0.001$).
Startup & Segman 2008	57 psychosis	Cross-sectional	SFSC	Correlation analyses revealed that self-focused responses ($r=0.02$) and negative self-focused responses ($r=0.26$) on the sentence completion task were not associated with performance on a source monitoring task.

CSC: Cognitive Self-Consciousness Scale (Wells & Cartwright-Hatton, 2004); PSCS: Private Self-Consciousness Scale (Sedikides, 1992); SAS: Self-Absorption Scale (McKenzie & Hoyle, 2008); SCS: Self-Consciousness Scale (Fenigstein et al., 1975); SCS-R: Self-Consciousness Scale-Revised (Scheier & Carver, 1985); SFSC: Self-Focus Sentence Completion (M. Startup, Startup, & Sedgman, 2008); SSAS: Situational Self Awareness Scale (Govern & Marsch, 2001).

4.5.1.1 Self-focused attention and paranoia

A series of experimental studies using student samples suggest public self-consciousness is associated with a “self as a target bias”. The findings indicated that heightened self-consciousness was associated with a tendency to make paranoid interpretations of relatively benign and ambiguous situations (e.g. to believe oneself as the recipient of a particularly good or bad exam mark; the target of selection for a demonstration; and the target of other’s behaviour in social vignettes), and amplified feelings of being watched (Fenigstein, 1984; Fenigstein & Vanable, 1992). Conversely, a more recent study did not find a relationship between paranoia and heightened self-consciousness in students (Flower, Newman Taylor, & Stopa, 2013). Following a threat activation task, those with higher levels of paranoia did not differ to those with lower levels in self-reported public, private or situational self-awareness. However, in this study, self-consciousness was only measured after the threat activation; therefore, a comparison of changes to attention between the two groups was not possible. It is also possible the task increased self-focused attention across all participants. Similarly, McKie, Askew, and Dudley (2017) found that following a paranoia induction, participants allocated to a ruminative self-focus condition did not show a subsequent increase in paranoid ideation, but levels of paranoia were maintained. However, participants allocated to a mindful self-focus induction demonstrated a decrease in paranoid ideation. These studies signal that enhanced self-processing may be implicated in experiences of low-level paranoid ideation in non-clinical groups. A key methodological strength of these experiments is the capacity for direct manipulation of paranoia and self-processing. However, a considerable weakness is the limited comparability these scenarios have with clinical persecutory delusions that are likely to be more idiosyncratic, distressing and tenaciously held.

Evidence from cross-sectional studies suggests that self-focused attention may form part of a complex multifactorial predisposition to paranoia. A large student survey found paranoia

was predicted by separation anxiety, depression, fragile inner-self, hallucinatory experiences, discomfort with ambiguity, stress and private self-consciousness (Freeman, Garety, et al., 2005). In a clinical sample, persecutory delusions were associated with increased anticipation of threat, negative interpretations of ambiguous events, higher levels of self-consciousness, and negative self-schemas (Freeman, Dunn, et al., 2013). However, when controlling for anxiety and depression, the relationship between some aspects of attention and paranoia were no longer significant (i.e. private self-consciousness, attention to inner thoughts and attention to surroundings) whilst other's remained (i.e. public self-consciousness and attention to one's appearance). This suggests that some aspects of attention may be contingent on emotional factors. This is consistent with findings that people with social anxiety and people with persecutory delusions appear to share similar expectations of social threat, beliefs about oneself as being bad or flawed, and heightened levels of self-consciousness (Newman-Taylor & Stopa, 2012). This evidence suggests that predisposition to persecutory ideation may be underpinned by similar attentional biases to those observed in anxiety and that negative emotional states (such as anxiety) may further influence this relationship.

4.5.1.2 Self-focused attention and hallucinations

Studies utilising student samples have found that higher levels of anxiety and private self-consciousness are associated with increased hallucination proneness (Allen et al., 2005), and people with high hallucination proneness perform less well on attention-focussed tasks than those less prone (Cangas, Errasti, Garcia-Montes, Alvarez, & Ruiz, 2006). This is consistent with the proposal that increases in self-focused attention may predispose a person to intrusions, and may affect cognitive effectiveness. However, non-clinical hallucinatory phenomena are likely to be qualitatively different to distressing clinical experiences (Stanghellini, Langer, Ambrosini, & Cangas, 2012).

In clinical samples, Morrison and Haddock (1997) found that people with psychosis with auditory hallucinations had significantly higher levels of private self-consciousness than people with psychosis that did not experience hallucinations, but did not differ from non-clinical controls. In addition, the loudness of hallucinations was associated with greater levels of self-consciousness. The authors suggest that people with a higher degree of self-focus may experience internal events with greater intensity. Similarly, Perona-Garcelán et al. (2016) found that private and public self-absorption was predicted by perceived dominance of auditory hallucinations. The findings suggest people that perceive their voices as more dominant have a greater awareness of their own inner events as well as how others perceive them. In addition, public self-awareness partially mediated the relationship between voice dominance and anxiety. Conversely, Perona-Garcelan et al. (2008) found that people with auditory hallucinations had greater levels of self-focused attention than non-clinical subjects, but did not differ from people with psychosis that had recovered from or had never experienced hallucinations. The reason for these discrepant findings is unclear. However, given that some research has identified affective processes as potentially influential in the relationship between self-focused attention and paranoia, these findings may be the result of some additional confounding variable that acts on emotion. Alternatively, self-focus may not be stable, but may periodically heighten and fluctuate. This is a potential confound of cross-sectional studies where attentional biases are only assessed at one time point. In line with this, an experience sampling study using a sample of people at risk of developing psychosis found that a period of heightened cognitive self-consciousness often preceded hallucinatory experiences (Palmier-Claus et al., 2013). This study emphasises the potential importance of momentary alterations in self-focused processing on intrusive experiences.

Two studies suggest that self-focused processing may be related to other perceptual factors known to predict hallucinatory phenomena. Perona-Garcelan et al. (2013) found self-

focused attention was positively correlated with increased absorption and depersonalization in people highly prone to hallucinatory experiences. In a clinical sample, depersonalisation was found to mediate the relationship between self-focused attention and hallucinations (Perona-Garcelan et al., 2011). These findings support a general underlying role for attentional processes in hallucinatory experiences.

Two experimental studies investigated the relationship between self-focused attention, hallucinations and source monitoring. Source monitoring refers to a difficulty distinguishing between internal and external stimuli (Bentall, 1990). Ensum and Morrison (2003) found that people with psychosis asked to construct a narrative using self-referent pronouns (internal focus manipulation) performed significantly poorer on a subsequent source monitoring task than those asked to construct a narrative using nonself-referent pronouns (control). Those in the self-referent group were more likely to externally attribute their own thoughts in a subsequent word association task. Conversely, Startup, Startup and Sedgman (2008) did not find a relationship between self-focused attention and external attributions using a sentence completion task. However, this task was originally developed and validated as a measure of egocentricity, and, whilst it has been previously used in studies of self-focus, it may be a less sensitive measure of attentional bias to internal events or threat.

4.5.1.3 Summary of the association between self-focused attention and psychosis

These studies indicate that positive symptoms of psychosis may be intrinsically linked to heightened self-focused attention. This relationship appears relevant at varying levels of severity as evidenced across the continuum of non-clinical and clinical experiences. There is some indication that public self-consciousness may be more closely related to paranoia and persecutory ideation, whilst private self-consciousness may be associated with hallucinatory experiences. This suggests different self-processing styles may predispose a

person to different intrusive experiences. However, this requires further investigation where directions of causality can be tested.

There is sufficient evidence to suggest the relationship between self-focused attention and experiences of psychosis may be influenced by comorbid factors. For example, emotional factors (i.e. anxiety and depression), and comorbid symptoms (e.g. hallucinations) contributed greater variance in predicting paranoia over and above self-focused attention in the general population (Freeman, Dunn, et al., 2005), and when controlling for anxiety and depression some forms of attention no longer had a significant relationship with clinical delusions (Freeman, Dunn, et al., 2013). It is, therefore, possible that self-referential biases will be more closely linked to distress than positive symptoms themselves. This may also account for the inconsistency in the literature regarding the specificity of self-focused attention to hallucination status in clinical samples where emotion was not controlled. However, it is evident and interesting that self-focused processing may interact with other perceptual processes implicated in hallucinatory experiences (e.g. source monitoring and dissociation). This supports the assumption that common underlying processes may initiate a general predisposition toward psychological disorder, and this is affected by individual factors. It is also noteworthy that none of the studies investigated the relationship between self-focused processing and negative symptoms of psychosis; this may be an important area of enquiry if these biases share relationships with negative affect and general psychopathology.

Further research is required to establish whether the relationship between self-focused attention and experiences of psychosis is direct with symptoms, distress or is bidirectional. In particular, longitudinal research is needed to establish different mediating factors and pathways. In addition, further tests of the effects of self-focused processing on cognitive efficiency are required to test the hypothesis that “locked in” attentional biases have a detrimental effect on cognitive control and flexibility.

4.5.2 Are experiences of psychosis associated with negative perseveration?

Negative perseveration refers to enhanced verbal processing in the form of worry and rumination. Within the S-REF model, worry and rumination are thought to be utilised as coping strategies. However, these responses are unhelpful because they support threat-related processing and maintain negative emotions (Wells & Matthews, 1994, 1996).

Worry is defined as primarily verbal thoughts about future events with the potential for negative outcome (Borkovec et al., 1991) whilst rumination refers to repetitive thinking of the causes, consequences and symptoms of negative events or affect (Martinelli, Cavanagh, & Dudley, 2013). A summary of eligible studies is provided in table 8.

4.5.2.1 Negative perseveration and paranoia

Experimental studies have suggested that the induction of worry and rumination can increase paranoid ideation. Following a short paranoia induction, Martinelli et al. (2013) found that participants instructed to focus on their emotion and experience (i.e. ruminate) rather than direct their attention to neutral and externally focussed ideas (i.e. distract) subsequently reported higher levels of paranoia. This is supported by a series of studies utilising virtual reality. Paranoid ideation in a neutral environment was predicted by catastrophizing worry, worry style, perceptual anomalies and cognitive inflexibility (Freeman et al., 2008). Across the spectrum of low paranoia, high paranoia and clinical delusions, Freeman, Pugh, Vorontsova, Antley, and Slater (2010) found a corresponding increase in anxiety, worry, interpersonal sensitivity, depression, anomalous experiences and trauma. More severe perceptual anomalies, but not mild anomalies, reliably distinguished people with non-clinical paranoia from people with persecutory delusions. In addition, worry was found to increase feelings of detachment from reality, increase perceptual alterations and affect temporal disintegration (Freeman, Startup, et al., 2013). This suggests that increased worry may affect cognitive processing, and may result in confusing perceptual experiences associated with paranoia.

Table 8

Studies analysing the relationship between perseverative processing and psychosis

Study ID	Sample	Design	Measure	Key findings
Badcock et al. 2011	34 psychosis (with hallucinations) 34 non-clinical	Cross-sectional	PSWQ RRS	Group comparisons revealed that worry ($t=4.20, p<0.001$) and rumination ($t=3.38, p<0.001$) were significantly higher in people with psychosis; correlations indicated that rumination ($r=0.398, p<0.05$) but not worry ($r=0.001, p>0.05$) was associated with depression in psychosis; and rumination ($r=0.378, p<0.05$) but not worry ($r=0.238, p>0.05$) was associated with distress.
Bassett et al. 2009	25 psychosis (with persecutory delusions) 25 non-clinical	Cross-sectional	PSWQ	Between group t-tests revealed people with psychosis had significantly higher levels of anxiety ($t(34)=5.29, p<0.001$), worry ($t(38.45)=2.74, p=0.009$), preoccupation ($t(32.1)=3.97, p<0.001$), conviction ($t(31.1)=4.99, p<0.001$) and distress ($t(48)=2.84, p=0.007$) than non-clinical controls.
Carse & Langdon 2013	152 non-clinical	Cross-sectional	RRQ	Multiple regression revealed that rumination ($\beta=0.19, p<0.05$) and reflection ($\beta=0.46, p<0.01$) predicted delusion proneness.
Cernis et al. 2014	50 psychosis	Cross-sectional	PSWQ	Correlations indicated the relationship between worry and paranoia ($r=0.29, p=0.04$) was non-significant when controlling for depersonalisation ($r=0.20, p=0.18$).

Cernis et al. 2016	142 psychosis (with persecutory delusions) 273 non-clinical	Cross-sectional	PTQ	Between-group t-tests indicated negative perseverative thinking was significantly higher in people with persecutory delusions compared to non-clinical controls ($t(373.7)=-16.0, p<0.001$).
Clemente et al. 2013	24 psychosis (with persecutory delusions) 25 pathological worriers	Cross-sectional	PSWQ	Correlations suggested higher levels of worry were associated with greater levels of delusion distress ($r=0.74, p<0.01$), preoccupation ($r=0.83, p<0.01$) and conviction ($r=0.81, p<0.01$) in people with psychosis.
Freeman & Garety 1999	15 psychosis (with persecutory delusions) 14 generalised anxiety disorder	Cross-sectional	PSWQ	Between-group t-tests indicated no significant differences in worry across the groups; correlations indicated that higher levels of meta-worry were associated with delusion distress ($r=0.71, p<0.01$) but not preoccupation ($r=0.22, p>0.05$) or conviction ($r=-0.04, p>0.05$).
Freeman et al. 2008	200 non-clinical	Cross-sectional	PSWQ	Logistic regression indicated paranoia was predicted by catastrophizing ($OR= 1.07, p<0.001$), worry style ($OR=1.03, p=0.006$), perceptual anomalies ($OR= 1.07, p=0.013$) and cognitive inflexibility ($OR=0.095, p=0.031$).
Freeman et al. 2010	30 low paranoia 30 high paranoia 30 psychosis (with persecutory delusions)	Cross-sectional	PSWQ	Analysis of variance revealed significant differences in anxiety ($F(2,87)=58.16, p<0.001$), worry ($F(2,87)=22.73, p<0.001$), interpersonal sensitivity ($F(2,87)= 21.73, p<0.001$), anomalous perceptions ($F(2,87)=28.90, p<0.001$) and trauma ($F(2,87)=16.09, p<0.001$) between the three groups. There was an increase in scores across all variables across

Freeman et al. 2011	7281 general population	Cross-sectional	-	the continuum of low paranoia, high paranoia and psychosis groups. Logistic regression indicated that higher levels of paranoid ideation was associated with greater levels of insomnia ($OR=2.54, p<0.001$), irritability ($OR=5.79, p<0.001$), depression ($OR=7.26, p<0.001$), worry ($OR=8.94, p<0.001$), anxiety ($OR=9.74, p<0.001$), phobias ($OR=13.63, p<0.001$), panic ($OR=20.26, p<0.001$) and trauma ($OR=27.12, p<0.001$).
Freeman et al. 2012	2382 general population	Cohort	CIS-R	Logistic regression indicated that new paranoid thinking was predicted by insomnia ($OR=1.52, p<0.001$), worry ($OR=1.68, p<0.001$), anxiety ($OR=1.63, p<0.001$), depression ($OR=1.66, p<0.001$) and depressive ideas ($OR=1.87, p<0.001$); persistence of paranoid thinking was predicted by insomnia ($OR=1.20, p<0.001$), worry ($OR=1.34, p<0.001$), anxiety ($OR=1.17, p<0.001$), depression ($OR=1.20, p<0.001$) and depressive ideas ($OR=1.30, p<0.001$).
Freeman et al. 2013	67 psychosis (with persecutory delusions)	Experimental	PSWQ	Analysis of variance revealed the worry induction increased non-hallucination anomalies ($F(2,65)=5.5, p=0.006$) and depersonalisation ($F(2,65)=10, p<0.05$).
Halari et al. 2009	37 psychosis	Cross-sectional	RSQ	Multiple regression indicated rumination predicted negative symptoms ($\beta=0.33, p<0.05$) but not positive symptoms; correlations suggested rumination was positively associated with emotional withdrawal ($\rho(35)=0.23, p<0.05$) and stereotyped thinking ($\rho(35)=0.28, p<0.05$).

Hartley et al. 2014	27 psychosis	ESM	-	Worry predicted delusional ideation ($\beta=0.332, p<0.001$) and distress ($\beta=0.324, p=0.012$); hallucinations ($\beta=0.206, p=0.016$) and distress ($\beta=0.418, p<0.001$). Rumination also predicted delusions ($\beta=0.203, p=0.002$) and distress ($\beta=0.343, p=0.007$); and hallucinations ($\beta=0.202, p<0.001$) and distress ($\beta=0.398, p<0.001$).
Jones and Fernyhough 2009	296 non-clinical	Cross-sectional	RRQ	Correlation suggested rumination was associated with hallucination proneness ($r=0.39, p<0.05$); path analyses mediation: rumination predicted intrusive thoughts ($\beta=0.37, p<0.006$) and intrusive thoughts predicted hallucination proneness ($\beta=0.51, p<0.001$).
Kertz et al. 2012	379 depression 66 bipolar depressed 30 bipolar manic 93 psychosis	Cross-sectional	PSWQ	Correlations suggested worry was associated with distress across all groups. Analysis of variance revealed a significant difference between groups ($F(3,563)=19.82, p<0.001$). Post-hoc tests indicated the depressed and bipolar depressed groups had significantly greater levels of worry than the psychosis and bipolar manic groups.
Krabbendam & Van Os 2005	4848 general population	Cohort	-	Neuroticism at baseline was positively associated with psychotic-like experiences at time 2 ($OR= 1.20, p<0.05$); the strength of association increased across levels of neuroticism (low scores $OR=2.21, p<0.05$; middles scores $OR=1.80, p<0.05$; high scores $OR=3.89, p<0.05$).
Martinelli et al. 2013	37 non-clinical	Experimental	-	Analysis of variance revealed significant differences in paranoia between groups following the rumination manipulation. Post-hoc tests indicated that

				participants in the rumination group had significantly higher levels of paranoia following the manipulation ($t(35)=-2.31, p=0.02$).
Morrison & Wells 2007	51 psychosis 40 anxiety disorder 60 non-clinical	Cross-sectional	AnTI	Correlations indicated that all sub-scales of the AnTI were associated with delusion frequency and delusion distress; the meta-worry subscale was associated with hallucination distress but not with cognitive or physical dimensions; multiple regression indicated that worry predicted emotional response in delusions (delusions $\beta=0.41, p=0.002$; worry $\beta=0.49, p=0.006$) and predicted depression over and above the intensity of delusional experiences (social worry $\beta=0.33, p=0.048$; meta-worry $\beta=0.35, p=0.065$).
Rowland et al. 2013A	126 psychosis 97 bipolar 81 non-clinical	Cross-sectional	CERQ	Analysis of variance revealed the clinical groups used more rumination (Ps: $F(3,206)=8.05, p<0.001$; BD: $F(3,177)=14.16, p<0.001$), catastrophizing (Ps: $F(3,206)=10.17, p<0.001$; BD: $F(3,177)=4.77, p=0.003$) and self-blame (Ps: $F(3,206)=5.12, p=0.002$; BD: $F(3,177)=9.25, p<0.001$) than non-clinical controls.
Rowland et al. 2013B	56 psychosis 33 bipolar 58 non-clinical	Cross-sectional	CERQ	Multivariate analysis of variance revealed people with psychosis were more likely to engage in catastrophizing ($F(2,67)=10.78, p=0.002$) and rumination ($F(2,67)=3.99, p=0.05$) whilst people with bipolar used less positive re-appraisal ($F(2,59)=9.38, p=0.003$) and greater self-blame ($F(2,59)=5.15, p=0.027$) compared to non-clinical controls.
Startup et al. 2007	30 psychosis (with	Cross-sectional	PSWQ	Between group t-tests revealed people with persecutory delusions scored

	persecutory delusions) 30 non-clinical			higher than non-clinical controls on worry ($t(55)=2.79, p<0.001$); subsequent correlations suggested worry was associated with delusion preoccupation ($r=0.46, p<0.05$), intensity of distress ($r=0.42, p<0.05$) and amount of distress ($r=0.48, p<0.01$); and less improvement ($r=-0.52, p<0.01$).
Thomas et al. 2014	40 psychosis	Cross-sectional	RRQ	Correlation suggested rumination was associated with depression ($r=0.57, p<0.001$).
Vorontsova et al. 2013	60 psychosis (with persecutory delusions) 30 depression 30 non-clinical	Cohort	PSWQ	Correlations indicated higher levels of negative schematic beliefs ($r=0.37, p<0.01$), worry ($r=0.34, p=0.01$) and problem solving difficulties ($r=-0.33, p=0.02, r=-0.31, p=0.03$) were positively associated paranoia persistence.
Westerman et al. 2013	60 non-clinical	Cohort	CERQ	Correlations indicated that blaming others ($r=0.02, p<0.05$) and catastrophizing ($r=0.37, p<0.05$) were correlated with paranoia at time 1 but catastrophizing did not predict paranoia at time 2.

AnTI: Anxious Thoughts Inventory (Wells, 1994); CERQ: Cognitive Emotion Regulation Questionnaire (Garnefski & Kraaij, 2007); CIS-R: Clinical Interview Schedule-Revised (Lewis, Pelosi, Araya, & Dunn, 1992); PSWQ: Penn State Worry Questionnaire (Meyer et al., 1990); PTQ: Perseverative Thinking Questionnaire (Ehring et al., 2011); RRQ: Rumination and Reflection Questionnaire (Trapnell & Campbell, 1999); RRS: Ruminative Response Scale (Treynor et al., 2003); RSQ: Response Styles Questionnaire (Nolen-Hoeksema, 1991)

The relationship between perseveration and paranoia appears well replicated in cross-sectional research. Analysis of a sample of paranoid individuals from the Adult Psychiatric Morbidity Survey in England found that paranoia was associated with anxiety, worry, panic and depression (Freeman et al., 2011). In a large student sample, rumination was associated with delusion proneness (Carse & Langdon, 2013). In clinical samples, people with persecutory delusions demonstrate significantly higher levels of anxiety and worry (Bassett, Sperlinger, & Freeman, 2009), and engage in significantly more negative perseverative thinking (Cernis et al., 2016) than non-psychiatric controls. In addition, almost two-thirds of a sample of people with psychosis were found to experience pathological levels of worry (Clemente, Gleeson, & Lim, 2013). Levels of worry were associated with delusion related distress, preoccupation and conviction. However, Cernis et al. (2014) found that when controlling for depersonalisation, the relationship between worry and persecutory delusions was no longer significant. This suggests other comorbid processes may influence the relationship between worry and paranoia.

Longitudinal research suggests that increased worry is associated with the onset and maintenance of paranoid ideation. A cohort study of the incidence, prevalence and course of psychiatric disorders in the Dutch general population indicated that high levels of worry at initial assessment significantly increased the risk of developing new psychotic symptoms over a three-year follow-up (Krabbendam & van Os, 2005). Similarly, the British National Psychiatric Morbidity Survey (Freeman et al., 2012) found that the development and persistence of paranoid thinking over 18 months was predicted by insomnia, worry, anxiety and depression. In both of these studies, the relationship was independent of psychosis-like symptoms at baseline. Conversely, Westerman et al. (2013) found that emotion regulation strategies characterised by a tendency to catastrophize and blame other's predicted cross-sectional sub-clinical paranoia in a general population sample. However, catastrophizing did not predict paranoia prospectively one month later.

In a clinical sample, Startup, Freeman and Garety (2007) found that people with persecutory delusions were more anxious and more likely to catastrophize than a non-clinical control group. Again, higher levels of worry and catastrophizing were associated with higher levels of distress and less improvement over three months. These findings are consistent with the proposal that perseverative processing maintains threat beliefs and impedes emotional regulation.

Comparisons of people with psychosis and people with emotional disorder further support the proposition that negative perseveration is an important process across disorders.

People with persecutory delusions and people with depression both have similar levels of negative schematic beliefs and utilise coping strategies characterised by avoidance and rumination (Vorontsova, Garety, & Freeman, 2013). Furthermore, worry appears to be associated with distress trans-diagnostically in depression, bipolar-depressed, bipolar-manic and psychosis groups (Kertz, Bigda-Peyton, Rosmarin, & Bjoergvinsson, 2012).

Finally, people with persecutory delusions appear comparable to people with GAD in the frequency of their general worry (Freeman & Garety, 1999). The majority of those with persecutory delusions experienced significant meta-worry, defined as worry about worry (Wells, 1994), relating to controlling thoughts relevant to their beliefs, which was strongly associated with delusional distress.

4.5.2.2 Negative perseveration and other experiences of psychosis

Four studies investigated the role of perseveration in hallucinatory experiences and two studies investigated perseveration in negative symptoms and distress. Jones and Fernyhough (2009) found a strong relationship between rumination and hallucination proneness in a non-clinical sample. Path analysis indicated this relationship was mediated by intrusive thoughts. This is consistent with the S-REF model, which argues that intrusive thoughts act as a trigger for unhelpful coping responses (such as rumination) that increase distress. However, in clinical samples, the specific role of worry and rumination

appears inconsistent. Using experience sampling methodology, both worry and rumination were found to be instrumental precursors to hallucinations and delusions (Hartley, Haddock, Vasconcelos e Sa, Emsley, & Barrowclough, 2014). Similarly, Morrison and Wells (2007) found that all types of worry were associated with positive symptoms, whilst meta-worry was associated specifically with negative symptoms and distress. However, Badcock, Paulik, and Maybery (2011) found that higher levels of rumination, but not worry, was associated with distress in people with auditory hallucinations.

In terms of negative symptoms, Halari et al. (2009) found rumination was associated with emotional withdrawal and stereotyped thinking, but not depression. Conversely, Thomas, Ribaux, and Phillips (2014) found that rumination was positively associated with depression in people with psychosis. Finally, Rowland et al. (2013a, 2013b) found that people with psychosis and people with bipolar disorder used more rumination, catastrophizing and self-blame emotion regulation strategies than non-clinical controls.

These differential effects of worry and rumination in relation to particular symptoms may indicate that perseverative processing is relevant regardless of whether this relates to past events (i.e. rumination) or future events (i.e. worry). The evidence is not indicative of any direct relationships with specific symptoms but remains consistent with the assumption that a general processing style is associated with all psychological disorder. Alternatively, these processes may influence emotional factors (such as anxiety and depression) and may have stronger associations with distress than specific symptoms.

4.5.2.3 Meta-analytical group comparisons

To examine the extent to which people with psychosis engage in perseveration relative to people with emotional disorder and non-clinical controls, statistical meta-analysis was used. Analyses compared the effect size of worry in psychosis to the effect size of worry in non-psychiatric controls ($k=5$) and emotional disorder controls ($k=4$) as measured using

the PSWQ. Sensitivity analyses compared the effect size of worry in psychosis to the effect size of worry in non-psychiatric controls ($k=8$) and emotional disorder controls ($k=6$) as measured using the PSWQ, CERQ and AnTI. Figures 5 and 6 display the individual effect size estimates with the variance and 95% confidence intervals for the primary analyses.

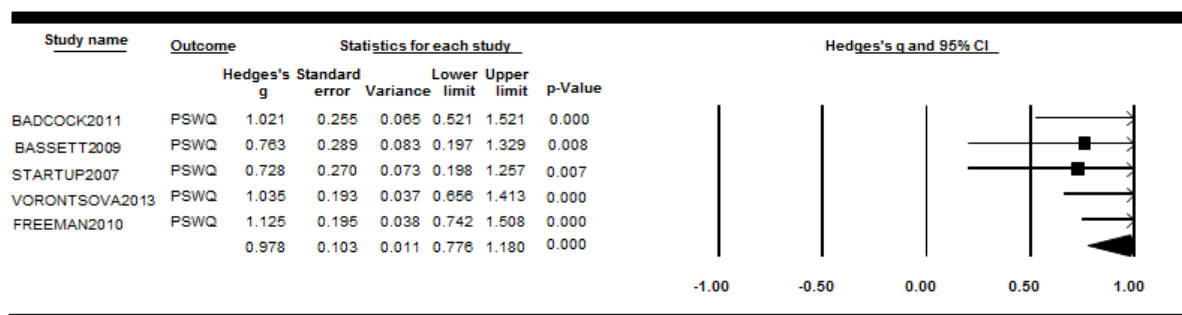


Figure 5. Summary effect sizes for psychosis vs. non-psychiatric control analyses

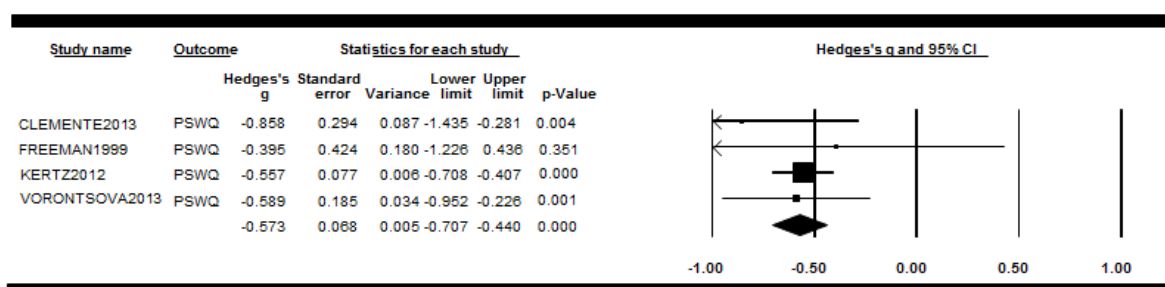


Figure 6. Summary effect sizes for psychosis vs. emotional disorder control analyses

The analyses revealed that scores on the PSWQ are significantly elevated in psychosis compared to non-psychiatric controls: ($g=0.978$, variance=0.011, $CI=0.776:1.180$, $p<0.001$); and significantly lower in psychosis compared to emotional disorder controls ($g=-0.573$, variance=0.005, $CI=-0.707:-0.440$, $p<0.001$). The same pattern was observed in the psychosis vs non-psychiatric control sensitivity analysis. In the psychosis vs emotional disorder control analysis, the effect was in the same direction but reduced and crossed the line of no effect. According to Cohen (1988) effect size criteria, the magnitude of the effect between people with psychosis and non-psychiatric controls is large and the

magnitude of the effect between people with psychosis and people with emotional disorder is medium.

Heterogeneity was tested using the Q statistic. The results suggest that there is no significant heterogeneity in effect size estimates between psychosis and non-psychiatric controls ($Q(4)=2.097, p=0.718$) and psychosis and emotional disorder controls ($Q(3)=1.164, p=.762$). Inconsistency in effect sizes across the studies was quantified using the I^2 statistic. The I^2 statistic provides a percentage of variability in point estimates that is due to “true” heterogeneity rather than sampling error (Higgins & Thompson, 2002). Examination of I^2 indicates the estimates of the true effect size in the primary analyses have no heterogeneity ($I^2<0.001$). However, the I^2 statistic also suffers uncertainty when only a few studies are available and should be interpreted with caution (Liberati et al., 2009).

Publication bias was assessed through inspection of funnel plots asymmetry using both visual and statistical (i.e. Egger’s test) methods. There was no evidence of significant publication bias.

4.5.2.4 Summary of the association between negative perseveration and psychosis

The evidence suggests that cognitive self-regulation characterised by worry and rumination may have an important relationship with the development and maintenance of distressing experiences of psychosis. In particular, worry appears to influence paranoia and persecutory ideation. The quality of this evidence is generally good with data from large longitudinal cohort studies as well as cross-sectional studies using virtual reality. In addition, the relationship appears consistent across the continuum of paranoia.

Perseverative thinking patterns appeared to be consistent across different diagnoses.

Consistent with those relationships observed in self-focused attention, this suggests that metacognitive coping strategies may underlie psychological distress associated with both

emotional disorder and psychosis. However, the specific pathways or mechanisms through which worry interacts with other factors to maintain positive symptoms and/or distress requires further investigation. There is some indication that the number and/or nature of perceptual anomalies may distinguish psychosis groups from emotional disorder groups. This could be an important finding if replicated to understand the development of particular symptoms.

A statistical meta-analysis of the relationship between worry and experiences of psychosis indicated that compared with non-psychiatric controls those with psychosis had significantly elevated worry scores. When compared to people with emotional disorder those with psychosis showed significantly lower scores. Further moderation analyses are required to understand these differences, one possibility is that worry is utilised as a coping response to negative affect (i.e. anxiety and depression) rather than positive symptoms. The effect between psychosis and emotional disorder samples was reduced slightly when additional measures of worry were included in sensitivity analyses. This may be due to the additional heterogeneity introduced by including additional measures.

4.5.3 Are experiences of psychosis associated with counterproductive thought control strategies?

Thought control strategies refer to the strategies people use to reduce unpleasant or unwanted intrusive experiences (Wells, 2009). Within the S-REF model, the use of particular thought control strategies is associated with emotional vulnerability.

Specifically, worry and punishment oriented strategies are considered maladaptive responses whilst social control, reappraisal and distraction are regarded as markers of psychological health (Wells & Davies, 1994). These responses are maladaptive because they can lead to counterproductive rebound effects whereby intrusive thoughts and emotional responses increase rather than reduce (Wells, 2000, p. 43). A summary of eligible studies is provided in table 9.

Table 9

Studies analysing the relationship between thought control strategies and psychosis

Study ID	Sample	Design	Measure	Key findings
Campbell & Morrison 2007	540 non-clinical	Cross-sectional	TCQ	Multiple regression indicated that punishment ($\beta=0.244, p<0.005$) and worry based thought control strategies ($\beta=0.218, p<0.005$) predicted distress.
Garcia-Montes et al. 2004	61 non-clinical	Experimental		Analysis of variance indicated that thought suppression ($F(1,49)=14.716, p<0.001$), self-discrepant thoughts ($F(1,49)=13.829, p<0.001$) and interaction between the two ($F(1,49)=13.161, p<0.001$) increased the quality and vividness of hallucinations.
Garcia-Montes et al. 2006	150 non-clinical	Cross-sectional	TCQ	Multiple regression indicated that worry based thought control ($\beta=0.35, p<0.001$) and lack of cognitive confidence ($\beta=0.24, p<0.001$) predicted hallucination proneness when controlling for state anxiety ($\beta=0.17, p=0.02$).
Jones & Fernyhough 2006	751 non-clinical	Cross-sectional	WBSI	Multiple regression indicated that thought suppression ($\beta=0.26, p<0.001$), high levels of metacognitive beliefs about thought control ($\beta=0.12, p<0.001$), cognitive self-consciousness ($\beta=0.21, p<0.001$) and lack of cognitive confidence ($\beta=0.11, p<0.01$) predicted hallucination proneness.
Jones & Fernyhough 2008	183 non-clinical	Cross-sectional	WBSI	Multiple regression indicated that persecutory delusion-like beliefs were predicted by an interaction between anxiety and thought suppression ($\beta=0.26,$

p<0.01).

Morrison et al. 2000	105 non-clinical	Cross-sectional	TCQ	Analysis of variance revealed people with high hallucination proneness used more punishment ($F=6.63$, $p=0.011$) and reinterpretation ($F=6.43$, $p=0.013$) strategies than people with low hallucination proneness.
Morrison & Wells 2000	22 psychosis 22 non-clinical	Cross-sectional	TCQ	Analysis of variance revealed people with psychosis used more punishment ($F(1,41)=11.40$, $p=0.002$) and worry ($F(1,41)=15.40$, $p=0.001$) based strategies than non-clinical controls.
Newman-Taylor et al. 2009	150 non-clinical	Cross-sectional	TCQ	Correlations indicated paranoia was associated with punishment ($r=0.33$, $p<0.001$), worry ($r=0.24$, $p<0.01$) and re-appraisal strategies ($r=0.24$, $p<0.01$); multiple regression indicated anxiety predicted punishment ($\beta=0.279$, $p<0.01$) and worry ($\beta=0.362$, $p<0.001$) whilst paranoia uniquely predicted re-appraisal ($\beta=0.288$, $p<0.05$).
Rassin & Heiden 2006	50 non-clinical	Experimental		Between group t-tests revealed thought suppression decreased the occurrence of hallucinations at time 1 ($t(48)=1.9$, $p=0.05$) but there were no significant differences at time 2 ($t(48)=1.4$, $p=0.17$); there was an increase in hallucinations from time 1 to time 2 for the suppression group ($t(24)=2.8$, $p=0.01$) but not the control group ($t(24)=1.4$, $p=0.17$).

TCQ: Thought Control Questionnaire (Wells & Davies, 1994); WBSI: White Bear Suppression Inventory (Muris et al., 1996)

In non-clinical samples, people with higher proneness to hallucinatory experiences have demonstrated a greater use of punishment, reinterpretation strategies and worry strategies (Garcia-Montes, Cangas, Perez-Alvarez, Fidalgo, & Gutierrez, 2006; Morrison et al., 2000) in response to intrusive or distressing thoughts compared to people less prone. In addition, avoidant safety behaviours and punishment strategies have been linked to the frequency of hallucinatory phenomena, delusional ideation and distress (Campbell & Morrison, 2007). When controlling for the frequency of phenomena, these responses had reduced associations with distress, however, they remained significant. Similarly, people with schizophrenia appear to use more punishment and worry based strategies, and fewer distraction strategies, than non-clinical controls (Morrison & Wells, 2000). Consistent with the S-REF model, these studies indicate that particular strategies may be associated with vulnerability to intrusive thoughts and distress. In particular, themes of worry and punishment appear relevant. However, these studies are also confounded by the uncertainty as to whether these strategies are a cause or effect of intrusive experiences, and whether the relationship is dependent on emotional factors.

Consistent with this, Newman-Taylor, Graves, and Stopa (2009) found the relationship between thought control strategies and predisposition to experiences of psychosis is not direct. Anxiety independently predicted both worry and punishment strategies, whilst paranoia was associated only with reappraisal strategies. Similar patterns have been observed in relation to thought suppression. Two cross-sectional studies found that thought suppression is associated with increased proneness to auditory hallucinations (Jones & Fernyhough, 2006) and persecutory delusion-like beliefs (Jones & Fernyhough, 2008) in students. However, when controlling for anxiety and negative affect thought suppression was not a significant predictor of paranoid thinking but appeared to interact with emotion. That is, when anxiety was high, thought suppression had a significant effect on persecutory ideation. This indicates that thought control strategies may be utilised as a

coping strategy in response to negative affect, rather than act as a causal factor for intrusive thoughts or anomalies.

In terms of counterproductive rebound effects, an experimental study found that instructions to suppress intrusive thoughts increased the vividness of hallucinations during a verbal summator task compared to instructions to focalize on them (Garcia-Montes, Perez-Alvarez, & Fidalgo, 2003). Conversely, Rassin and Heiden (2006) found participants allocated to a thought suppression condition during a white-noise task did not experience a higher frequency of intrusions. However, the instruction to suppress was not effective in reducing detection of the target.

4.5.3.1 Summary of the association between thought control strategies and psychosis

The evidence suggests those thought control strategies deemed to be particularly unhelpful in emotion regulation might be used in response to intrusive experiences associated with psychosis. However, this pattern is less consistent when negative affect and emotional distress is controlled. This is not indicative of a causal relationship between thought control strategies and symptoms of psychosis but remains consistent with the assumption that a common set of unhelpful responses are associated with psychological disorder and general emotional distress.

Given this is a small number of studies and only one utilised a clinical sample, the findings should be interpreted with caution. The predominant use of student samples limits the generalizability of the findings to experiences that meet clinical threshold and may cause greater distress and impact on functioning. In addition, the direction of relationships and interactions with emotional factors requires further scrutiny. It is unlikely but unclear whether these strategies have a causal role in psychological anomalies, or whether they are a response to increased intrusions or distress. It may also be useful to examine the

relationship between negative symptoms and thought control strategies to establish effects on thought processes and emotion.

4.6 Discussion

This review aimed to provide an exploratory investigation of unhelpful coping strategies in experiences of psychosis. Specifically, those strategies grounded in the S-REF model and their relationships with symptoms and distress were examined. Based on three assumptions of the model (Wells, 2000, p. 34) evidence relating to the role of self-focused processing, negative perseveration and thought control was systematically reviewed.

4.6.1 Summary of findings

The majority of research discussed in this review demonstrates a relationship between metacognitive coping strategies and experiences of psychosis. This suggests that the Cognitive Attentional Syndrome (CAS) postulated by the S-REF model may extend to understanding the maintenance of symptoms and distress in psychosis. However, two important issues for future consideration were identified. First, it is unclear to what extent these relationships are influenced by emotion. That is, whether there are any direct relationships between the CAS and experiences of psychosis that are independent of negative affect (such as anxiety). Second, the direction of relationships or potential pathways through comorbid factors (such as negative affect) and other processes (such as dissociation) requires further investigation.

Prior to further discussion, it should be noted that half of the studies included in this review utilised non-clinical samples. Assuming a continuum approach to psychosis (e.g. Johns & Van Os, 2001), studying lower level anomalies may enhance our understanding of more severe and distressing phenomena. However, it is possible that phenomena in the non-clinical population may be unrelated or qualitatively different to clinical experiences (Stanghellini et al., 2012), and may arise from understandable or everyday errors in

reasoning (Freeman, 2006). It is, therefore, reasonable to consider clinical findings with greater weighting.

The clinical studies reviewed had methodological weaknesses owing to their predominant cross-sectional designs. There were also some inconsistencies in the findings, such as those relationships observed between self-focused attention and hallucination status. However, this is possibly due to the variable nature of self-focused attention. It is likely that self-focus is not a stable trait but may fluctuate causing it to be periodically heightened; this variation in activation of attentional bias may not be adequately captured by cross-sectional studies.

There was evidence some attentional biases may be more predisposing to some experiences of psychosis. In particular, public self-consciousness tended to share relationships with paranoia and delusions, whilst private self-consciousness and cognitive self-consciousness appeared to predict hallucinations. However, there was less consistency in associations between particular types of perseveration and particular experiences (e.g. hallucinations). This suggests that a perseverative processing style may lead to a general proneness to increased intrusions and distress, rather than to specific symptoms. The results of the statistical meta-analysis appear commensurate with this. People with psychosis used more worry than non-psychiatric controls but less than emotional disorder controls. Therefore, worry may be more closely related to negative affective states than psychotic symptoms. Clinical research was notably lacking in the area of thought control strategies. However, strategies utilised by people with psychosis appeared consistent with strategies hypothesised to be particularly unhelpful and associated with negative emotions (Wells & Davies, 1994).

A small number of studies found that people with psychosis were generally distinguished from other groups (i.e. non-clinical and emotional disorder) by the nature or number of internal anomalies. According to the S-REF model, internal anomalies and intrusions that

are appraised as threatening initiate the CAS. Thus, we may expect to see more triggers of this kind in people with more severe psychological disorders, such as psychosis, but observe a similar response style irrespective of diagnosis.

The model predictions concerning the effects of worry and rumination were well addressed in the literature. However, there was limited evidence to address specific predictions in relation to self-focused processing; in particular, effects on cognitive efficiency. There was also limited evidence to address specific predictions in relation to thought control strategies, such as influence on intrusion frequency and distress. Overall, the findings support the investigation of common contributory and maintaining factors between emotional disorder and psychosis. This lends support to the assertion that the distinction between psychosis and neurosis may not be helpful (Freeman et al., 2008).

4.6.2 The potential influence of emotion

On balance, the relationship between CAS coping strategies and experiences of psychosis appears to be influenced by emotion. However, this does not undermine the importance of considering metacognitive factors in psychosis. Negative affect and emotional states are an important aspect of clinical psychosis, in particular in the prodromal phase (Yung & McGorry, 1996), and in the content of positive symptoms (Freeman & Garety, 2003). As such, consideration of the factors that drive and increase emotion may be useful therapeutically. Metacognitive therapy techniques developed for re-establishing control over the CAS in emotional disorders may be usefully applied to managing distress in psychosis. Recent clinical trials of worry based interventions indicate strategies aimed at disrupting perseveration may reduce persecutory ideation and distress, as well as overall worry (Foster, Startup, Potts, & Freeman, 2010; Freeman et al., 2015; Hepworth, Startup, & Freeman, 2011). In addition, two case studies and a randomised pilot trial of the Attention Training technique found promising results relating to increasing the perceived controllability of experiences and reducing distress in people with psychosis (Levaux et al.,

2011; Parker et al., 2016; Valmaggia et al., 2007). The technique aims to disrupt and modify attentional biases associated with the maintenance of self-focused attention (Wells, 1990). Finally, one trial of pure metacognitive therapy for psychosis (Morrison et al., 2014) demonstrated the therapy was an acceptable treatment with good adherence and no adverse events. At nine-month follow-up, there was a clinically significant reduction in positive symptoms which was maintained at twelve months.

4.6.3 Issues of causality and inter-dependency

It is apparent that the relationship between the CAS and psychosis is complex, multifactorial and difficult to delineate at the present time. Our interpretations are embedded in S-REF theory but alternative explanations are possible. For example, it is unclear whether increases in unhelpful metacognitive coping strategies cause a predisposition to experiences of psychosis, or whether intrusions associated with psychosis induce attentional biases, perseverative processing and attempts to control thoughts. Second, the extent to which these general processes interact with other psychosis specific variables, such as source monitoring, dissociative experiences and intrusive thoughts is an interesting area of enquiry. It remains unclear the extent to which these variables influence or interact with metacognition and to what extent. These relationships may be bi-directional and exert an exacerbating effect on each other.

4.6.4 Future directions

Future research should aim to unravel the pathways through which these three metacognitive variables interact with other psychosis specific factors and comorbidities to increase symptoms and distress. For example, longitudinal designs allowing for mediation analyses or larger clinical studies allowing for more complex modelling may provide greater clarification of these relationships. Future research is also required to provide a more detailed investigation of the specific predictions of the model. In particular, in relation to self-focused processing (e.g. effects on cognitive efficiency) and thought control

strategies (e.g. frequency of intrusive thoughts and intensity of distress). Finally, effects of CAS coping strategies in relation to negative symptoms of psychosis is also an important area of future enquiry given these variables are proposed to influence cognitive and emotional processing.

4.6.5 Limitations

There was a high level of heterogeneity in the studies utilised in this review, therefore generalisation of the findings is difficult. The studies utilised various measures, samples and research designs. As such, the review employed a mixed methods approach; hence, not all conclusions are supported by appropriate statistical analysis. Second, the predominance of cross-sectional research prevents the possibility of establishing any causal association between the variables considered and has a confounding effect on the overall quality of the review. Third, confounds relating to comorbidity cannot be ruled out. For example, a number of studies failed to control for the possible confounding effect of comorbid emotional disorder and other psychosis symptoms. Therefore, these studies do not allow for specific analyses of direct and indirect pathways between the CAS and experiences of psychosis.

4.6.6 Conclusions

These findings provide preliminary evidence that a central tenet of the S-REF model proposing a core cognitive-attentional syndrome in psychological disorder may be extended to understanding experiences of psychosis and associated distress. However, further research is needed to understand the precise nature of this relationship. This research should focus on understanding whether CAS coping strategies are causally related to the formation of psychotic symptoms or whether this association is with symptom maintenance and distress. Such findings could have important implications for theory and the development and evaluation of metacognitive approaches to the treatment of psychosis.

5 Chapter 5: The role of unhelpful metacognitive beliefs in psychosis: relationships with positive symptoms and negative affect.

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The role of unhelpful metacognitive beliefs in psychosis: relationships with positive symptoms and negative affect.

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5.1 Abstract

The Self-Regulatory Executive Function (S-REF) model assumes that a common set of unhelpful metacognitive beliefs have a central role in predisposition to psychological disorder and the maintenance of symptoms and distress. This research aims to test whether the five unhelpful metacognitive beliefs implicated in the model are associated with positive symptoms of psychosis and whether they are a better predictor of negative affect than topological characteristics of positive symptoms. A sample of people with psychosis completed a semi-structured interview about psychotic symptoms and self-report measures of metacognitive beliefs (MCQ-30), anxiety and depression. Hierarchical multiple regression analyses suggested that unhelpful metacognitive beliefs predict negative affect in people with psychosis over and above symptom frequency and other topological characteristics of symptoms captured by the Psychotic Symptoms Rating Scale (PSYRATS). The findings support the application of the metacognitive model to emotional distress in people with psychosis.

Keywords: Metacognition, Schizophrenia, Negative affect

5.2 Introduction

The Self-Regulatory Executive Function (S-REF) model (Wells & Matthews, 1994, 1996) is an information processing approach to psychological disorder that emphasises the role of unhelpful metacognitive beliefs and self-regulation strategies. The model assumes that a core Cognitive Attentional Syndrome (CAS) is associated with the maintenance of unhelpful thinking styles that maintain symptoms and distress. The CAS is underpinned by the presence of unhelpful metacognitive beliefs that can be positive and negative in content, and often co-occur. Positive metacognitive beliefs reflect an individual's beliefs regarding the usefulness of some cognitive enterprises (e.g. "worrying about danger will mean I'm always prepared"), whilst negative metacognitive beliefs reflect an individual's beliefs about the danger or uncontrollability of thoughts (e.g. "my thoughts will cause harm"). A core assumption of the model is that unhelpful metacognitive beliefs lead to conflicts in self-regulation, and negative metacognitive beliefs are considered particularly important in distress (Wells, 2009, p. 17). The model is distinct from other research within the psychosis literature that also uses the term "metacognition", such as Lysaker's work on theory of mind deficits and social cognition (Lysaker et al., 2010); and Moritz' series of studies investigating metacognitive training focusing on awareness and modification of cognitive biases associated with attributional style and reasoning (Moritz et al., 2010).

The role of metacognitive beliefs in psychosis has received considerable attention. However, the specific nature of this relationship is currently unclear. Initial accounts suggested that metacognitive beliefs might have a causal role in positive symptoms, such as auditory hallucinations. Morrison et al. (1995) suggested that the misattribution of internal thoughts as external voices is influenced by the beliefs that an individual holds about the importance of thought control, thought consistency and the danger of certain thoughts. Consistent with this, a number of studies found people with experiences of psychosis report higher levels of unhelpful metacognitive beliefs. For example, research

using non-clinical samples found that people with higher proneness to hallucinations and delusions tend to report more positive and negative metacognitive beliefs (Laroi & Van der Linden, 2005; Morrison et al., 2000). Research using people at risk of developing psychosis found that at-risk mental state (Morrison et al., 2006) and subsequent transition (Barbato et al., 2013; Morrison, Bentall, et al., 2002) is associated with a greater endorsement of negative metacognitive beliefs.

A recent meta-analysis, however, found limited support for a causal role of metacognitive beliefs in hallucinatory experiences. The authors found that when controlling for comorbid symptoms, such as delusional beliefs and emotional distress, associations between metacognitive beliefs and hallucinations were reduced (Varese & Bentall, 2011). This suggests that metacognitive beliefs may instead have a more general role related to symptom maintenance, help seeking, and distress. Consistent with this, subsequent studies have shown that elevated metacognitive beliefs are associated with increased distress (Barbato et al., 2013; Brett et al., 2009; Hill et al., 2012; van Oosterhout et al., 2013) and a more severe and chronic course of illness (Austin et al., 2015).

Co-morbid symptoms of anxiety and depression are common throughout the course of illness in people with psychosis (Buckley, Miller, Lehrer, & Castle, 2009). Negative affect and emotional state appear to have an important role in the psychosis prodrome (e.g. Debbane et al., 2009; Yung & McGorry, 1996) and are thought to influence the content of positive symptoms (Freeman & Garety, 2003). According to the S-REF model, metacognitive beliefs are associated with enduring psychological distress (i.e. anxiety and depression) because they guide unhelpful coping strategies such as worry, rumination and threat monitoring (i.e. the CAS). These strategies are counterproductive because they increase detection of threat and prolong negative emotional states. If metacognitive beliefs have a role related to distress in psychosis, it would be expected that higher levels of unhelpful metacognitive beliefs would predict higher levels of negative affect in people

with the diagnosis. In addition, it might be expected that this relationship would be independent of the frequency or characteristics of positive symptoms alone.

In order to investigate these predictions, this research will test whether metacognitive beliefs predict negative affect over and above topological characteristics of positive symptoms (e.g. symptom frequency) in people with psychosis. The following research questions will be addressed: 1) Are unhelpful metacognitive beliefs associated with positive symptoms of psychosis? 2) Are unhelpful metacognitive beliefs associated with negative affect? 3) Do metacognitive beliefs predict negative affect over and above symptom frequency, and other dimensions of psychotic symptoms captured by the Psychotic Symptoms Rating Scale (Haddock et al., 1999).

5.3 Method

5.3.1 Participants

A total of 159 people took part in this study. The mean age was 35.7 years (SD= 12.2; range= 17-47) and the male: female ratio was 92:67. All participants had either a diagnosis of psychotic disorder according to the Diagnostic Statistical Manual of Mental Disorders fourth edition (American Psychiatric Association, 2000) or met threshold for early intervention in psychosis using the Positive and Negative Syndrome Scale (Kay et al., 1987) defined as a score of four on hallucinations or delusional beliefs or a score of five on paranoid ideation. Fifty-five percent of the sample (n= 88) had current hallucinations; 75% (n= 119) had current delusional beliefs; and 48% (n=76) had both.

Eighty-four participants were recruited from Greater Manchester West NHS Trust and surrounding areas (male: female ratio= 46:38; mean age= 32.6 years). Seventy-four participants took part in a trial of cognitive behaviour therapy for people with psychosis not currently taking anti-psychotic medication, and ten participants took part in an open trial of metacognitive therapy for psychosis and were taking antipsychotic medication. All participants were recruited through contact with mental health professionals (e.g. care

coordinators and psychiatrists) within inpatient services, community mental health teams and early intervention services. The diagnoses of the sample included schizophrenia (n=76), persistent delusional disorder (n=3), psychosis not otherwise specified (n=1), schizoaffective disorder (n=2) and paranoid schizophrenia (n=2). Seventy-five participants were recruited from an inpatient and outpatient clinic in Warsaw (male: female ratio= 46:29; mean age= 38.8 years). All participants had a diagnosis of schizophrenia and were taking antipsychotic medication.

5.3.2 Procedure

Symptoms of psychosis were assessed using the Psychotic Symptoms Rating Scale (Haddock et al., 1999) administered by a trained mental health professional. Participants then completed validated self-report measures of metacognitive beliefs, anxiety and depression.

5.3.3 Measures

5.3.3.1 The Psychotic Symptoms Rating Scale (Haddock et al., 1999): The PSYRATS is a clinician-administered semi-structured interview consisting of 11 items assessing auditory hallucinations (PSYRATS-AH), and six items assessing delusional beliefs (PSYRATS-D). All items are scored from 0 to 4, with higher scores reflecting more severe phenomena. The auditory hallucinations scale yields four sub-scales (frequency, loudness, attribution and distress); the delusions scale yields two sub-scales (frequency and distress) (Woodward et al., 2014). The PSYRATS has previously demonstrated excellent inter-rater reliability (Haddock et al., 1999). The Warsaw sample was assessed using the Polish version of the PSYRATS (Gaweda, 2012).

5.3.3.2 The Metacognitions Questionnaire-30 (Wells & Cartwright-Hatton, 2004): The MCQ-30 is a self-report measure of metacognitive beliefs. The measure yields five subscales consisting of “positive beliefs about worry” reflecting the belief that worry can help to solve problems; “negative beliefs including the uncontrollability and danger of

thoughts” reflecting the belief that thoughts must be controlled in order to function well; “cognitive confidence” capturing the extent to which an individual lacks confidence in their memory and attentional capabilities; “negative beliefs relating to the need to control thoughts” reflecting themes that certain thoughts can cause negative outcomes, and feelings of responsibility for preventing these outcomes; and “cognitive self-consciousness” reflecting the extent to which an individual engages in monitoring their own thought processes. Higher scores on each subscale indicate a greater endorsement of unhelpful beliefs. The Warsaw sample was assessed using the Polish version (Dragan & Dragan, 2011). Reliability of the sub-scales was measured using Cronbach’s alpha (positive beliefs $\alpha=0.884$; negative beliefs relating to uncontrollability and danger $\alpha=0.821$; cognitive confidence $\alpha=0.838$; negative beliefs relating to the need to control thoughts $\alpha=0.753$; cognitive self-consciousness $\alpha=0.761$).

5.3.3.3 Negative affect: Negative affect was operationalised using standardised measures of anxiety and depression. Participants from Manchester completed the Social Interaction Anxiety Scale (Mattick & Clarke, 1998) and the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). Participants from Warsaw completed the State-Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) and the Beck Depression Inventory. Reliability of the sub-scales was measured using Cronbach’s alpha (SIAS $\alpha=0.894$; STAI $\alpha=0.913$; BDI $\alpha=0.829$).

The PSYRATS distress subscales were not used in the main analyses because these subscales measure distress specific to a particular symptom (i.e. hallucination related distress and delusion related distress) and the absence of a symptom confers a default score of zero across all subsequent items. The PSYRATS distress items (e.g. “amount of distress”, “amount of negative content” and “degree of negative content”) may also lack specificity in terms of our research questions as they do not only capture negative affect and are confounded with content.

5.3.4 *Data analysis*

Data were analysed using the Statistical Package for Social Sciences (SPSS) version 22. Before carrying out our primary analyses the data were comprehensively screened for missing values, outliers and normality. We then tested for possible cultural confounds by comparing bivariate correlations between the Manchester and Warsaw participants using a calculation for the test of the difference between two independent correlation coefficients (Preacher, 2002).

The first research question (Are unhelpful metacognitive beliefs associated with positive symptoms of psychosis?) was tested using correlation analyses. Bivariate correlations were run using participant scores on the five MCQ-30 sub-scales and participant scores on the PSYRATS-AH frequency, attribution and loudness sub-scales and the PSYRATS-D frequency sub-scale.

The second research question (Are unhelpful metacognitive beliefs associated with negative affect?) was also tested using correlational analyses. Analyses utilised participant scores on the five MCQ-30 sub-scales and participant scores on anxiety and depression. Participant scores on measures of anxiety were standardised by converting them to z-scores.

The final research question (Do metacognitive beliefs predict negative affect over and above other dimensions of psychosis?) was tested utilising multiple regression analyses. Two hierarchical multiple regressions were conducted first with anxiety scores as the dependent variable and then with depression scores as the dependent variable. Topological characteristics of positive symptoms (delusion frequency, hallucination frequency, hallucination attribution and hallucination loudness) were entered as one block at step one. The metacognitive beliefs that had significant correlations with the dependent variables were then added at step two to test the contribution of different meta-cognitive beliefs to negative affect once topological characteristics are controlled. Stepwise entry was selected

as the method of entry for metacognitive beliefs because there were no a priori hypotheses about the relative contribution of metacognitive beliefs to negative affect within this sample.

5.4 Results

5.4.1 Data screening

First, data were screened for missing values. Five participants had not completed the MCQ-30 and were excluded from analyses. There were 26 individual item scores missing across the remaining dataset (<1%) and missing values analysis confirmed there were no patterns to the missing data. Expectation maximisation was utilised to estimate and replace these values. Second, data were screened for outliers. Visual inspection of box-plots indicated no evidence of univariate outliers. Data were subsequently screened for normality. The metacognitive variable positive beliefs about worry showed evidence of positive skew. This was corrected using logarithm transformation. Visual inspection of histograms suggested floor effects on the PSYRATS hallucination sub-scales; statistical tests confirmed negative skew. Due to the nature of the scoring system for the PSYRATS, these scores were not transformed. The absence of a symptom confers a default score of zero on all subsequent items in the PSYRATS so skewness might be expected. For this reason, analyses using PSYRATS sub-scales were conducted using Spearman's correlations. Normally distributed variables were tested using Pearson's correlations.

5.4.2 Sample characteristics, demographic data and tests for cultural confounds

A summary of sample characteristics is provided in table 10.

Table 10

Descriptive statistics for PSYRATS and MCQ sub-scales

Demographics	<i>M</i>	<i>SD</i>
Age (years)	35.7	12.2
Gender (M:F)	90:64	-
Education (years)	12.5	2.5
Baseline characteristics		
PSYRATS-AH	15.7	15.0
PSYRATS-D	11.7	7.9
PBW	11.1	4.9
NBUD	15.8	5.0
CC	13.8	4.9
NTC	14.7	4.6
CSC	15.3	4.5

PBW: Positive Beliefs about Worry, NBUD: Negative Beliefs relating to Uncontrollability and Danger; CC: Cognitive Confidence; NTC: Negative Beliefs relating the Need to Control Thoughts; CSC: Cognitive Self-Consciousness.

To test for potential cultural confounds in our sample, bivariate correlations between participant scores on the five MCQ sub-scales and the PSYRATS subscales were compared between the Manchester participants and Warsaw participants. Fisher's *r*-to-*z* transformation was utilised to convert each correlation coefficient to a *z*-score. The *z*-scores were then compared taking into account the sample size (Cohen & Cohen, 1983, p. 54).

The results revealed there were no significant differences in the observed relationships between metacognitive beliefs and psychosis symptoms between the two groups. The Manchester and Warsaw samples were therefore combined for subsequent analyses.

5.4.3 Are unhelpful metacognitive beliefs associated with positive symptoms of psychosis?

Spearman's correlations were conducted using participant scores on the five MCQ-30 subscales and four PSYRATS topological characteristics (hallucination frequency, attribution and loudness and delusion frequency). The results indicate that topological characteristics of positive symptoms are associated with unhelpful metacognitive beliefs (see table 11 for a summary). Bonferonni adjustments were applied to correct for multiple comparisons. The relationship between delusion frequency and negative beliefs relating to uncontrollability and danger ($p=0.01$) and negative beliefs relating to the need to control thoughts ($p=0.01$) remained significant. The relationship between hallucination frequency and negative beliefs relating to the need to control thoughts ($p=0.06$) approached significance.

Table 11

Summary of non-adjusted correlations between MCQ-30 sub-scales and PSYRATS topological sub-scales

	PBW	NBUD	CC	NTC	CSC	AH Frequency	AH Attribution	AH Loudness	D Frequency
PBW	-	0.188*	0.173*	0.341**	0.335**	0.086	0.079	0.090	0.178*
NBUD	-	-	0.418**	0.619**	0.402**	0.152	0.089	0.157	0.349**
CC	-	-	-	0.446**	0.123	0.187*	0.160*	0.177*	0.231**
NTC	-	-	-	-	0.381**	0.241**	0.191*	0.214**	0.341**
CSC	-	-	-	-	-	0.031	0.014	0.022	0.242**
AH Frequency	-	-	-	-	-	-	0.831**	0.826**	0.256**
AH Attribution	-	-	-	-	-	-	-	0.827**	0.186*
AH Loudness	-	-	-	-	-	-	-	-	0.105
D Frequency	-	-	-	-	-	-	-	-	-

*correlation is significant at the 0.05 level; **correlation is significant at the 0.01 level; Bonferonni adjusted p-values are available in text.

PBW: Positive Beliefs about Worry, NBUD: Negative Beliefs relating to Uncontrollability and Danger; CC: Cognitive Confidence; NTC: Negative Beliefs relating the Need to Control Thoughts; CSC: Cognitive Self-Consciousness.

5.4.4 Are unhelpful metacognitive beliefs associated with negative affect?

Pearson's correlations were conducted using participant scores on the five MCQ-30 sub-scales and standardised scores of anxiety and depression. The results indicate that metacognitive beliefs were positively associated with negative affect (i.e. anxiety and depression).

Table 12

Summary of correlations between MCQ-30 sub-scales and negative affect

	PBW	NBUD	CC	NTC	CSC	Anxiety	Depression
PBW	-	0.219**	0.167*	0.382**	0.389**	0.301**	0.247**
NBUD	-	-	0.417**	0.637**	0.429**	0.528**	0.657**
CC	-	-	-	0.446**	0.131	0.377**	0.377**
NTC	-	-	-	-	0.398**	0.493**	0.535**
CSC	-	-	-	-	-	0.082	0.306**
AH Distress	-	-	-	-	-	0.136	0.221**
D Distress	-	-	-	-	-	0.217**	0.451**
Anxiety	-	-	-	-	-	-	0.569**
Depression	-	-	-	-	-	-	-

*correlation is significant at the 0.05 level; **correlation is significant at the 0.01 level; Bonferonni adjusted p-values are available in text.

PBW: Positive Beliefs about Worry, NBUD: Negative Beliefs relating to Uncontrollability and Danger; CC: Cognitive Confidence; NTC: Negative Beliefs relating the Need to Control Thoughts; CSC: Cognitive Self-Consciousness.

With the application of a Bonferonni adjustment, the majority of relationships between metacognitive beliefs and anxiety and depression remained significant: positive beliefs

about worry (anxiety $p=0.01$; depression $p=0.02$); negative beliefs relating to uncontrollability and danger (anxiety $p=0.01$; depression $p=0.01$); cognitive confidence (anxiety $p=0.01$; depression $p=0.01$); negative beliefs relating to need to control thoughts (anxiety $p=0.01$; depression $p=0.01$); and cognitive self-consciousness (depression $p=0.01$).

5.4.5 *Do metacognitive beliefs predict negative affect over and above topological dimensions of hallucinations and delusions?*

Two hierarchical multiple regression analyses were carried out to test the relationship between psychotic symptoms, metacognitive beliefs and negative affect. In the first analysis, anxiety was entered as the dependent variable and in the second analysis depression was the dependent variable. At step one PSYRATS topological characteristics (i.e. delusion frequency, hallucination frequency, hallucination attribution and hallucination loudness) were entered as one block. At step two, those MCQ-30 sub-scales that had significant correlations with the dependent variable in our initial correlation analyses were entered using stepwise entry. The results were verified using forward entry.

5.4.5.1 *PSYRATS topological characteristics, metacognitive beliefs and anxiety*

At step one the model was not significant ($F[4,146]= 1.87$, $MSE= 0.969$, $p= 0.120$). Topological characteristics accounted for just 5% of the variance in anxiety scores ($r^2= 0.049$, adjusted $r^2= 0.023$). On step two the inclusion of negative beliefs about uncontrollability and danger explained a significant additional 23% of the variance (r^2 change= 0.233, F change $[1,145]= 47.16$, $p<0.001$). On step three (with the inclusion of negative beliefs concerning need for control) there was a significant increase of 4% in the variance explained (r^2 change= 0.04, F change $[1,144]= 7.99$, $p= 0.005$). On the fourth step, the inclusion of positive beliefs about worry accounted for a significant increase of 2% (r^2 change= 0.018, F change $[1,143]= 3.98$, $p= 0.048$). Cognitive confidence did not

contribute to the final model. The results revealed that metacognitive beliefs predict anxiety over and above topological characteristics of positive symptoms². Table 13 provides a summary of the contribution of each significant predictor variable.

Table 13

Stepwise multiple regression with anxiety as the dependent variable and topological characteristics of positive symptoms entered at step one followed by metacognitive beliefs at step two

	R^2	ΔR^2	t	β	p
Step 1	0.049	0.023			
AH Frequency			0.549	0.084	0.584
AH Attribution			-0.505	-0.074	0.614
AH Loudness			0.537	0.070	0.592
D Frequency			2.227	0.188	0.027
Step 2	0.282	0.257			
AH Frequency			0.444	0.059	0.658
AH Attribution			0.203	0.026	0.839
AH Loudness			-0.508	-0.059	0.612
D Frequency			0.080	0.006	0.938
NBUD			6.867	0.524	<0.001
Step 3	0.320	0.292			
AH Frequency			0.178	0.023	0.859
AH Attribution			0.181	0.023	0.857

² The model was replicated using forwards entry of metacognitive variables

AH Loudness	.	-0.421	-0.047	0.674
D Frequency		-0.263	-0.020	0.793
NBUD		3.995	0.369	<0.001
NTC		2.827	0.261	0.005
Step 4	0.338	0.306		
AH Frequency		0.293	0.038	0.770
AH Attribution		0.195	0.024	0.846
AH Loudness		-0.543	-0.061	0.588
D Frequency		-0.404	-0.031	0.687
NBUD		4.117	0.377	<0.001
NTC		2.120	0.203	0.036
PBW		1.996	0.147	0.048

NBUD= Negative beliefs relating to Uncontrollability and Danger; NTC= Negative beliefs relating to Need for Control; PBW= Positive Beliefs about Worry

5.4.5.2 PSYRATS topological characteristics, metacognitive beliefs and depression

At step one the model was significant ($F[4,147]= 8.92$, $MSE= 0.830$, $p<0.001$).

Topological characteristics accounted for 20% of the variance in depression scores ($r^2= 0.195$, adjusted $r^2= 0.173$). On step two the inclusion of negative beliefs relating to uncontrollability and danger explained a significant additional 29% of the variance (r^2 change= 0.287, F change [1,146]= 80.87, $p<0.001$). On the final step (with the inclusion of negative beliefs relating to the need to control thoughts), the model ($F[6,145]= 23.93$, $MSE= 0.526$, $p<0.001$) accounted for 50% of the variance in depression scores ($r^2= 0.498$, adjusted $r^2= 0.477$), this step was also a significant increase (r^2 change= 0.015, F change [1,145]= 4.43, $p= 0.037$). Positive beliefs about worry, cognitive self-consciousness and cognitive confidence did not contribute to the final model. The results

revealed that metacognitive beliefs predict depression over and above topological characteristics of positive symptoms³. Table 14 provides a summary of the contribution of each significant predictor variable.

Table 14

Stepwise multiple regression with depression as the dependent variable and topological characteristics of positive symptoms entered at step one followed by metacognitive beliefs at step two

	R^2	ΔR^2	t	β	P
Step 1	0.195	0.173			
AH Frequency			-0.700	-0.100	0.485
AH Attribution			0.359	-0.049	0.720
AH Loudness			1.240	0.149	0.217
D Frequency			5.574	0.429	<0.001
Step 2	0.482	0.464			
AH Frequency			-0.991	-0.114	0.323
AH Attribution			1.264	0.139	0.208
AH Loudness			0.074	0.007	0.941
D Frequency			3.412	0.225	0.001
NBUD			8.993	0.581	<0.001
Step 3	0.498	0.477			
AH Frequency			-1.201	-0.137	0.232
AH Attribution			1.245	0.135	0.215

³ The model was replicated using forwards entry of metacognitive variables

AH Loudness	0.50	0.015	0.881
D Frequency	3.198	0.210	0.002
NBUD	6.179	0.485	<0.001
NTC	2.105	0.164	0.037

NBUD= Negative beliefs relating to Uncontrollability and Danger; NTC= Negative beliefs relating to Need for Control

5.5 Discussion

The first aim of this research was to test whether unhelpful metacognitive beliefs are associated with positive symptoms and negative affect in people with psychosis. The second aim was to test whether the relationship between unhelpful metacognitive beliefs and negative affect is substantive in this group by partialling out covariances with topological characteristics of positive symptoms (e.g. symptom frequency assessed using the Psychotic Symptoms Rating Scale).

The findings indicated that metacognitive beliefs had small positive relationships with topological features of delusions and hallucinations. Topological features had small to moderate positive relationships with psychological distress (i.e. anxiety and depression) whilst metacognitive beliefs had moderate to large positive relationships with these variables. Metacognitive beliefs were independent cross-sectional predictors of negative affect when topological features of symptoms (e.g. frequency, attribution and loudness) were controlled. It is noteworthy that the features of symptoms themselves did not explain unique variance in anxiety in the final equation when metacognitive beliefs were included. Delusion frequency, but not topological features of hallucinations, contributed to depression in the final equation when metacognitive beliefs were included. Of the metacognitive subscales that predicted negative affect, negative beliefs about the uncontrollability and danger of thoughts and the need to control thoughts emerged as a

consistent predictor in all analyses and remained significant when controlling for topological characteristics of hallucinations and delusions.

The findings also indicated that there were no significant differences in the relationships observed between metacognitive beliefs and positive symptoms of psychosis between the two groups that constitute our sample (i.e. those recruited from Manchester and those recruited from Warsaw). This is an interesting finding because it suggests that these relationships may be cross-cultural. Furthermore, the majority of participants recruited from Manchester were not taking antipsychotic medication. This suggests the relationships between metacognitive beliefs, distress and positive symptoms may not be affected by the use of anti-psychotic medications.

5.5.1 Clinical and theoretical implications

The results suggest that metacognitive beliefs are unique and independent predictors of anxiety and depression in people with psychosis. These relationships persist when features of positive symptoms are controlled. The implication of this finding is that metacognition may be a more important determinant of negative affect than the characteristics of positive symptoms. This is consistent with the S-REF model (Wells & Matthews, 1996) which questions whether the occurrence of negative mental experiences, such as unwanted or unpleasant thoughts, are the main cause of psychological disorder. If intrusive experiences associated with psychosis (e.g. paranoid thoughts and hearing voices) are considered commonly occurring phenomena (Johns & Van Os, 2001) that become pre-occupying and distressing in people with psychosis and a need for care (Peters, Day, McKenna, & Orbach, 1999), it may not be their exaggerated or qualitatively unique nature, but the presence of elevated unhelpful metacognitions that are a primary source of distress and help-seeking. According to the S-REF model, metacognitive beliefs determine the individual response style in reaction to such mental experiences. If this style is characterised by unhelpful

cognitive-attentional responses (i.e. the Cognitive Attentional Syndrome), then distress is more likely to occur when an individual has unhelpful negative beliefs about such experiences. Whilst negative beliefs were clearly related to symptoms of psychosis and negative affect, the latter was a stronger and more reliable finding. This supports the suggestion that unhelpful metacognitions may be a maintenance factor for symptoms but are perhaps particularly important in the development of negative affect.

Uncontrollability and danger beliefs have emerged as an important factor trans-diagnostically (Austin et al., 2015) and appeared to be a consistent predictor of affect in our analyses. There was some additional specificity of particular metacognitive beliefs depending on the outcome (anxiety or depression). This suggests that psychological interventions aimed at reducing negative affect in people with psychosis may benefit from identifying and modifying metacognitive beliefs that drive unhelpful cognitive, attentional and behavioural responses. A recent pilot study of metacognitive therapy in psychosis indicated that the therapy was an acceptable treatment with good adherence and no adverse events (Morrison et al., 2014). Two case studies utilising attention training (Wells, 1990) suggest this metacognitive therapy technique is useful in increasing the perceived controllability of psychotic experiences and reducing distress (Levaux et al., 2011; Valmaggia et al., 2007). However, the results of these trials should be interpreted with caution given the lack of randomisation, the absence of a control condition and the small sample sizes. A recent randomised trial targeting worry in people with persecutory delusions found the intervention significantly reduced both worry and delusional ideation (Freeman et al., 2015). This suggests that interventions aimed at modifying unhelpful metacognitive beliefs and counterproductive coping strategies may be useful in the treatment of psychosis.

5.5.2 *Limitations*

This research utilised correlational analyses and cross-sectional data. Therefore, the direction of causality cannot be conclusively determined. Our interpretation of the findings is embedded in the S-REF model and suggests that negative metacognitive beliefs increase emotional distress associated with psychotic symptoms. A possible reverse causal explanation is that individuals with greater levels of negative affect develop unhelpful metacognitive beliefs in response to emotional distress.

5.5.3 *Conclusions*

Consistent with the metacognitive model, our results suggest that people with positive symptoms of psychosis also have unhelpful metacognitive beliefs. In particular, unhelpful metacognitive beliefs were associated with negative affect. More specifically, the presence of unhelpful negative beliefs predicted emotional distress over and above the frequency of positive symptoms.

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6 Chapter 6: Do people with psychosis engage in unhelpful metacognitive coping strategies? A test of the validity of the Cognitive Attentional Syndrome (CAS) in a clinical sample

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Do people with psychosis engage in unhelpful metacognitive coping strategies? A test of the validity of the Cognitive Attentional Syndrome (CAS) in a clinical sample

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6.1 Abstract

The Self-Regulatory Executive Function (S-REF) model assumes that unhelpful metacognitive coping strategies characterised by worry, rumination, threat monitoring and attempts to control thoughts, have a central role in psychological disorder and prolonged negative affect. Collectively, these strategies constitute the Cognitive Attentional Syndrome (CAS). This research aims to test whether a questionnaire designed to capture these responses (the CAS-1: Wells, 2009, p. 268) is a valid assessment tool in clinical psychosis, and to test whether activation of the CAS is associated with positive and negative outcomes. A sample of 60 people with psychosis completed a semi-structured interview about psychotic symptoms, the CAS-1 self-report measure and validated self-report measures of metacognitive beliefs, negative affect, quality of life and recovery. The CAS-1 demonstrated good internal consistency, concurrent validity and predictive validity. Hierarchical multiple regression analyses revealed that negative metacognitive beliefs predict negative affect, perceptions of recovery and quality of life in people with psychosis over and above psychotic symptoms. CAS-1 scores did not contribute additional variance in the final regression models. Implications for theory and clinical practice are discussed.

Keywords: metacognition, psychosis, negative affect, recovery

6.2 Introduction

The Self-Regulatory Executive Function (S-REF) model (Wells and Matthews, 1994, 1996) proposes that psychological disorders are maintained by the presence of unhelpful coping strategies. Strategies such as enhanced perseverative processing in the form of worry and rumination, attentional biases towards internal or external threat-related information, and attempts to control unwanted or distressing thoughts and intrusions are proposed to be particularly problematic. These coping responses are not uncommon or unusual; however, they become problematic when a person overuses them or is unable to disengage from them (Wells, 2000, pp. 23-24). This leads to a fixed and inflexible style of thinking referred to as the Cognitive Attentional Syndrome (CAS).

Within the S-REF model, the unhelpful coping strategies that constitute the CAS are proposed to be driven by a particular set of metacognitive beliefs (Wells, 2000, p. 25). These beliefs can be measured using the metacognitions questionnaire (Cartwright-Hatton and Wells, 1997; Wells and Cartwright-Hatton, 2004) and are distinct from the CAS because they reflect stable beliefs, which are a form of metacognitive knowledge (Wells, 2000, p. 9). Within this model, positive metacognitive beliefs refer to beliefs that support the use of worry, rumination and threat monitoring as a way to solve problems or remain safe. Negative metacognitive beliefs refer to beliefs that some thoughts are dangerous or should be controlled. Metacognitive beliefs are intrinsically linked to the CAS because their content is thought to determine the selection of a coping strategy when an unwanted or distressing intrusion occurs. As such, the CAS may be considered a state response to intrusions that is determined by a person's metacognitive beliefs (Wells, 2000, pp. 23-24). The CAS can be measured using the Cognitive Attentional Syndrome Scale (CAS-1: Wells, 2009, p. 268) which is designed to assess the amount of time a person has spent engaging in processes of worry, rumination and threat monitoring within the past week. The S-REF model predicts that a greater endorsement of unhelpful metacognitive beliefs,

and the resulting use of maladaptive coping strategies, is particularly problematic for the prolongation of negative emotional states (Wells, 2009, p. 17). The model stipulates that the more a person engages in these strategies the more automatic and reflexive they become. As a result of repetitive negative processing, negative emotional states (such as anxiety and depression) are thought to persist, and underlying threat beliefs remain unchallenged (Wells, 2000, p. 23).

The role of unhelpful metacognitive beliefs has received substantial investigation in experiences of psychosis. The emerging consensus is that metacognitive beliefs may be an important determinant of distress rather than underlie specific symptoms (Hill et al., 2012; Varese & Bentall, 2011). Less research has investigated metacognitive coping strategies (i.e. the CAS) in the context of the S-REF model. A criticism of this approach is that relationships observed between metacognitive variables and psychosis may be an artefact of underlying emotional disorder. However, anxiety and depression are a common comorbidity in psychosis (Hartley et al., 2013) and affective changes appear to have an influential role in the onset of psychosis (Yung & McGorry, 1996) as well as the content and course of symptoms (Freeman & Garety, 2003). As such, understanding factors that contribute to the maintenance of affective states could have important implications for therapeutic intervention in psychosis.

There is accumulating evidence that people with psychosis engage in perseverative response styles such as worry (Freeman & Garety, 1999; Morrison & Wells, 2007; H. Startup et al., 2007) and rumination (Hartley et al., 2014; Vorontsova et al., 2013). Therapeutic interventions that target worry have shown promise in reducing persecutory ideation and distress (e.g. Foster et al., 2010; Freeman et al., 2015).

Attentional biases to sources of threat also appear to share relationships with experiences of psychosis. In particular self-focused attention, also referred to as cognitive self-

consciousness, appears to be associated with predisposition to hallucinatory phenomena and paranoid ideas (Allen et al., 2005; Palmier-Claus et al., 2013), as well as auditory hallucinations (Ensum & Morrison, 2003; Varese et al., 2011) and delusional beliefs (Freeman, Dunn, et al., 2013) in clinical populations.

A smaller number of studies have investigated thought control strategies. People with higher proneness to hallucinatory experiences (Garcia-Montes et al., 2006; Morrison et al., 2000) and people with a diagnosis of schizophrenia (Morrison & Wells, 2000) appear to use more punishment and worry oriented coping strategies in response to unwanted thoughts and intrusions than people less prone or with no experiences of psychosis. In addition, avoidant safety behaviours and punishment strategies are associated with the frequency of hallucinatory phenomena, delusional ideation and distress (Campbell & Morrison, 2007).

This literature suggests that people with experiences of psychosis utilise unhelpful metacognitive coping strategies that may affect symptoms and distress as predicted by the S-REF model. However, such studies have assessed individual components of the S-REF model using trait measures of thought control, meta-beliefs and worry/rumination. This study aims to provide the first empirical investigation of metacognitive coping strategies operationalised using the CAS-1 measure (Wells, 2009, p. 268) which assesses multiple components of the CAS and beliefs within a specific time frame (the last week). The following research questions will be addressed:

1) Is the CAS-1 a valid assessment of metacognitive coping strategies in psychosis?

Specifically, the scale reliability (i.e. Cronbach's alpha), predictive validity and concurrent validity will be tested.

2) Are higher levels of metacognitive beliefs associated with increased use of metacognitive coping strategies as measured by the CAS-1?

3) Do higher levels of CAS processing predict negative outcomes (i.e. positive symptoms and negative affect) on a state rather than trait-basis?

4) Do lower levels of CAS processing predict positive outcomes (i.e. quality of life and recovery) on a state rather than trait-basis?

6.3 Method

6.3.1 Design

This study used a cross-sectional design. A semi-structured interview and self-report questionnaires were administered at a single time point.

6.3.2 Participants and inclusion criteria

6.3.2.1 Clinical sample

The clinical sample consisted of 60 people with psychosis. Baseline data was utilised from 20 participants that took part in a randomised controlled trial of attention training for psychosis (ISRCTN06815355). This was combined with data from an additional 40 people recruited specifically for this cross-sectional study. All participants were recruited from early intervention in psychosis and community mental health teams within Greater Manchester West NHS Foundation Trust. The sample demographics are presented in table 15.

Participants were referred to the study by their key worker (e.g. community psychiatric nurse, occupational therapist or support worker) and met the following inclusion criteria: aged between 18 and 65 years; in contact with mental health services; had a psychotic disorder according to the Diagnostic and Statistical Manual of Mental Disorders fourth Edition (American Psychiatric Association, 2000) or met threshold for early intervention in psychosis using the Positive and Negative Syndrome Scale (Kay et al., 1987) defined as a

score of four on hallucinations or delusional beliefs or a score of five on paranoid ideation; competent and willing to provide written informed consent.

Participants were not included if they: had moderate to severe learning disability (as defined by their care team); had organic impairment (as defined by their care team); were non-English speaking (this would prevent the use of standardised assessment instruments); were an inpatient or had acute psychiatric care needed; did not have a care coordinator or responsible clinician; had substance dependency.

Table 15

Demographic information for the clinical sample

Demographic information	
Gender:	
Male	37 (62%)
Female	23 (38%)
Age:	
M (SD)	34.78 (12.33)
Highest level of education:	
Primary	6 (10%)
Secondary	25 (42%)
Further	19 (32%)
Higher	10 (17%)
Employment status:	
Full-time	4 (7%)
Part-time	7 (12%)
Voluntary	7 (12%)
Unemployed	38 (63%)
Retired	2 (3%)
Student	2 (3%)
Marital status:	
Single	40 (67%)
Married	8 (13%)
Divorced	5 (9%)
Cohabiting	7 (12%)
Ethnicity:	
Asian or Asian British	3 (5%)
Mixed white	2 (3%)
White British	50 (83%)
Other white	2 (3%)
Other	3 (5%)
Service:	
Early Intervention	36 (60%)

CMHT	24 (40%)
Average DUP (months):	
M (SD)	35 (41.31)
Average DOI:	
M (SD)	116 (123.41)

DUP: Duration of untreated psychosis;
 DOI: Duration of illness; CMHT: Community
 Mental Health Team.

6.3.2.2 *Non-clinical sample*

The non-clinical sample consisted of 60 people that took part in an online survey about paranoia in the general population. The survey had a total of 227 respondents and data for the first sixty people that matched the clinical sample in age and gender were utilised in this study. The matched sample consisted of 37 males with a mean age of 34.5 years ($SD=11.83$) and 23 females with an average age of 36.2 years ($SD=12.64$).

Participants were eligible to take part in the survey if they were aged over 18 years and had no history of severe mental illness. Participants were not eligible if they had a history of severe mental health problems (e.g., schizophrenia, bipolar disorder, affective psychosis); were using secondary mental health services (e.g., community mental health teams or early intervention services) or were taking psychiatric medication.

6.4 Procedure

Symptoms of psychosis were assessed in a semi-structured interview using the Positive and Negative Syndrome Scale (Kay et al., 1987). Participants then completed the CAS-1 self-report questionnaire and validated self-report measures of metacognitive beliefs, negative affect, recovery and quality of life.

6.4.1 *Outcome measures*

6.4.1.1 *The Positive and Negative Syndrome Scale* (Kay et al., 1987): The PANSS is a clinician-administered, 30-item, semi-structured interview. All items are scored

between 1 (not present) and 7 (severe). The PANSS can be analysed using a five-factor model comprised of positive symptoms (POS), negative symptoms (NEG), disorganised symptoms (DIS), excitement (EXC) and emotional distress (EMO) (van der Gaag et al., 2006). The scale has good internal reliability and consistency (Kay et al., 1987). Reliability of the sub-scales was measured in the present sample using Cronbach's alpha (POS α =0.611; NEG α =0.691; DIS α =0.610; EXC α =0.682; EMO α =0.654).

6.4.1.2 The Cognitive Attentional Syndrome Scale (Wells, 2009, p. 268): The CAS-1 is a 16-item self-report measure to assess four aspects of the Cognitive Attentional Syndrome (worry/rumination, threat monitoring, coping behaviours, and metacognitive beliefs). The first two items reflect the amount of time spent worrying about problems and focusing attention on threats. The next six items capture the frequency of which unhelpful strategies have been used to cope with negative feelings or thoughts (e.g., Tried not to think about things; Tried to control my emotions). Responses to these initial eight items are scored from 0 (none of the time) to 8 (all of the time). The final eight items assess endorsement of positive and negative metacognitive beliefs about the CAS (e.g., Worrying helps me cope; some thoughts could make me lose my mind) and are rated on a 0–100 scale.

Previous research using the CAS-1 in emotional disorder suggests that in order to reduce the impact of the final eight items on the total scale score, the original item responses to these eight items should be transformed (to a scale of 0-8). The authors recommend the 16 CAS-1 items are then summed to create a total scale (Fergus, Bardeen, & Orcutt, 2012). We will test the reliability of two sub-scales (the first 8 items that capture coping responses; and the final 8 items that capture beliefs) as well as the scale total.

6.4.1.3 The Metacognitions Questionnaire-30 (Wells & Cartwright-Hatton, 2004): The MCQ-30 is a 30-item trait scale designed to measure metacognitive beliefs. The

measure yields five subscales consisting of “positive beliefs about worry” (PBW) reflecting the belief that worry can help to solve problems; “negative beliefs including the uncontrollability and danger of thoughts” (NBUD) reflecting the belief that thoughts must be controlled in order to function well; “cognitive confidence” (CC) capturing the extent to which an individual lacks confidence in their memory and attentional capabilities; “negative beliefs relating to the need to control thoughts” (NTC) reflecting themes that certain thoughts can cause negative outcomes, and feelings of responsibility for preventing these outcomes; and “cognitive self-consciousness” (CSC) reflecting the extent to which an individual engages in monitoring their own thought processes. Higher scores on each subscale indicate a greater endorsement of unhelpful beliefs. Reliability of the sub-scales was measured using Cronbach’s alpha (PBW $\alpha=0.833$; NBUD $\alpha=0.863$; CC $\alpha=0.887$; NTC $\alpha=0.786$; CSC $\alpha=0.803$).

6.4.1.4 The Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983):

The HADS is a self-report scale comprised of seven items measuring the severity of anxiety and seven items measuring the severity of depression. All items are rated on four point scales. The HADS has good internal consistency and concurrent validity (Bjelland et al., 2002). Reliability of the sub-scales was measured using Cronbach’s alpha (anxiety $\alpha=0.834$; depression $\alpha=0.770$).

6.4.1.5 The Process of Recovery Questionnaire (Neil et al., 2009): The QPR is a 15-item self-report measure of recovery designed in collaboration with service users. Items are scored on a five-point Likert scale between 1 (strongly disagree) and 5 (strongly agree). The scale has good internal consistency, construct validity and reliability (Neil et al., 2009). Reliability in the present sample was very good ($\alpha=0.955$).

6.4.1.6 The World Health Organisation Quality of Life –Brief (Skevington, Lotfy, & O’Connell, 2004): The WHOQOL is a 26 item self-report measure of quality of life.

The scale assesses four broad domains (physical health, psychological health, social relationships and environment). All items are scored on a five-point Likert. The measure has good to excellent reliability and validity (Skevington et al., 2004). The total scale reliability in the present sample was good ($\alpha=0.876$).

6.4.2 *Data analysis*

Data were analysed using the Statistical Package for Social Sciences (SPSS) version 22. Before conducting analyses, the data was screened for missing values, outliers and normality.

First, the reliability of the CAS-1 measure (Wells, 2009, p. 268) was tested using Cronbach's alpha. Predictive validity was tested using correlation analyses between the CAS-1, the Metacognitions Questionnaire (MCQ-30) and the Hospital Anxiety and Depression Scale (HADS). The beliefs captured by the MCQ-30 are proposed to drive and maintain the CAS (Wells & Matthews, 1996), whilst the CAS is thought to underlie prolonged emotional states such as anxiety and depression (Wells, 2000, p. 23). Finally, concurrent validity was tested by conducting independent samples t-tests between the clinical and non-clinical sample on CAS-1 scores. The S-REF model predicts that unhelpful coping strategies are intrinsically linked to psychological disorder, it was therefore expected that the clinical sample would have significantly higher CAS-1 scores than the non-clinical sample.

The assumptions underlying the CAS were then tested in the clinical psychosis sample. Bivariate correlations tested whether higher levels of metacognitive beliefs are associated with increased use of CAS-1 coping strategies. Four hierarchical multiple regressions were conducted to test how much variance the CAS predicts in the outcome measures (i.e. positive symptoms, negative affect, quality of life and recovery) once confounding symptoms and metacognitive beliefs are controlled. The order of entry of the independent

variables is grounded in the predictions of the S-REF model. The selection of metacognitive beliefs for each regression was informed by the initial correlations.

The S-REF model predicts that unhelpful metacognitions predict distress over and above symptoms. For this reason, comorbid symptoms were controlled at step one. The relevant metacognitive beliefs were then entered as one block at step two because they are proposed to drive the CAS; finally, the CAS processing sub-scale was entered at step three. The CAS total scale was not used in the main analyses because half of the items capture metacognitive beliefs; metacognitive beliefs have been controlled at the previous step using an independent measure (i.e. the MCQ-30). However, we repeated the regressions using the two CAS-1 sub-scales after removing the MCQ-30 to test the sensitivity of the findings to different measurement.

6.5 Results

6.5.1 Data screening

There were 15 item scores missing across the dataset (0.2%). Missing values analysis confirmed there were no patterns to the missing data. These values were replaced using the variable mean. Visual inspection of box-plots indicated evidence of one univariate outlier on the PANSS total variable. This was resolved by using the next extreme score plus one. There were no multivariate outliers. Normality tests revealed no evidence of skew or kurtosis. Bivariate scatterplots indicated assumptions of homoscedasticity were met.

6.5.2 Sample characteristics

A summary of sample characteristics is available in table 16.

Table 16

Baseline characteristics for the clinical sample

Measure	<i>M (SD)</i>
PANSS total	57.22 (9.74)
PANSS positive symptoms	18.82 (5.11)
HADS anxiety	18.14 (4.56)
HADS depression	14.85 (4.08)
HADS total	32.99 (7.59)
MCQ-PBW	12.28 (4.32)
MCQ-NBUD	16.11 (4.81)
MCQ-CC	13.59 (5.13)
MCQ-NTC	14.35 (4.54)
MCQ-CSC	16.55 (4.22)
CAS total	62.32 (23.46)
CAS processing	30.40 (11.47)
CAS beliefs	31.92 (14.10)
WHOQOL total	82.19 (16.55)
QPR total	49.92 (13.18)

PANSS: positive and negative syndrome scale; HADS: hospital and depression scale; MCQ: metacognitions questionnaire; PBW: positive beliefs about worry; NBUD: negative beliefs relating to uncontrollability and danger; CC: cognitive confidence; NTC: Negative beliefs relating to control; CSC: cognitive self-consciousness; CAS: cognitive attentional syndrome; WHOQOL: world health organisation quality of life; QPR: Process of recovery questionnaire

6.5.3 *Is the CAS-1 a valid assessment of metacognitive coping strategies in psychosis?*

Prior to reliability analyses, the CAS-1 was standardised so that all items reflected a scaled score of 0-8. This was done by converting the final eight-item scores (scored from 0-100) to the scale used for the first eight items (scored from 0-8) using the formula $Y=(B-A)*(x-a)/(b-a)+A$.

Reliability tests using Cronbach's alpha indicate greater reliability is achieved when processes and beliefs are combined to give a CAS total scale score ($\alpha= 0.854$). However, it is acceptable to use two sub-scales (CAS processing $\alpha= 0.695$; CAS beliefs $\alpha= 0.808$). The CAS-1 had moderate to strong positive relationships with metacognitive beliefs

captured by the MCQ-30, indicating good convergent validity. The CAS-1 also had a moderate positive correlation with the HADS, indicating good predictive validity.

Correlations are presented in table 17.

Table 17

Bivariate correlations between the CAS-1, psychotic symptoms, negative affect, quality of life and recovery

	CAS total	CAS process	CAS beliefs	PBW	NBUD	CC	NTC	CSC	HADS total	PANSS total	PANSS positive	QPR total	WHO total
CAS total	-	0.897**	0.933**	0.419**	0.674**	0.580**	0.671**	0.628**	0.597**	0.472**	0.428**	-0.363**	-0.482**
CAS process	-	-	0.679**	0.318*	0.583**	0.522**	0.558**	0.506**	0.504**	0.404**	0.341**	-0.317*	-0.447**
CAS beliefs	-	-	-	0.438**	0.647**	0.541**	0.662**	0.633**	0.583**	0.457**	0.435**	-0.346**	-0.438**
PBW	-	-	-	-	0.387**	0.295**	0.555**	0.502**	0.324*	0.037	-0.057	-0.149	-0.155
NBUD	-	-	-	-	-	0.609**	0.670**	0.382**	0.731**	0.441**	0.324**	-0.580**	-0.638**
CC	-	-	-	-	-	-	0.448**	0.254**	0.505**	0.572**	0.397**	-0.358**	-0.390**
NTC	-	-	-	-	-	-	-	0.559**	0.453**	0.330*	0.217	-0.355**	-0.401**
CSC	-	-	-	-	-	-	-	-	0.318*	0.230	0.195	-0.121	-0.240
HADS total	-	-	-	-	-	-	-	-	-	0.397**	0.371**	-0.763**	-0.749**
PANSS	-	-	-	-	-	-	-	-	-	-	0.703**	-0.357**	-0.447**

Independent sample t-tests revealed significant differences between the clinical and non-clinical sample on CAS processing ($t(118)=-7.58, p<0.001$), CAS beliefs ($t(118)=-3.61, p<0.001$) and CAS total ($t(118)=-6.16, p<0.001$). Examination of the means indicates the clinical sample had higher processing scores (clinical: $M=30.40, SD=11.47$; non-clinical: $M=15.60, SD=9.86$), higher belief scores (clinical: $M=32.18, SD=13.55$; non-clinical: $M=23.48, SD=12.85$) and higher total scores (clinical: $M=62.95, SD=22.52$; non-clinical: $M=39.28, SD=19.43$). This suggests the measure has good concurrent validity.

6.5.4 *Are higher levels of metacognitive beliefs associated with increased use of metacognitive coping strategies?*

Bivariate correlations revealed moderate to strong correlations between the five metacognitive beliefs captured by the MCQ-30 and the processing sub-scale of the CAS-1: positive beliefs about worry ($r=0.318, p=0.013$); negative beliefs relating to uncontrollability and danger ($r=0.583, p<0.001$); cognitive confidence ($r=0.522, p<0.001$); negative beliefs relating to needs for control ($r=0.558, p<0.001$); cognitive self-consciousness ($r=0.506, p<0.001$). This suggests that a greater endorsement of unhelpful metacognitive beliefs is associated with increased use of metacognitive coping strategies.

In addition, higher CAS-1 processing scores had moderate positive correlations with psychotic symptoms ($r=0.404, p=0.001$) and negative affect ($r=0.504, p<0.001$); and moderate negative correlations with quality of life ($r=-0.447, p<0.001$) and recovery ($r=-0.317, p=0.014$). This suggests that activation of the CAS is associated with both positive and negative outcomes.

6.5.5 *Do levels of CAS processing predict positive and negative outcomes?*

6.5.5.1 *Psychotic symptoms*

To control for negative affect, HADS total scores were entered at step one. Metacognitive beliefs that had significant correlations with PANSS total symptoms were added as one block at step two, followed by the CAS processing sub-scale at step three.

At step one the model was significant ($F[1,58]= 10.88$, $MSE= 81.27$, $p=0.002$), negative affect accounted for 16% of the variance ($r^2= 0.158$, adjusted $r^2=0.143$). At step two metacognitive beliefs accounted for an additional 19% of the variance ($r^2\text{change}= 0.188$, $F\text{ change } [3,55]= 5.29$, $p=0.003$). At step three CAS processing did not account for any significant additional variance ($r^2\text{change}= 0.005$, $F\text{ change } [1,54]=0.441$, $p=0.509$). In the final model cognitive confidence was the sole predictor of psychotic symptoms. Summary statistics for each step are presented in table 18.

Table 18

Summary statistics for stepwise multiple regression with psychotic symptoms as the dependent variable, negative affect entered at step one, metacognitive beliefs entered at step two and CAS processing entered at step three

	R^2	ΔR^2	t	β	p
Step 1	0.158	0.143			
HADS total			3.299	0.397	0.002
Step 2	0.346	0.299			
HADS total			0.646	0.104	0.521
NBUD			0.267	0.054	0.791
CC			3.396	0.471	0.001
NTC			0.240	0.035	0.811
Step 3	0.352	0.292			
HADS total			0.541	0.089	0.591
NBUD			0.204	0.042	0.839
CC			3.127	0.449	0.003
NTC			0.043	0.007	0.966
CAS processing			0.664	0.097	0.509

HADS: Hospital Anxiety and Depression Scale; NBUD: Negative beliefs relating to Uncontrollability and Danger; CC: Cognitive Confidence; NTC: Negative beliefs relating to Control

6.5.5.2 *Negative affect*

To control for psychotic symptoms, PANSS positive symptoms were entered at step one. The PANSS positive subscale was entered instead of PANSS total because the total scale contains several items relating to negative affect. Metacognitive beliefs that had significant correlations with HADS total symptoms were added as one block at step two, followed by the CAS processing sub-scale at step three.

At step one the model was significant ($F[1,58]= 9.28$, $MSE= 50.51$, $p=0.003$), positive symptoms accounted for 14% of the variance ($r^2=0.138$, adjusted $r^2=0.123$). At step two metacognitive beliefs accounted for an additional 43% of the variance (r^2 change=0 .432, F change $[5,53]= 10.66$, $p<0.001$). At step three CAS processing did not account for any significant additional variance (r^2 change=0 .005, F change $[1,52]=0.612$, $p=0.437$). In the final model negative beliefs relating to uncontrollability and danger were the only predictor of negative affect. Summary statistics for each step are presented in table 19.

Table 19

Summary statistics for stepwise multiple regression with negative affect as the dependent variable, positive symptoms entered at step one, metacognitive beliefs entered at step two and CAS processing entered at step three

	R^2	ΔR^2	t	β	p
Step 1	0.138	0.123			
PANSS positive			3.047	0.371	0.003
Step 2	0.570	0.521			
PANSS positive			1.562	0.162	0.124
PBW			0.997	0.118	0.323
NBUD			5.047	0.696	<0.001
CC			0.153	0.019	0.879
NTC			-1.069	-0.152	0.290
CSC			0.310	0.036	0.758
Step 3	0.575	0.518			
PANSS positive			1.469	0.154	0.148
PBW			1.046	0.124	0.300
NBUD			4.766	0.673	<0.001
CC			0.153	0.019	0.879
NTC			-1.116	-0.168	0.249
CSC			0.057	0.007	0.955

CAS	0.783	0.099	0.437
processing			

PANSS: Positive and Negative Syndrome Scale; PBW: Positive Beliefs about Worry; NBUD: Negative beliefs relating to Uncontrollability and Danger; CC: Cognitive Confidence; NTC: Negative beliefs relating to Control; CSC: Cognitive Self-Consciousness

6.5.5.3 *Quality of life*

PANSS total scores were controlled at step one. Metacognitive beliefs that had significant correlations with WHOQOL total scores were added as one block at step two, followed by the CAS processing sub-scale at step three.

At step one the model was significant ($F[1,58]= 14.47$, $MSE= 222.99$, $p<0.001$), psychotic symptoms accounted for 20% of the variance ($r^2=0.200$, adjusted $r^2=0.186$). At step two metacognitive beliefs accounted for an additional 25% of the variance ($r^2\text{change}=0.250$, $F\text{ change } [3,55]= 8.34$, $p<0.001$). At step three CAS processing did not account for any significant additional variance ($r^2\text{change}=0.008$, $F\text{ change } [1,54]=0.768$, $p=0.385$). In the final model negative beliefs relating to uncontrollability and danger were the singular predictor of quality of life scores. Summary statistics for each step are presented in table 20.

Table 20

Summary statistics for stepwise multiple regression with quality of life as the dependent variable, psychotic symptoms entered at step one, metacognitive beliefs entered at step two and CAS processing entered at step three

	R^2	ΔR^2	t	β	p
Step 1	0.200	0.186			
PANSS total			-3.804	-0.447	<0.001
Step 2	0.450	0.410			
PANSS total			-2.040	-0.251	0.046
NBUD			-4.419	-0.635	<0.001
CC			0.822	0.115	0.415
NTC			0.418	0.056	0.678
Step 3	0.458	0.407			
PANSS total			-1.937	-0.240	0.058
NBUD			-3.888	-0.608	<0.001
CC			0.970	0.138	0.336
NTC			0.636	0.089	0.527
CAS processing			-0.876	-0.117	0.385

PANSS: Positive and Negative Syndrome Scale; NBUD: Negative beliefs relating to Uncontrollability and Danger; CC: Cognitive Confidence; NTC: Negative beliefs relating to Control

6.5.5.4 Recovery

PANSS total scores were controlled at step one. Metacognitive beliefs that had significant correlations with QPR total scores were added as one block at step two, followed by the CAS processing sub-scale at step three.

At step one the model was significant ($F[1,58]= 8.50$, $MSE= 154.19$, $p=0.05$), psychotic symptoms accounted for 13% of the variance ($r^2=0.128$, adjusted $r^2=0.113$). At step two metacognitive beliefs accounted for an additional 23% of the variance (r^2 change=0.226, F change $[3,55]= 6.42$, $p<0.001$). At step three CAS processing did not account for any significant additional variance (r^2 change=0.001, F change $[1,54]=0.073$, $p=0.788$). In the final model negative beliefs relating to uncontrollability and danger were the only predictor of recovery. Summary statistics for each step are presented in table 21.

Table 21

Summary statistics for stepwise multiple regression with recovery as the dependent variable, psychotic symptoms entered at step one, metacognitive beliefs entered at step two and CAS processing entered at step three

	R^2	ΔR^2	T	β	p
Step 1	0.128	0.113			
PANSS total			-2.915	-0.357	0.005
Step 2	0.354	0.307			
PANSS total			-1.114	-0.153	0.258
NBUD			-3.591	-0.595	0.001
CC			0.411	0.062	0.683
NTC			0.456	0.067	0.650
Step 3	0.355	0.295			
PANSS total			-1.156	-0.156	0.253
NBUD			-3.544	-0.605	0.001
CC			0.350	0.054	0.728
NTC			0.364	0.056	0.717
CAS processing			0.270	0.039	0.788

PANSS: Positive and Negative Syndrome Scale; NBUD: Negative beliefs relating to Uncontrollability and Danger; CC: Cognitive Confidence; NTC: Negative beliefs relating to Control

6.5.6 Sensitivity analyses

Pre-planned sensitivity analyses replicated the four multiple regressions. The only alteration was instead of MCQ-30 beliefs entered at step 2; the CAS beliefs subscale was

entered. The pattern of results for negative affect was replicated; however, CAS beliefs failed to reach significance as a predictor in the final models for psychotic symptoms, quality of life and recovery.

6.6 Discussion

This study provided the first empirical investigation of metacognitive coping strategies using the CAS-1 measure (Wells, 2009, p. 268) in a clinical psychosis sample. The CAS-1 is a self-report measure designed to assess metacognitive coping strategies, such as worry, rumination, threat monitoring and attempts to control intrusive thoughts. The assumptions underlying the CAS were systematically tested using correlation and multiple regression analyses.

6.6.1 Reliability and validity of the CAS-1 in psychosis

The CAS-1 showed good internal consistency. Consistent with Fergus et al. (2012), we recommend adjusting the scores to fit one scale of measurement and summing the scores to produce a scale total. However, we also found acceptable reliability to use two sub-scales (processing and beliefs) where this separation is useful. For example, in our subsequent analyses, we used an independent measure of metacognitive beliefs in the regression followed by the CAS processing sub-scale, to prevent issues of contamination and dependency.

The CAS-1 also demonstrated good predictive validity. As expected, CAS processing was positively correlated with those beliefs proposed to drive and maintain unhelpful coping strategies (i.e. the MCQ-30). Processing scores also had positive relationships with negative affect (i.e. anxiety and depression) and negative relationships with quality of life and recovery. This supports the prediction that activation of the CAS is associated with negative emotional responses and general negative outcomes (Wells, 2009, p. 17). Finally, comparisons of CAS-1 scores between the psychosis sample and a sample of people with

no psychiatric diagnosis demonstrated the concurrent validity of the scale. As predicted, the clinical sample had significantly higher processing, beliefs and total scores.

6.6.2 Tests of the assumptions underlying the CAS

Correlation analyses confirmed a moderate positive relationship between CAS-1 scores and the five sub-scales of the metacognitions questionnaire. Consistent with the S-REF model, this suggests that higher levels of metacognitive beliefs are associated with an increased use of metacognitive coping strategies. Subsequent regression analyses tested whether higher scores on the CAS-1 predict negative outcomes (i.e. psychotic symptoms and negative affect) and whether lower scores predict positive outcomes (i.e. quality of life and recovery).

In terms of psychotic symptoms, the metacognitive belief sub-scale relating to a lack of cognitive confidence was a unique cross-sectional predictor once negative affect was controlled. The addition of CAS processing scores did not contribute any further variance in the final model. Across the remaining outcomes (negative affect, quality of life and recovery), metacognitive beliefs relating to the uncontrollability and danger of thoughts emerged as a consistent and unique predictor once comorbidities were controlled. This suggests that elevated levels of uncontrollability and danger beliefs share important relationships with well-being. In particular, elevated levels of these beliefs predicted higher levels of negative affect and lower levels of self-reported quality of life and recovery. This important finding suggests metacognitive beliefs are a stronger determinant of self-reported recovery and fulfilment than psychotic symptoms themselves.

The failure of CAS processing scores to contribute unique variance in the final models may be explained by the variance accounted for by metacognitive beliefs. In the S-REF model, metacognitive beliefs are proposed to drive and maintain the CAS, hence, the inclusion of metacognitive beliefs may already account for the associated metacognitive strategies. In

our models, metacognitive beliefs accounted for between 20% and 40% of the variance in outcomes. In addition, the metacognitions questionnaire is a trait measure that captures beliefs that are relatively stable. Conversely, the CAS-1 is a state measure and captures processes that are likely to fluctuate. Therefore, measuring the CAS at a single time point may not capture this variability. Metacognitive beliefs also demonstrated consistently higher correlations with outcomes than CAS processing. This suggests beliefs may be a more important determinant of outcomes.

The results of the sensitivity analysis indicated that when metacognitive beliefs are measured using the CAS-1 beliefs scale, they fail to predict psychotic symptoms, recovery and quality of life. However, they do continue to predict negative affect. This is likely to be due to the MCQ-30 being a more comprehensive and reliable measure of metacognitive beliefs. This suggests that future research aiming to measure metacognitive beliefs should use the MCQ. The CAS-1 may provide an alternative measure where time and participant burden are important factors, such as session-by-session measurement of metacognition during therapy.

6.6.3 Theoretical and clinical implications

The results suggest that negative metacognitive beliefs relating to the uncontrollability and danger of thoughts are unique predictors of negative affect, perceptions of recovery and quality of life when psychotic symptoms are controlled. This is consistent with the S-REF model (Wells & Matthews, 1996) that suggests it is the way a person thinks, rather than intrusive experiences themselves, that are an important determinant of emotional distress. It is also consistent with the prevailing view that negative metacognitive beliefs may be a better predictor of general (transdiagnostic) psychological distress, rather than specific symptoms (e.g. Hill et al., 2012; Varese & Bentall, 2011).

Lower cognitive confidence emerged as a unique predictor of psychotic symptoms once negative affect was controlled. This finding requires further investigation. One possible explanation is that people with lower cognitive confidence (i.e. people that lack confidence in their memory and attention) may be more likely to make external attributions of their intrusive experiences. On the other hand, these beliefs may be reflective of the sedative effects of antipsychotic medications that can affect cognitive processes.

Whilst the CAS-1 did not contribute unique variance in predicting positive and negative outcomes in this sample once comorbidities and metacognitive beliefs were controlled, this does not undermine the usefulness of considering metacognitive beliefs and coping strategies in the formulation and treatment of psychosis. Especially given a large amount of variance was accounted for by beliefs, which may have obscured any unique variance contributed by processes. Furthermore, if negative metacognitive beliefs predict prolonged negative affect (i.e. anxiety and depression), as well as decreased quality of life and recovery in psychosis, strategies aimed at modifying such beliefs may be particularly helpful in this population.

Previous research has found that modification of coping strategies underpinned by unhelpful metacognitive beliefs can be helpful in clinical psychosis. For example, a recent randomised controlled trial of a worry intervention found that reductions in worry led to reductions in persecutory ideation and distress (Freeman et al., 2015). In addition, two case studies (Levaux et al., 2011; Valmaggia et al., 2007) and a recent randomised controlled trial (Parker et al., 2016) suggest that attention training, a metacognitive strategy that aims to disrupt unhelpful forms of perseverative and attentional processing, may be useful in reducing psychotic experiences and increasing perceived controllability of experiences. Finally, one case series of metacognitive therapy for psychosis found the

intervention was an acceptable treatment with good adherence and no adverse events (Morrison et al., 2014).

6.6.4 Limitations and future directions

This research utilised correlational analyses and cross-sectional data. Therefore, the direction of causality between the variables measured cannot be conclusively determined. Future studies would benefit from longitudinal assessment of the effect of metacognitive beliefs and strategies on psychotic symptoms and distress. In addition, the sample size was modest. Hence, the results warrant replication in a larger sample. In particular, the psychometric properties and incremental validity of the CAS-1 require further investigation in a larger sample. Moreover, the CAS-1 measure could be revised and further tested. Further development of the measure to increase the number of items relating to CAS processes could increase its utility as a research tool, as well as a clinical tool. Furthermore, the convergent validity of the CAS-1 with measures of other similar constructs remains to be assessed. For example, the extent to which the CAS-1 is related to other measures of worry (e.g. the Penn State Worry Questionnaire: Meyer et al., 1990) and attention (e.g. the Self-Consciousness Scale: Fenigstein et al., 1975) could be tested.

6.6.5 Conclusions

This study found that the CAS-1 has good internal validity when interpreted as a total scale within a psychosis sample. The reliability of two sub-scales (CAS-processing and CAS-beliefs) is acceptable. However, the measure may lack sensitivity when used alongside other validated measures of metacognitions (i.e. the MCQ-30). This study also found the presence of negative metacognitive beliefs predicted negative affect and perceptions of recovery and quality of life over and above total psychotic symptoms. This suggests beliefs about the uncontrollability and danger of thoughts may be an important determinant of emotional distress and general perceptions of wellbeing in people with psychosis.

7 Chapter 7: An experimental manipulation of negative metacognitive beliefs in non-clinical paranoia: effects on intrusions and state anxiety

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An experimental manipulation of negative metacognitive beliefs in non-clinical paranoia:
effects on intrusions and state anxiety

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7.1 Abstract

The metacognitive beliefs implicated in the Self-Regulatory Executive Function (S-REF) model (Wells & Matthews, 1994, 1996) have demonstrated significant positive relationships with experiences of psychosis. This study aimed to investigate the effect of manipulating metacognitive beliefs relating to the uncontrollability and danger of thoughts on paranoia frequency and negative affect. Seventy-six students participated in a randomised experiment. All participants were falsely informed they were taking part in an EEG study about thought processes in paranoia. Following a paranoia induction, participants in the experimental condition were told that the EEG could detect paranoid thoughts and may make a loud noise in response to detecting them; participants in the control condition were told the EEG could detect paranoid thoughts and may make a loud noise at random. Validity checks confirmed the paranoia prime was effective and there was a significant change in metacognitive beliefs following the manipulation. Overall, no significant differences between the two groups on measures of intrusions or anxiety emerged following the manipulation. However, changes in physiological anxiety approached significance. The results demonstrate it is feasible to manipulate metacognitive beliefs and induce paranoia. A recommendation for further research to use a refined paradigm with a clinical sample is discussed.

Keywords: paranoia; metacognition; negative affect

7.2 Introduction

Metacognitive beliefs refer to beliefs about thought processes. They affect the way particular cognitive processes are appraised and utilised (Wells, 2000, pp. 6-7). A specific set of metacognitive beliefs has been linked to unhelpful thinking patterns associated with emotional dysregulation. These beliefs form the basis of the Self-Regulatory Executive Function (S-REF) model (Wells & Matthews, 1994, 1996); an information processing approach to psychological disorder. Within this model, the prolongation of psychological distress is related to the use of maladaptive coping strategies (such as worry and rumination, threat monitoring and thought control) that are underpinned by a combination of positive and negative metacognitive beliefs (Wells, 2000, p. 25). Positive metacognitive beliefs reflect the usefulness of worry, rumination, threat monitoring, and other similar strategies (e.g. “focussing on danger will keep me safe” or “if I worry I will be prepared”), and are thought to initiate and support their continued use. Negative metacognitive beliefs reflect beliefs concerning the danger or uncontrollability of particular thoughts (e.g. “my thoughts are uncontrollable” or “my thoughts could make a bad thing happen”) and are thought to increase distress and prolong unhelpful thinking patterns.

Research has consistently supported a relationship between unhelpful metacognitive beliefs and experiences of psychosis. For example, increased proneness to hallucinatory phenomena and unusual beliefs in non-clinical samples is associated with an increased endorsement of both positive and negative beliefs (e.g. Laroi & Van der Linden, 2005; Morrison et al., 2000). At risk mental state (Morrison et al., 2006), and transition to first-episode psychosis is associated with elevated negative beliefs (Barbato et al., 2013; Morrison, Bentall, et al., 2002). In addition, clinical samples with more negative beliefs appear to experience greater distress (e.g. van Oosterhout et al., 2013). A comprehensive review of this literature suggested metacognitive beliefs do not have a causal role in specific symptoms, but may rather be associated with help-seeking and distress (Varese &

Bentall, 2011). Consistent with this, a recent meta-analysis found that people with a diagnosis of psychosis are significantly elevated in all sub-types of metacognitive beliefs compared to non-psychiatric controls, and have similar patterns to people with a diagnosis of emotional disorder (Sellers et al., 2017). This pattern of results supports the prediction metacognitive beliefs may be associated with emotional dysregulation and negative affect, rather than specific symptoms.

Negative affect appears to have an influential role in positive symptoms of psychosis, such as hallucinations and delusional beliefs. Studies have noted an increase in anxiety and depression during the psychosis prodrome (Yung & McGorry, 1996) and an association between negative emotional states and the severity and content of symptoms (Freeman & Garety, 2003; Hartley et al., 2013). It has recently been suggested that treating emotional dysregulation in people with experiences of psychosis may lead to reductions in symptoms (Freeman, Dunn, et al., 2013). Therefore, if metacognitive beliefs are a determinant of negative affect, they may be an important target for therapeutic intervention in people with psychosis.

Consistent with this, a recent study found that negative metacognitive beliefs, in particular, those relating to the uncontrollability and danger of thoughts, are a stronger predictor of negative affect than positive symptoms themselves (Sellers et al., 2016). A similar pattern has emerged concerning metacognitive beliefs specific to paranoia, such as those measured using the beliefs about paranoia scale (Gumley et al., 2011; Morrison et al., 2005). Studies have indicated that positive beliefs about paranoia as a survival strategy are associated with the frequency of paranoid ideation in both non-clinical and clinical samples (Morrison et al., 2005; Murphy et al., 2017), whilst negative beliefs about paranoia appear to predict higher levels of anxiety and depression, as well as clinical status (Gumley et al., 2011; Morrison et al., 2011).

At present, the majority of research in this area is observational and further empirical evidence is needed. This study aims to test the effect of an experimental manipulation of metacognitive beliefs on paranoid intrusions and state anxiety in a non-clinical population. Paranoia has been selected as the independent variable because there is a strong argument that paranoid ideation lies on a continuum of severity that can be measured in the general population (Freeman, Garety, et al., 2005; Johns et al., 2004), and may precede more severe persecutory belief formation (Kaymaz et al., 2012; Poulton et al., 2000). Therefore, understanding the mechanisms involved in non-clinical paranoid intrusions and distress may have relevance to understanding clinical persecutory ideas.

The present study set out to manipulate metacognitive beliefs relating to uncontrollability and danger using a fake EEG paradigm. Paranoid ideation will be primed using three short video clips, and uncontrollability and danger beliefs will be manipulated with the suggestion that subsequent detection of paranoid thoughts by the EEG may lead to a loud noise. The following hypotheses based on the S-REF model are tested: 1) Participants allocated to the belief manipulation condition will experience a higher number of intrusive threat-related thoughts as a result of unhelpful attempts to control them (i.e. rebound effects); 2) Participants allocated to the belief manipulation condition will experience greater discomfort in response to a threatening thought; 3) Participants allocated to the belief manipulation condition will experience higher levels of state anxiety.

7.3 Method

7.3.1 Design

The experiment was conducted as a randomised group comparison. Participants were allocated to either the experimental condition (group 1; $n=38$) or the control condition (group 2; $n=38$) using an online randomisation tool (<http://www.randomization.com>). Randomisation was conducted in permuted blocks of four. The independent variable

(group) was comprised of two levels (experimental vs. control). The dependent variables were intrusion frequency, discomfort caused by intrusions and state anxiety.

7.3.2 *Participants*

Seventy-six students from the University of Manchester took part in the study. The sample consisted of 11 males and 65 females with a mean age of 19 years ($SD= 1.21$; range=18-25). The primary method of recruitment was through advertisement on the School of Psychological Sciences participant recruitment announcement. Undergraduate psychology students received course credits for taking part. The study was also advertised on the university volunteer service. A summary of sample demographics is provided in table 22.

Participants were eligible to take part if they reported paranoid ideation in the past week. This was operationalised as a rating of “sometimes” in response to at least one item on the Paranoia Checklist (Freeman, Garety, et al., 2005). Participants were not eligible for the study if they have a history of severe mental health problems (e.g., schizophrenia, bipolar disorder, affective psychosis); currently use secondary mental health services (e.g., community mental health teams or early intervention services); currently take psychiatric medication; or have a sight or hearing impairment that would prevent engagement with video stimuli.

Table 22

Sample demographic information

Demographic information	
Gender:	
Male	11 (15%)
Female	65 (85%)
Age (years):	
<i>M (SD)</i>	19.03 (1.21)
Highest level of education:	
College	40 (53%)
Undergraduate degree	36 (47%)
Employment status:	
Full-time student	76 (100%)
Marital status:	
Single	70 (92%)
Married	2 (3%)
Cohabiting	4 (5%)
Ethnicity:	
Asian British	3 (4%)
Asian Bangladeshi	3 (4%)
Asian Indian	2 (3%)
Asian Pakistani	4 (5%)
Asian other	3 (4%)
Black British	1 (1%)
Black Caribbean	2 (3%)
Chinese	1 (1%)
White British	46 (61%)
White European	6 (8%)
White Irish	2 (3%)
White other	2 (3%)
Other	1 (1%)

7.3.3 Procedure

Ethical approval was granted from the University of Manchester Research Ethics Committee 1 (UREC-1; reference: 15455). The fake EEG procedure utilised in this study was adapted from Myers and Wells (2013). Prior to taking part, participants were provided with a copy of the participant information sheet and asked to complete the screening questions. Those that were eligible were invited to meet with the researcher and complete the experiment.

The experiment was conducted in a temperature-controlled room. After receiving a verbal overview of the study participants completed a consent form, a demographics form and self-report questionnaires (the STAI and a manipulation check). They were then connected to a Galvanic Skin Response sensor and a four-minute baseline was commenced.

After the four-minute baseline, participants received the following instruction: “We are interested in thought processes and how these affect our reaction to different stimuli. I’m going to connect you to an EEG that will pick up signals from a part of your brain that is related to threat. It is very sensitive and studies have shown that it can often be triggered just by having thoughts relating to threatening themes and this activity is picked up by the EEG. In the first part of the experiment, I’ll check this by showing you three short video clips from Greater Manchester Police”.

The researcher then assisted the participant in fitting the EEG cap and attached the electrodes. The electrodes were connected to a genuine EEG but participants were unaware that no actual EEG readings were being taken. As actual recordings were not taken, no gel was applied. When the EEG was set-up, participants watched three short video clips produced by Greater Manchester Police relating to student safety. The purpose of the video clips was to induce paranoid thoughts. After the three videos had finished, the researcher showed participants a 30-second EEG wave to increase the authenticity of the

experience. Following this, the experimental group was told “Okay that is detecting the activity well. For the next four minutes, I would like you to think about anything you want. If you have any threat related thoughts or thoughts about the video clips the EEG will detect this and I am going to set it up so that each time it does you may hear a burst of white noise. The noise is high-pitched and makes people jump. However, even though people find it unpleasant it is not harmful: having paranoid thoughts may lead you to hear this loud noise”. This instruction was intended to manipulate the metacognitive belief that some thoughts are dangerous and must be controlled.

The control group was given a variation of this instruction: “Okay that is detecting the activity well. For the next four minutes, I would like you to think about anything you want. If you have any threat related thoughts or thoughts about the video clips the EEG will detect this and I am going to set it up so that unrelated to the thoughts you have, you may randomly hear a burst of white noise. The noise is high-pitched and makes people jump. However, even though people find it unpleasant it is not harmful: unrelated to the thoughts you have, you may randomly hear this loud noise”.

After four minutes, the GSR was terminated and the EEG cap and electrodes were removed. Participants then completed the second battery of self-report questionnaires (a measure of their experiences, the STAI, the manipulation check and an experimental validity check).

7.3.4 Measures

7.3.4.1 The State-trait Anxiety Inventory (Spielberger et al., 1983): The STAI is a 40 item self-report questionnaire composed of 20 items that capture state anxiety and 20 items that capture trait anxiety. The 20-item state inventory was administered. Responses assess the intensity of current feelings rated from 1 (not at all) to 4 (very much so).

7.3.4.2 Galvanic Skin Response sensor: A Galvanic Skin Response (GSR) sensor was used to measure physiological response at sampling rates of 1-10Hz. The GSR measures electrical conductance of the skin that varies with moisture level. Sweat glands on the skin are controlled by the sympathetic nervous system and respond to strong emotion. The two sensors were placed on the tip of the index finger and middle finger of the participant's non-dominant hand.

7.3.4.3 Measures of experiences: This measure captures participant's experiences of intrusive thoughts and subjective discomfort during the experiment. The first question uses a four-point scale to assess the number of paranoid thoughts that occurred. Four subsequent items utilise 100mm visual analogue scales measuring 1) time spent thinking about the film stimulus/threat related thoughts (0= none of the time, 100= all of the time); 2) effort put into not thinking about the film stimulus/threatening thoughts (0= none, 100= total); 3) discomfort felt when a threatening thought occurred (0= none, 100= the most discomfort I could have); 4) discomfort felt as a whole (0= none, 100= the most discomfort I could have).

7.3.4.4 Manipulation check: This measure tests the validity of the metacognitive belief manipulation and the paranoia induction. The first six items are comprised of the "negative beliefs about uncontrollability and danger" sub-scale from the Metacognitions Questionnaire-30 (Wells & Cartwright-Hatton, 2004). This was used to test whether the manipulation instructions increased metacognitive beliefs. The final item uses a visual analogue scale to rate the extent to which respondents feel they need to be on their guard against others (0= not at all to 100= completely). This was used to test whether the video stimuli were an effective paranoia induction. This statement was selected because it was the most frequently endorsed item on the Paranoia Checklist in a non-clinical sample (Freeman, Garety, et al., 2005).

7.3.4.5 Experimental validity check: This measure assesses the validity of the experimental paradigm. The measure is comprised of three visual analogue scales (rated from 0 to 100%) that ask the respondent to rate (1) how much they believed they were connected to a working EEG (2) how much they believed that the EEG could detect certain thoughts (3) how much they believed that the EEG might deliver a loud sound.

7.3.5 Data analysis plan

7.3.5.1 Power calculation

A power calculation utilising www.sealedenvelope.com was conducted to advise sampling. Seventy-six participants were required to have a 90% chance of detecting, as significant at the 5% level, an increase in the primary outcome measure from 15 in the control group to 30 in the experimental group. This calculation was advised using data from (Myers & Wells, 2013).

7.3.5.2 Statistical analysis

Data were screened for missing values, outliers and normality prior to analysis. The two groups (experimental and control) were then screened to test that the randomisation procedure resulted in equality between the two groups on demographic variables (i.e. age and gender), baseline anxiety (i.e. STAI scores and GSR readings), baseline paranoia and baseline metacognitive beliefs (i.e. the manipulation check).

Following this, a number of validity and manipulation checks were conducted. The validity of the fake EEG paradigm was tested using between-subjects analysis of variance. The dependent variables were ratings of the three beliefs that constitute the experimental validity measure. The paranoia manipulation was tested using repeated measures ANOVA. The within-subjects factor was time (pre- and post-video stimuli) and the dependent variable was the belief “I need to be on my guard against other’s”. The

metacognitive belief manipulation was tested using a mixed factor ANOVA. The dependent variable was negative beliefs relating to uncontrollability and danger with a between-subjects factor of group (experimental vs control) and a within-subjects factor of time (pre- and post-manipulation).

The primary outcomes were tested using a series of one-way ANCOVA's where the independent variable was group (experimental vs. control) and the dependent variables were items on the measures of experiences questionnaire. The secondary outcomes (i.e. STAI scores and GSR readings) were tested using one-way ANCOVA where the covariates were baseline anxiety. As above, the between-subjects factor was group (experimental vs control) and the within-subjects factor was time (pre- and post-manipulation).

7.4 Results

7.4.1 Data screening

There were no missing values in the dataset. One univariate outlier was detected and amended using the next extreme score plus one. There were no multivariate outliers. One dependent variable (number of intrusions) demonstrated positive kurtosis and this was corrected using bootstrapping.

7.4.2 Baseline characteristics and descriptive statistics

Baseline characteristics and descriptive statistics for the two groups are presented in table 23. Independent samples t-tests revealed there were no significant differences between the experimental and control groups on age ($t(74)=-1.139, p=0.258$) baseline STAI scores ($t(66.125)=-1.836, p=0.071$), baseline GSR readings ($t(74)=-0.932, p=0.354$), metacognitive beliefs ($t(74)=-1.688, p=0.096$) or paranoia ($t(74)=-1.250, p=0.215$). Chi-square tests indicated a significant difference between the two groups in gender balance ($\chi^2(1)=5.21, p=0.022$). There were significantly more males in the experimental group

($n=9$) compared to the control group ($n=2$). Subsequent between group analyses covaried for gender.

Table 23

Sample characteristics pre and post manipulation for the experimental group and control group

Variable	Pre-manipulation		Post-manipulation	
	Experimental <i>M (SD)</i>	Control <i>M (SD)</i>	Experimental <i>M (SD)</i>	Control <i>M (SD)</i>
STAI	39.0 (11.65)	34.68 (8.61)	42.31 (12.16)	37.87 (9.52)
GSR (Hz)	4.04 (2.16)	3.58 (2.15)	5.62 (2.43)	4.57 (2.57)
NBUD	12.39 (4.40)	10.84 (3.58)	12.87 (4.62)	10.60 (3.77)
Paranoia	38.29 (23.72)	31.97 (20.19)	45.24 (28.6)	39.74 (22.36)
N intrusions			1.87 (0.67)	2.03 (0.59)
Time			30.0 (23.54)	31.18 (18.29)
Effort			36.71 (23.89)	27.89 (21.8)
Discomfort – intrusions			32.76 (26.48)	31.97 (21.01)
Discomfort - general			23.03 (19.85)	25.92 (20.92)
EEG working			83.95 (24.64)	91.32 (16.91)
EEG detecting			58.29 (26.92)	68.29 (28.58)
EEG noise			71.84 (29.0)	83.95 (27.76)

STAI: State Anxiety Inventory; GSR: Galvanic Skin Response;

NBUD: Negative Beliefs relating to Uncontrollability and Danger;

N intrusions: Number of threat-related thoughts;

Time: Time spent thinking about threat-related thoughts;

Effort: Effort put into not thinking about threat-related thoughts;

Discomfort – intrusions: Discomfort felt when a threat-related thought occurred;

Discomfort – general: Discomfort felt during the EEG overall;

EEG working: Belief that the EEG was working;

EEG detecting: Belief that the EEG could detect thoughts;

EEG noise: Belief that the EEG would make a high pitched sound.

7.4.3 *Experimental validity check*

Analysis of covariance revealed a marginally non-significant difference between the two groups in their belief that the EEG was working ($F(1,73)=3.860, p=0.053, \eta^2_p=0.050$) and would make a loud noise ($F(1,73)=3.839, p=0.054, \eta^2_p=0.050$). There was no significant difference in the belief that the EEG could detect threat-related thoughts ($F(1,73)=1.733, p=0.192, \eta^2_p=0.023$). The means and standard deviations for each group are presented in table 23 and suggest belief ratings were higher in the control group. Subsequent between group analyses covaried for belief the EEG was working.

7.4.4 *Manipulation check*

A repeated measures ANOVA indicated a statistically significant change in ratings of paranoia ($F(1,74)=19.518, p<0.001, \eta^2_p=0.206$) before and after the video stimuli (see table 23 for group means and standard deviations). This suggests the video stimuli were an effective prime for paranoid thoughts.

A mixed factor ANCOVA revealed a significant time by group interaction for metacognitive beliefs ($F(1,73)=4.607, p=0.035, \eta^2_p=0.059$). Examination of mean scores indicates uncontrollability and danger beliefs increased in the experimental group and decreased in the control group. The means and standard deviations are presented in table 23 and a graphical representation is depicted in figure 7. This suggests the experimental vs control instructions were an effective manipulation of the target metacognitive beliefs.

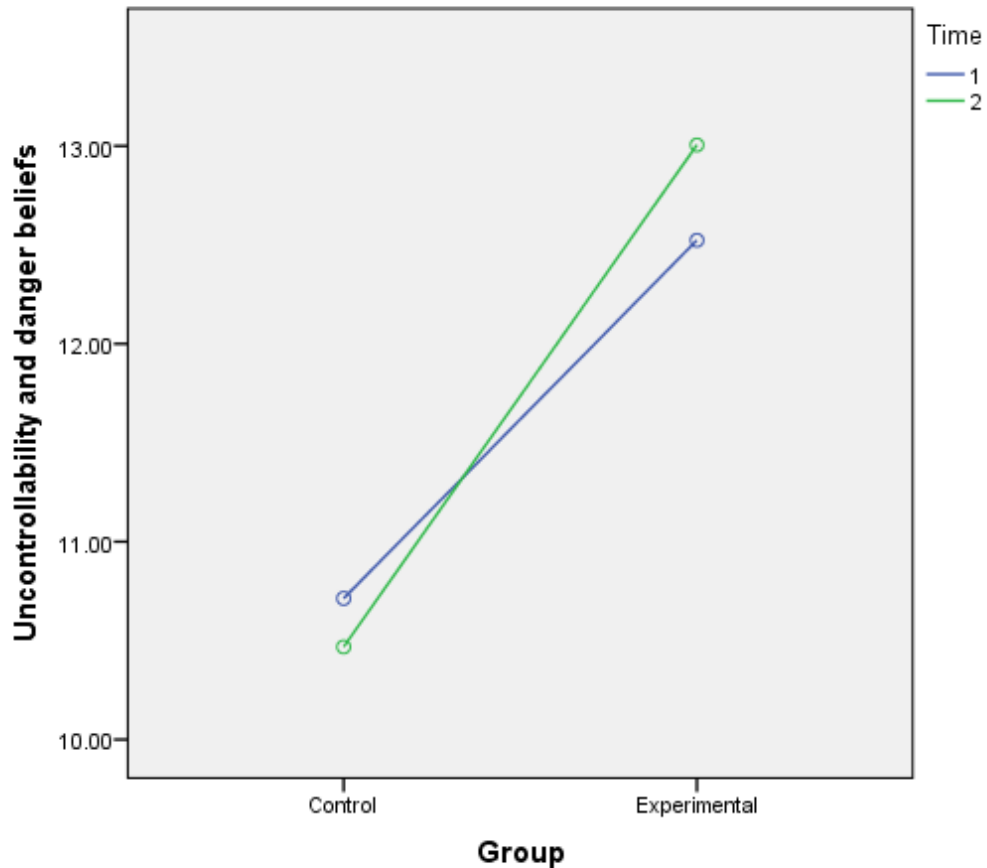


Figure 7. Estimated marginal means for uncontrollability and danger beliefs in the experimental and control group before and after the metacognitive belief manipulation with gender as a covariate

7.4.5 Primary outcome variables

A series of one-way ANCOVA's indicated there were no significant differences between the experimental and control group on the items that constitute the measure of experiences during the EEG: number of threat-related thoughts ($F(1,72)=1.497, p=0.225, \eta^2_p=0.020$); time spent thinking about threatening thoughts ($F(1,72)=0.007, p=0.934, \eta^2_p<0.001$); effort put into not thinking about threatening thoughts ($F(1,72)=3.252, p=0.076, \eta^2_p=0.043$); discomfort felt when a threatening thought occurred ($F(1,72)=0.268, p=0.606, \eta^2_p=0.004$); and discomfort felt during the EEG ($F(1,72)=0.002, p=0.967, \eta^2_p<0.001$).

7.4.6 *Secondary outcome variables*

Analysis of covariance revealed no significant differences in post-manipulation self-reported anxiety scores between the two groups when covarying for gender, baseline anxiety scores and belief the EEG was working ($F(1,71)=0.821, p=0.365, \eta^2_p=0.011$). The difference in post-manipulation physiological anxiety measured using the GSR was marginally non-significant between the two groups, also with gender and baseline reading as covariates ($F(1,71)=3.684, p=0.059, \eta^2_p=0.049$). The means and standard deviations are presented in table 23 and suggest self-reported and physiological anxiety was higher in the experimental group.

7.5 Discussion

This study aimed to manipulate negative metacognitive beliefs relating to the uncontrollability and danger of thoughts, using a fake EEG paradigm adapted from Myers and Wells (2013). The sample consisted of undergraduate students that had experienced paranoid thoughts in the past seven days. Paranoia was primed using three short video clips from Greater Manchester Police relating to student safety. Metacognitive beliefs were manipulated with the suggestion that the EEG could detect paranoid thoughts and may make a loud noise in response to detecting them.

First, the validity of the experimental paradigm was tested. The paranoia prime was effective as demonstrated by a significant increase in endorsement of the belief “I need to be on my guard against other’s” measured before and after the video stimuli. The manipulation of metacognitive beliefs was also effective as indicated by a significant interaction between group (experimental vs. control) and time point (pre- and post-manipulation). Following the manipulation instruction, uncontrollability and danger beliefs increased in the experimental group and decreased in the control group. This is an important finding, which indicates that metacognitive beliefs are amenable to experimental

manipulation. Moreover, participants' belief in the deceptive element of the study was reasonable. The mean belief the EEG was working was 88%, and belief it would emit a loud noise was 78%. However, the belief that the EEG could detect thoughts was less (63%). Overall, these analyses are proof of concept that metacognitive beliefs can be experimentally manipulated in the context of paranoia.

The results of the primary analyses were not statistically significant. Contrary to the hypotheses, there were no significant differences between the experimental and control group on self-reported intrusion frequency, the effort put into controlling intrusions or general discomfort during the EEG. One possibility for this finding is the measure may have lacked sensitivity. The majority of participants gave the same answer for the item that captured the number of intrusive thoughts experienced during the EEG. It is, therefore, possible this question did not capture variability. The majority of participants responded they had experienced "a couple of thoughts (1-5)". However, the subsequent items utilised 0-100 visual analogue scales that allowed for greater variability in response, and there were no significant differences between the two groups on these items.

In terms of the secondary outcomes, self-reported levels of anxiety at time two did not differ significantly between the experimental and control group when controlling for self-reported anxiety at time one. Between-group differences in physiological ratings of anxiety using the GSR approached significance at time two when controlling for baseline GSR readings. Consistent with predictions, physiological anxiety was higher in the experimental condition. The reason that physiological anxiety approached significance but self-reported anxiety did not, may reflect the sensitivity of these measures to momentary fluctuations in negative affect. Whilst the self-report measure was specifically a state measure of cognitive and body state information, the GSR that measures skin conductance does not rely on the participant's interpretations of body state information, which may be

an important factor. The misinterpretation of cognitive and body state information is an important aspect of cognitive approaches to psychosis (e.g. Morrison, 2001). The GSR may also be better able to detect more subtle changes in arousal.

The S-REF model focuses on metacognitive beliefs and coping strategies that lead to biased information processing of threatening stimuli (Wells & Matthews, 1996). Negative metacognitive beliefs relating to the uncontrollability and danger of thoughts are considered especially important to intrusion frequency and negative emotional responses. The model suggests beliefs that thoughts need to be controlled or can cause negative outcomes lead to unsuccessful attempts to reduce intrusions and increase negative affect in response to them. Several studies have supported this finding in the psychosis and paranoia literature (Gumley et al., 2011; Murphy et al., 2017; Sellers et al., 2016). The results of this study are partially consistent with this finding as they demonstrated changes in physiological arousal that approached significance in the experimental condition.

The main strength of this study is the proof of concept in the paradigm. However, if this experiment were to be repeated there are ways it could be refined and improved. First, an alternative measure of intrusion frequency may improve sensitivity. The majority of participants responded with the same answer, which may indicate a lack of sensitivity to variation in frequency. Second, the null findings and the modest sample size raise the possibility of type-II error. Therefore, a future replication using a larger sample size may provide better statistical power to detect an effect. The power calculation for this study was based on a previous study by Myers and Wells (2013) that used a sample of people who met the clinical threshold for obsessive compulsive disorder. An alternative possibility, therefore, might be to use a clinical sample. The threshold of paranoid ideation for inclusion in this study may have been a limitation (i.e. participants were required to endorse just one paranoid thought as occurring “sometimes” in the past week). Changes in

metacognitive beliefs may have a more significant impact on people with more frequent or pervasive paranoid ideas.

There are also some general limitations to this study that should be considered when interpreting the results. First, the sample demographic limits the generalizability of the results. The sample was predominantly female and comprised of undergraduate university students. For this reason, the generalizability of this sample to both a wider non-clinical population and people with clinical paranoia is uncertain. Second, when using non-clinical populations it is important to bear in mind there are likely important differences in the nature of paranoid ideas. For example, paranoid ideas in the general population may reflect concerns that might have a greater grounding in reality and may be more likely to reflect social evaluative concerns and lower level ideas of reference (e.g. Freeman, Garety, et al., 2005).

In terms of implications for theory and clinical practice, this study suggests that metacognitive beliefs relating to the uncontrollability and danger of thoughts are amenable to manipulation. This is consistent with the goals of metacognitive therapy that targets underlying metacognitive beliefs responsible for unhelpful coping strategies and emotional dysregulation. Metacognitive therapy has demonstrated effectiveness in reducing symptoms and psychological distress in emotional disorder (Normann et al., 2014), and has recently been piloted in psychosis with promising results regarding feasibility and acceptability (Morrison et al., 2014). The identification of unhelpful metacognitive beliefs that can enhance and maintain anxiety and maladaptive coping may help to tailor psychological interventions where emotional responses and avoidance are contributing to a person's difficulties.

Overall, this paradigm is novel in its application to experiences of psychosis. The key finding is that metacognitive beliefs can be experimentally manipulated, and there is

clearly a gap in the psychosis literature for more research to do so. The findings suggest that experimentally heightened metacognitive beliefs may influence anxiety. If replicated, these findings could have important implications for psychological assessment and treatment of paranoia.

8 Chapter 8: The role of cognitive and metacognitive factors in paranoia and negative affect

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The role of cognitive and metacognitive factors in paranoia and negative affect

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8.1 Abstract

Objectives: It is increasingly accepted that paranoia lies on a continuum of severity that can be observed in the general population. Several psychological factors have been implicated in the development of more distressing persecutory ideas including negative affect (i.e. anxiety and depression), beliefs about oneself and other people (i.e. schemas) and metacognitive beliefs. This study aimed to explore the combined role of cognition and metacognition in paranoia. Specifically, unhelpful metacognitive beliefs and schematic beliefs were tested as potential moderators of the relationship between non-clinical paranoid ideation and negative affect.

Methods: Measures from 227 people who took part in a cross-sectional online survey were analysed using structural equation modelling. A series of models grounded in cognitive and metacognitive theory were tested sequentially.

Results: The results demonstrated that unhelpful metacognitive beliefs had a positive moderating effect on the relationship between paranoia and negative affect. Negative beliefs about oneself and other people did not moderate distress but positive beliefs about other people had a negative moderating effect. In a final model, negative schematic beliefs predicted paranoid ideation whilst metacognitive beliefs predicted and moderated affect.

Conclusions: The findings suggest that consideration of metacognitive beliefs may be important to reduce psychological distress in the treatment of paranoia.

Practitioner points:

- Metacognitive beliefs may be an important determinant of negative affect in the context of non-clinical paranoia
- The findings highlight the importance of considering both cognitive and metacognitive factors when working with people with distressing paranoid ideas

8.2 Introduction

Research has indicated that paranoia is a common experience that lies on a continuum of severity (Freeman, Garety, et al., 2005; Johns et al., 2004). The continuum approach assumes that experiences associated with psychosis, such as paranoia, can be observed at varying levels within the general population (Freeman et al., 2012; Johns & Van Os, 2001). Consistent with this, studies have found that paranoid thoughts are a regular occurrence in 20-30% of people (Bebbington et al., 2013; Freeman, Garety, et al., 2005), and range from social evaluative concerns and feelings of vulnerability, to fears of significant social, physical or psychological harm (Freeman, Garety, et al., 2005). Further evidence suggests that paranoid ideation may precede delusion formation (Kaymaz et al., 2012; Poulton et al., 2000); as such, it is believed that the mechanisms underlying non-clinical paranoia may be useful in understanding the development of more severe and distressing persecutory ideas (Freeman, 2006).

The possible causes of paranoia are numerous, complex and multi-factorial. Common causal explanations include trauma and adverse experiences (Bentall, Wickham, Shevlin, & Varese, 2012; Janssen et al., 2003) and insecure attachment styles (Berry, Barrowclough, & Wearden, 2008; Pickering, Simpson, & Bentall, 2008). Numerous psychological factors have been implicated in the development and maintenance of more severe and enduring persecutory beliefs. This includes self-esteem (Bentall, Corcoran, Howard, Blackwood, & Kinderman, 2001; Bentall, Kinderman, & Kaney, 1994), beliefs about oneself and other people (Trower & Chadwick, 1995), reasoning biases (Dudley et al., 2015) and negative affect (e.g. Freeman et al., 2002).

Within the psychological literature, cognitive approaches have been particularly influential. The model proposed by Freeman et al. (2002) assumes that paranoid ideas are formed and maintained by an interaction between adverse life events, anomalous

experiences (such as perceptual anomalies) and pre-existing beliefs about oneself, others and the world. Negative emotional states are hypothesised to have a central role. In particular, anxiety is proposed to influence the content of persecutory ideas, which further reinforces negative emotions. The persistence of paranoia is thought to be driven by the continual confirmation of pre-existing beliefs through unhelpful cognitive-behavioural responses such as attentional biases, avoidance and safety behaviours (Freeman et al., 2002). Unhelpful schemas relating to the self, others and the world are also proposed to influence paranoid ideas. Appraisals of other people as bad, devious or untrustworthy, along with negative self-appraisals of being weak, worthless and inadequate are thought to result in major consequences for a person's perception of themselves within a social context (Fowler et al., 2012).

Consistent with the cognitive approach, research has demonstrated that negative emotional states and unhelpful schemas are associated with sub-threshold and clinical experiences of psychosis. For example, anxiety and depression have been found to increase during the psychosis prodrome, a period whereby a person is at increased risk of developing psychosis (Dominguez et al., 2011; Yung & McGorry, 1996). In addition, reviews have found that anxiety and depression are common comorbidities in clinical psychosis (Hartley et al., 2013), and may have a direct influence on the content of persecutory beliefs (Freeman & Garety, 2003; Smith et al., 2006). Furthermore, negative evaluations of oneself and others, coupled with anxiety, have been associated with both paranoid ideation and persecutory beliefs (Fowler et al., 2006; Fowler et al., 2012).

Another emerging approach to understanding paranoia is the Self-Regulatory Executive Function (S-REF) model (Wells & Matthews, 1996). The model assumes that a generic set of metacognitive beliefs about the usefulness of some thought processes (e.g. worry will keep me safe from harm) and the danger of others (e.g. I must be in full control of my

thoughts) contribute to the maintenance of symptoms and negative emotional states transdiagnostically. Metacognitive beliefs are proposed to underlie repetitive processing of negative thoughts and emotions (such as worry and rumination), biased attention towards threat (i.e. threat monitoring) and unhelpful attempts to reduce discomfort (e.g. thought control, avoidance and attempts to suppress or control emotions). These responses are not uncommon but they become problematic when a person is unable to disengage from them (Wells, 2000, p. 23). In contrast to cognitive approaches, the metacognitive approach places greater emphasis on the way that a person thinks, in particular, the way they selectively attend to threat-related information. In this model, schemas are considered as a trigger or result of repetitive negative processing, rather than a cause.

The metacognitive beliefs captured by the metacognitions questionnaire (Cartwright-Hatton & Wells, 1997; Wells & Cartwright-Hatton, 2004) have been associated with paranoid thoughts and persecutory ideation in both clinical and non-clinical samples. In particular, negative metacognitive beliefs relating to the uncontrollability and danger of thoughts appear to be particularly influential (e.g. Valiente, Prados, Gomez, & Fuentenebro, 2012). However, this association is reduced when negative affect (i.e. anxiety) and alternate psychotic phenomena (i.e. auditory hallucinations) are controlled (Garcia-Montes, Cangas, Perez-Alvarez, Hidalgo, & Gutierrez, 2005; Goldstone, Farhall, Thomas, & Ong, 2013). As such, there is an emerging consensus that metacognitive beliefs may be a determinant of emotional distress, rather than specific symptoms (Sellers et al., 2017; Varese & Bentall, 2011). Consistent with this, metacognitive beliefs have been found to predict negative affect over and above the frequency and characteristics of delusional beliefs and auditory hallucinations (Sellers et al., 2016).

Specific metacognitive beliefs about paranoia measured using the beliefs about paranoia scale (Gumley et al., 2011; Morrison et al., 2005), have also been associated with increased

predisposition to paranoid thoughts. In particular, positive beliefs about paranoia as a survival strategy are associated with the frequency of paranoid ideation in both non-clinical and clinical samples (Morrison et al., 2005; Murphy et al., 2017), whilst negative beliefs about paranoia appear to be implicated in increased negative affect and clinical status (Gumley et al., 2011; Morrison et al., 2011).

The combined role of cognitive and metacognitive factors in relation to paranoia has previously been investigated in a sample of people at risk of psychosis (Morrison et al., 2015). The findings supported several specific hypotheses of both cognitive and metacognitive models. Specifically, positive and negative beliefs about paranoia were associated with the severity of paranoid ideation, whilst negative self-schemas and metacognitive beliefs about the need to control thoughts were positively associated with feelings of deservedness. Negative affect, in particular depression, also had strong associations with dimensions of paranoia.

The present study aims to explore these relationships further. Specifically, this is the first study to test both metacognitive beliefs and schemas as potential moderators of the relationship between paranoia and negative affect in a large non-clinical sample. First, a baseline model will test the hypothesis that paranoia predicts negative affect as suggested by previous research (e.g. Fowler et al., 2006; Morrison et al., 2015). Second, the moderating effect of both metacognitive beliefs and schemas will be examined since these are both highlighted as potential factors related to non-clinical paranoia (e.g. Fowler et al., 2006; Morrison et al., 2005). According to the S-REF model, the presence of metacognitive beliefs influences the relationships between paranoia and negative affect. A final model incorporating both cognitive and metacognitive beliefs will test a series of exploratory hypotheses. On the basis of the approaches outlined, it is hypothesised that schemas will predict paranoid ideation, whilst metacognitive beliefs will predict negative

affect. Finally, we hypothesise a positive relationship between unhelpful metacognitive beliefs and negative schemas.

8.3 Method

8.3.1 Design

This study used a cross-sectional design. Participants took part in a confidential online survey intended to be completed at a single time-point.

8.3.2 Participants

The sample consisted of 227 participants from the general population. Participants were eligible to take part if they were aged between 18 and 65 years and had no history of severe mental illness. Participants were not eligible if they had a history of severe mental health problems (e.g., schizophrenia, bipolar disorder, affective psychosis); were using secondary mental health services (e.g., community mental health teams or early intervention services) or were taking psychiatric medication. In order to screen for the above criteria, participants were required to respond negatively to the following screening questions: Have you ever been hospitalised for assessment and/or treatment of schizophrenia, bipolar disorder, or a psychosis-related problem (e.g. depression with psychosis, etc.)? Have you ever received a diagnosis for any of the above? Have you ever been advised to take medication for hearing voices, paranoia or unusual thoughts? Was there ever a period in your life when you were receiving support from an Early Intervention Service? A summary of the sample demographics is presented in table 24.

Table 24

Sample demographic information

Demographic information	
Gender:	
Male	40 (18%)
Female	187 (82%)
Age:	
M (SD)	32.82 (13.36)
Highest level of education:	
High school	13 (6%)
College	31 (14%)
Undergraduate degree	88 (38%)
Postgraduate degree	95 (42%)
Employment status:	
Full-time	121 (53%)
Part-time	21 (9%)
Voluntary	1 (0.4%)
Unemployed	5 (2%)
Retired	6 (3%)
Full-time student	66 (29%)
Part-time student	7 (3%)
Marital status:	
Single	105 (46%)
Married	55 (24%)
Divorced	9 (4%)
Separated	2 (1%)
Widowed	4 (2%)
Cohabiting	51 (23%)
Civil partnership	1 (0.4%)
Ethnicity:	
Asian British	4 (2%)
Asian Chinese	6 (3%)
Asian Indian	3 (1%)

Asian Pakistani	2 (1%)
Asian other	3 (1%)
Black African	4 (2%)
Black British	1 (0.4%)
Black mixed	2 (1%)
White British	180 (80%)
White European	8 (4%)
White other	10 (4%)
Not specified	4 (2%)

8.3.3 Procedure

Participants were invited to take part in an online survey about paranoia and thought processes in the general population. The primary method of recruitment was through circulation of a link to the survey via the university's school of psychology participant recruitment announcement and Greater Manchester West NHS trust. Other methods of recruitment included access to the link via social media (e.g. Facebook and Twitter) and the university volunteer service.

After reading the information sheet participants completed a consent form followed by the mandatory screening questions. If they met any of the exclusion criteria, the survey terminated. If they were eligible to continue, participants completed a demographics page followed by seven self-report questionnaires. There was no time limit imposed for completing the survey.

8.3.4 Measures

8.3.4.1 The Paranoia Checklist (Freeman, Garety, et al., 2005): The PCL is an 18 item self-report questionnaire designed to provide a multi-dimensional assessment of non-clinical state paranoia. Items reflect different paranoid beliefs and are rated on a five-point

rating scale for frequency, conviction and distress. All statements relate to the past week. The scale has excellent internal validity. Reliability of the sub-scales was measured using Cronbach's alpha (frequency $\alpha=0.929$; conviction $\alpha=0.945$; distress $\alpha=0.959$).

8.3.4.2 The Metacognitions Questionnaire-30 (Wells & Cartwright-Hatton, 2004):

The MCQ-30 is a 30 item scale designed to measure unhelpful metacognitive beliefs. The measure yields five subscales consisting of "positive beliefs about worry" reflecting the belief that worry can help to solve problems; "negative beliefs including the uncontrollability and danger of thoughts" reflecting the belief that thoughts must be controlled in order to function well; "cognitive confidence" capturing the extent to which a person lacks confidence in their memory and attentional capabilities; "negative beliefs relating to the need to control thoughts" reflecting themes that certain thoughts can cause negative outcomes, and feelings of responsibility for preventing these outcomes; and "cognitive self-consciousness" reflecting the extent to which a person engages in monitoring their own thought processes. Higher scores on each subscale indicate a greater endorsement of unhelpful beliefs. Reliability of the sub-scales was measured using Cronbach's alpha (PBW $\alpha=0.894$; NBUD $\alpha=0.866$; CC $\alpha=0.881$; NTC $\alpha=0.830$; CSC $\alpha=0.860$).

8.3.4.3 The Depression Anxiety Stress Scale-21 (Lovibond & Lovibond, 1995):

The DASS is a 21 item scale designed to measure state depression, anxiety and stress in clinical and non-clinical populations. Items are rated on a four-point Likert scale from 0 (does not apply to me) to 3 (applies to me very much) based on the past week. The scales have good to excellent internal validity (Henry & Crawford, 2005). Reliability of the sub-scales was measured using Cronbach's alpha (depression $\alpha=0.897$; anxiety $\alpha=0.805$; stress $\alpha=0.855$).

8.3.4.4 *The Brief Core Schema Scale (Fowler et al., 2006)*: The BCSS is a 24 item self-report measure designed to capture positive and negative beliefs about the self and others. Beliefs are rated as present or absent, and if present are scored on a four-point scale of how much each statement is believed. The scales assess four dimensions: negative-self, positive-self, negative-other and positive-other. The scales have demonstrated good internal validity. Reliability of the sub-scales was measured using Cronbach's alpha (neg-self $\alpha=0.847$; pos-self $\alpha=0.928$; neg-oth $\alpha=0.931$; pos-oth $\alpha=0.930$).

8.3.5 *Statistical analysis*

Analyses were conducted using Mplus version 7.31 (Muthén & Muthén, 1998-2015), a latent variable modelling package. We used structural equation models (SEMs) to test the hypotheses since it allows the assessment of multiple pathways indicating direct and indirect effects, and allows for the simultaneous assessment of the multiple hypotheses.

The analysis was performed in two stages. First, we fitted measurement models for the latent constructs paranoia, negative affect and metacognitive beliefs using their respective observed measures. Second, based on the separate hypothesis under investigation, we formed the theoretically hypothesised SEM and fitted them to the data. We estimated the SEMs sequentially in order of the hypotheses by maximum likelihood estimation with robust standard errors using a numerical integration algorithm to account for non-normality in any dependent variables (Kline, 2011, p. 117). Mplus provides several tests of model fit, which are often used to assess the agreement between the hypothesised model and the observed data. However, these are not calculated in models containing latent variable by latent variable interactions, which is the focus of our hypothesised models and so only AIC and BIC values are reported.

8.4 Results

8.4.1 Data screening and descriptive statistics

There were 46 item scores missing across the data set (0.11%). Missing values analysis confirmed no patterns to the missing data. These values were replaced using the relevant variable sub-scale mean. There was evidence of positive skew in the negative affect, metacognitive belief and negative schema variables. However, the planned analyses accounted for non-normality. A summary of sample characteristics is presented in table 25.

Table 25

Sample characteristics on measures of paranoia, negative affect, schemas and metacognitive beliefs

Measure	<i>M (SD)</i>
PCL frequency	27.63 (10.56)
PCL conviction	27.58 (12.19)
PCL distress	29.07 (15.22)
DASS depression	10.91 (4.07)
DASS anxiety	9.84 (3.31)
DASS stress	12.38 (3.87)
BCSS positive self	18.18 (5.81)
BCSS positive other	18.18 (4.82)
BCSS negative self	9.71 (4.16)
BCSS negative other	10.60 (4.44)
MCQ PBW	10.0 (3.78)
MCQ NBUD	11.53 (4.54)
MCQ CC	10.04 (4.15)
MCQ NTC	9.65 (3.80)
MCQ CSC	13.86 (4.71)

PCL: paranoia checklist; DASS: depression anxiety and stress scales; BCSS: brief core schema scales; MCQ: metacognitions questionnaire; PBW: positive beliefs about worry;

NBUD: negative beliefs about uncontrollability and danger; CC: cognitive confidence; NTC: negative beliefs relating to control; CSC: cognitive self-consciousness

8.4.2 Structural Equation Modelling

8.4.2.1 Paranoia and negative affect

The results of the baseline model (model 1) confirmed a positive association between the latent variables paranoia and negative affect. The regressions coefficients for the model are presented in figure 8.

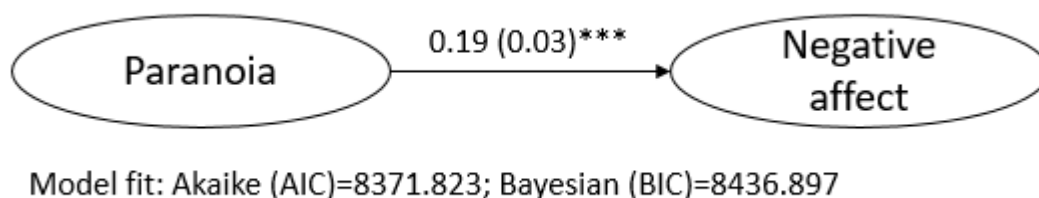
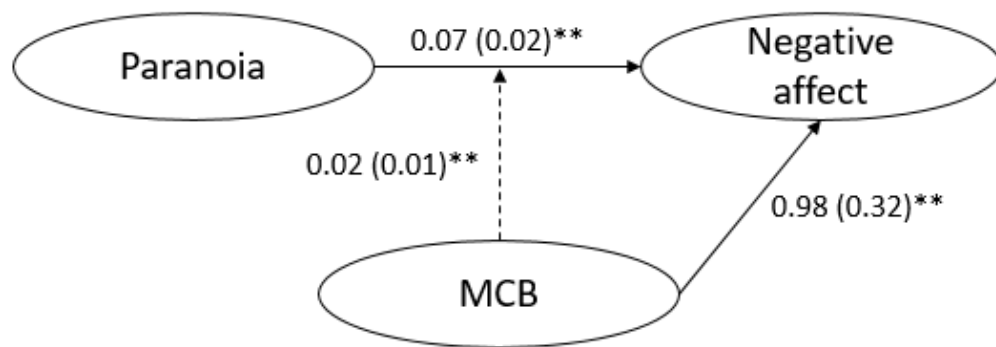


Figure 8. Baseline model testing the relationship between paranoia and negative affect (model 1)

8.4.2.2 Paranoia, negative affect and metacognitive beliefs

The second model tested whether unhelpful metacognitive beliefs moderate the relationship between paranoia and negative affect (model 2). The regressions coefficients for the model are presented in figure 9. As predicted, paranoia and metacognitive beliefs both had a significant positive relationship with negative affect. The interaction between paranoia and metacognitive beliefs was significant indicating that metacognitive beliefs moderate the relationship between paranoia and affect. This suggests that the relationship between paranoia and negative affect increases as the level of metacognitive beliefs increases.



Model fit: Akaike (AIC)=14524.109; Bayesian (BIC)=14647.407

Figure 9. Structural equation model testing the moderating effect of metacognitive beliefs on the relationship between paranoia and negative affect (model 2)

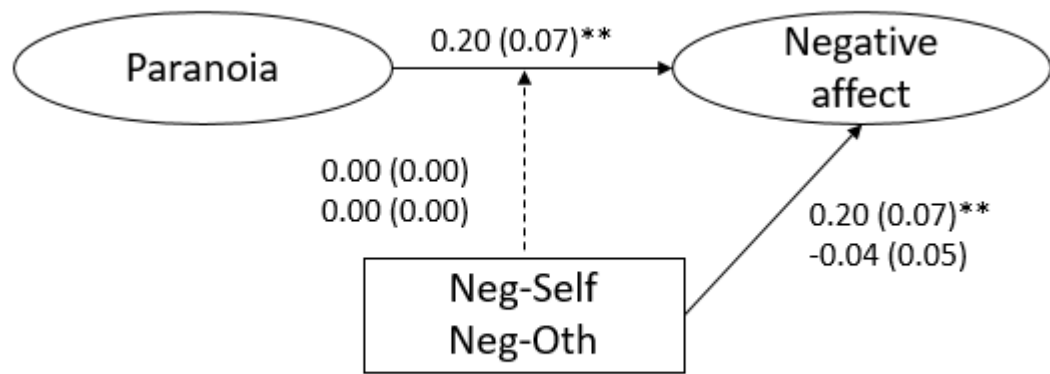
8.4.2.3 Paranoia, negative affect and schematic beliefs

To test the moderating effect of schemas on negative affect, we replicated model 2 using the schema observed variables. In model 3a negative beliefs about self (neg-self) and negative beliefs about others (neg-oth) were entered. In model 3b positive beliefs about self (pos-self) and positive beliefs about others (pos-oth) were entered.

Model 3a suggests negative beliefs about oneself but not negative beliefs about other people predict negative affect. The interaction was not significant which suggests negative schemas do not moderate the relationship between paranoia and negative affect.

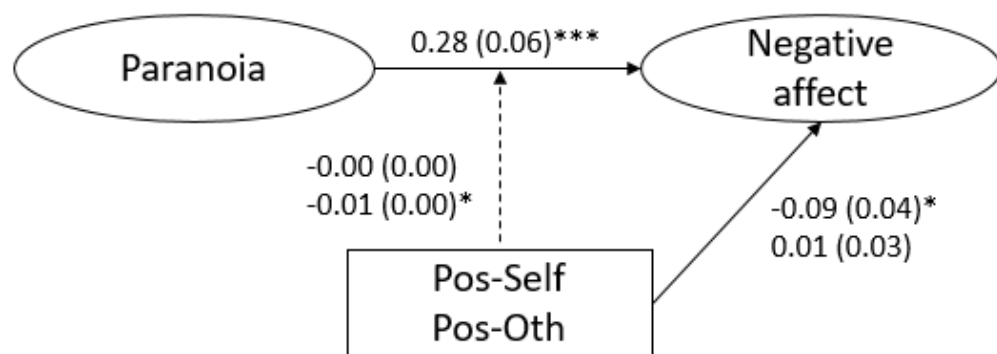
Model 3b suggests positive beliefs about oneself but not positive beliefs about other people have a negative relationship with negative affect. However, positive beliefs about other people had a significant negative interaction with paranoia in predicting negative affect.

This model suggests that positive beliefs about oneself may reduce negative affect, whilst a higher level of positive beliefs about others reduces the association between paranoia and negative affect. These two models are presented in figures 10 (model 3a) and 11 (model 3b).



Model fit: Akaike (AIC)=10808.058; Bayesian (BIC)=10910.807

Figure 10. Structural equation model testing the moderating effect of negative schemas on the relationship between paranoia and negative affect (model 3a)



Model fit: Akaike (AIC)=11037.005; Bayesian (BIC)=11139.754

Figure 11. Structural equation model testing the moderating effect of positive schemas on the relationship between paranoia and negative affect (model 3b)

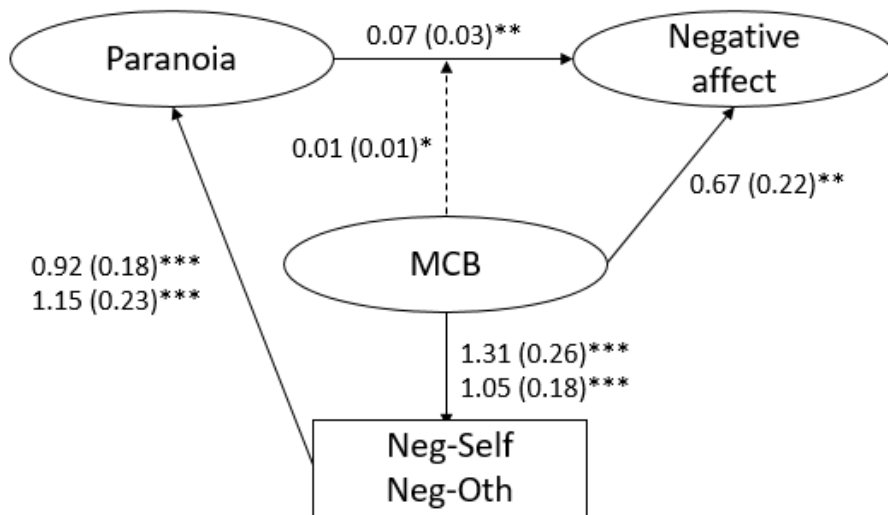
8.4.2.4 The combined effect of metacognitive beliefs and schematic beliefs

To test our exploratory hypotheses regarding the relationship between paranoia, negative affect, schemas and metacognition, we estimated two further models. Model 4a tested the hypothesis that metacognitive beliefs would predict negative affect, whilst negative schemas would predict paranoid ideation. Based on the assumptions of the S-REF model, we predicted there would be a positive relationship between unhelpful metacognitive

beliefs and negative schemas. Model 4b was a similar replication but predicted that positive schemas would be negatively related to paranoia.

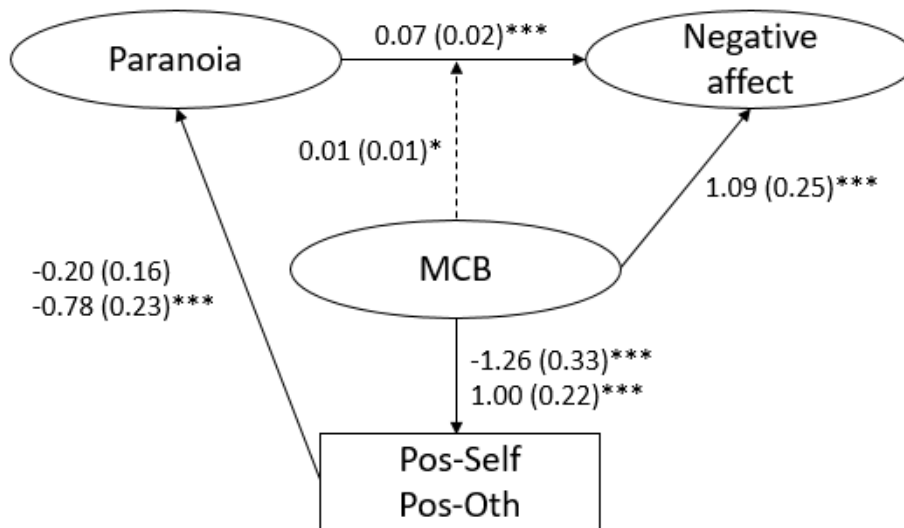
Model 4a was largely consistent with our hypotheses. Consistent with model 2, there was a significant interaction between metacognitive beliefs and paranoia in predicting affect suggesting that metacognitive beliefs moderate this relationship. The negative schema observed variables (i.e. neg-self and neg-oth) had significant positive relationships with the paranoia latent variable. As predicted, there was a positive relationship between unhelpful metacognitive beliefs and negative schemas.

In model 4b, the interaction between paranoia and metacognition remained significant in predicting affect. The pos-oth observed variable but not the pos-self observed variable had a significant negative relationship with paranoia, suggesting that positive beliefs about oneself are associated with lower levels of paranoia. There was a significant positive relationship between the metacognition latent variable and the pos-oth observed variable, and a significant negative relationship between the metacognition latent variable and the pos-self observed variable. Results for these two models are presented in figures 12 (model 4a) and 13 (model 4b).



Model fit: Akaike (AIC)=16857.769; Bayesian (BIC)=17011.891

Figure 12. Structural equation model testing the moderating effect of metacognitive beliefs on the relationship between paranoia and negative affect, and the role of negative schemas on paranoia (model 4a)



Model fit: Akaike (AIC)=17132.634; Bayesian (BIC)=17286.756

Figure 13. Structural equation model testing the moderating effect of metacognitive beliefs on the relationship between paranoia and negative affect, and the role of positive schemas on paranoia (model 4b)

8.5 Discussion

The aim of this study was to test the contribution of cognitive and metacognitive beliefs to non-clinical paranoia and distress using structural equation modelling. The results provide support for the hypotheses of both the cognitive (Freeman et al., 2002) and metacognitive (Wells & Matthews, 1996) approaches. Moderation analyses indicated that unhelpful metacognitive beliefs moderated the relationship between paranoia and negative affect. Increased endorsement of negative beliefs about oneself, but not other people predicted negative affect but did not moderate the relationship between paranoia and affect. Positive beliefs about oneself had a negative relationship with negative affect and positive beliefs about others had a negative moderating effect on negative affect. A final model combining both cognition and metacognition suggested schemas predict paranoid ideation and metacognitive beliefs moderate negative affect.

8.5.1 *The role of unhelpful metacognitive beliefs*

The finding that metacognitive beliefs positively moderate the relationship between non-clinical paranoia and negative affect suggests elevated levels of unhelpful beliefs about thoughts interact with paranoid ideation to increase negative emotional states. This is consistent with the prediction of the S-REF model (Wells & Matthews, 1996) that proposes beliefs about thoughts (rather than the content of thoughts) contribute to negative affective states. More specifically, the model proposes that positive beliefs about the usefulness of some thought processes (e.g. “focussing on threat will keep me safe”) combined with negative beliefs about the danger or uncontrollability of other’s (e.g. “my thoughts can make a bad thing happen”), underlie unhelpful thinking styles associated with the prolongation of negative thinking patterns and psychological distress.

These findings are also consistent with previous research that has found a generic set of unhelpful metacognitive beliefs are related to paranoid ideation and negative affect in non-

clinical samples (e.g. Garcia-Montes et al., 2005; Goldstone et al., 2013). They are also consistent with previous findings that an interaction between paranoia specific positive and negative metacognitive beliefs is associated with the severity of paranoia and negative affect (Gumley et al., 2011; Murphy et al., 2017).

8.5.2 *The role of positive and negative schemas*

In terms of negative schemas, beliefs about oneself predicted higher levels of negative affect but did not moderate the relationship between paranoia and negative affect. Beliefs about others did not have a significant relationship with negative affect and did not act as a moderator of affect. In terms of positive schemas, higher levels of positive beliefs about oneself had a significant negative relationship with negative affect, but higher levels of positive beliefs about other people did not. However, positive beliefs about others, but not positive beliefs about oneself, interacted with paranoia to reduce negative emotion. These findings are partially consistent with the cognitive models outlined by Freeman et al. (2002) and Fowler et al. (2012) as they suggest people's beliefs about themselves and others have significant relationships with negative affect. However, negative schematic beliefs failed to moderate the relationship between paranoia and negative affect as these models might suggest.

Several previous studies have supported the relationship between schemas and negative emotion in the context of experiences of psychosis (Gracie et al., 2007; Oliver, O'Connor, Jose, McLachlan, & Peters, 2012; Smith et al., 2006). The hypothesised direction of the relationship in our cross-sectional model contrasts with the position offered by Fowler et al. (2012) that suggests negative schemas mediate the relationship from negative affect to paranoid ideation and delusional formation. However, this study used cross-sectional data and primarily aimed to test predictors of enduring negative emotional states (i.e. anxiety, depression and stress) in relation to paranoid experiences, not predictors of paranoid

thinking. Therefore, we used an exploratory model to investigate the possible combined role of cognition and metacognition in paranoia and enduring distress that incorporated the pathway set out by the cognitive model.

8.5.3 The contribution of metacognitive beliefs and schemas

The results of the final model were largely consistent with our hypotheses. The findings indicated that unhelpful metacognitive beliefs predicted negative affect and moderated the relationship between paranoia and affect. In terms of negative schemas, negative beliefs about oneself and others had significant positive relationships with paranoia. This suggests negative cognitions relating to perceptions of oneself and others may predict paranoia frequency, whilst unhelpful metacognitive beliefs appear to enhance negative emotional states. There was also a positive relationship between unhelpful metacognitive beliefs and negative schematic beliefs that suggests these variables may influence each other. The S-REF model (Wells & Matthews, 1994) predicts this interaction, in that negative schemas are postulated to be the outputs or triggers of worry-based processing which is dependent on metacognition.

When the model was repeated with positive schematic beliefs, the relationship between paranoia, negative affect and metacognition remained consistent. Positive beliefs about others, but not positive beliefs about oneself, had a significant negative relationship with paranoid ideation. This suggests that positive beliefs about others may reduce paranoid ideation. In this model, unhelpful metacognitive beliefs had a positive relationship with positive beliefs about others and a negative relationship with positive beliefs about oneself.

The observed relationships between metacognitive beliefs and schemas are novel and require further investigation. Our interpretation is grounded in the S-REF model that suggests negative beliefs about oneself and others are a consequence or trigger for repetitive negative processing that is dependent on metacognition. However, given the

cross-sectional nature of the current data and the lack of a measure of perseverative processing in the current study we cannot test this assertion further.

8.5.4 Limitations

The data used in this study is cross-sectional; therefore, the direction of causality between the variables cannot be conclusively determined. The findings are novel and require further investigation using a longitudinal design allowing for tests of mediation as well as moderation. For example, the nature and direction of the relationship between cognitive schemas and metacognitive beliefs requires unravelling and may have implications for clinical formulation when working with people with distressing paranoid thoughts or persecutory ideas. Second, the sample was not epidemiologically representative.

Participants were self-selecting and recruited through circulation of a link to the survey via the university, NHS trust and social media, and the final sample was overwhelmingly female. Third, the study relied on self-report data from a non-clinical sample. Therefore, further exploration of these relationships is required in a clinical population utilising a validated clinician-led interview of persecutory delusions. Finally, model fit statistics could not be computed due to the models containing latent variable by latent variable interactions, which was the focus of our hypotheses. Therefore, the overall model fit between cognitive and metacognitive models could not be compared; likewise, the final model could not be tested for improved goodness of fit.

8.5.5 Clinical implications

These analyses highlight the respective contributions of cognition and metacognition to understanding paranoid ideation and distress. The contributions seem different, in that metacognition contributes to distress whilst schemas appear to correlate with the frequency of paranoid ideation. In clinical practice, this suggests that consideration of metacognitive beliefs may be important to reduce psychological distress and that only targeting the

schemas may reduce the frequency of paranoid ideation but may not necessarily improve the more enduring nature of the relationship that a person with paranoid ideas has with their negative thoughts. Specifically, the reduction of paranoia might act against the practice of experiencing such thoughts in new ways that may have a more profound influence on negative affect.

It has recently been suggested that treating emotional dysregulation in people with experiences of psychosis should lead to reductions in symptoms (Freeman, Dunn, et al., 2013). The metacognitive model provides a specific perspective on emotional regulation that emphasises changing metacognitive knowledge rather than general self-and other-schemas (Wells, 2009). Metacognitive therapy specifically targets positive and negative beliefs about thinking by evaluating and questioning metacognitive beliefs that are associated with prolonged negative affect. This includes the use of attention training techniques and detached mindfulness to manage intrusive thoughts and disengage from perseverative thinking styles that drive symptom maintenance and distress. A recent pilot study of metacognitive therapy in psychosis indicated that the therapy was an acceptable treatment with good adherence and no adverse events (Morrison et al., 2014). In addition, two case studies and a pilot randomised controlled trial utilising the attention training technique have found that this specific technique may reduce distress and increase perceptions of control associated with intrusive thoughts (Levaux et al., 2011; Parker et al., 2016; Valmaggia et al., 2007).

8.5.6 Conclusions

Consistent with the metacognitive model, this study found that metacognitive beliefs might be an important determinant of negative affective states in the context of non-clinical paranoia. Assuming a continuum approach, this finding emphasises the importance of considering metacognitive beliefs in psychological formulation and intervention when

working with people with distressing paranoid and persecutory ideas. The findings are partially consistent with the cognitive model of paranoia that suggests schematic beliefs about oneself and others could have a role in the development of paranoia, but the lack of a moderator effect on negative affect is a weakness. The factors that contribute to the generation and maintenance of paranoid ideas and distress are complex and multifactorial; these findings highlight the importance of different levels of cognition when understanding and treating paranoia.

9 Chapter 9: Discussion

This chapter will summarise the aims and key findings from the six studies conducted in this thesis. The emerging themes will be presented and the overall strengths and limitations of the work will be reviewed. Finally, the relevance of the findings in the context of previous research, psychological theory and clinical practice will be discussed and directions for future research considered.

9.1 Summary of the main aims and key findings

The broad aim of this thesis was to investigate the applicability of the metacognitive beliefs and coping strategies implicated in the Self-Regulatory Executive Function (S-REF) model (Wells & Matthews, 1996) to understanding the maintenance of symptoms and distress in psychosis. The first specific aim was to establish the current empirical position of this area of research. In order to achieve this, a systematic review was conducted and where appropriate meta-analysis was used to quantify the magnitude of the observed relationships. The subsequent aims were to explore the nature of the relationship between metacognitive variables and experiences of psychosis by addressing gaps in the literature and to test hypotheses based on the findings of the two systematic reviews.

9.1.1 Aim one: To establish the current empirical position of the application of the S-REF model to experiences of psychosis

The S-REF model emphasises metacognitive beliefs and specific types of unhelpful coping strategies in the development and maintenance of psychological disorder. Therefore, two systematic reviews were conducted to summarise the evidence relating to these fundamental aspects of the model in relation to experiences of psychosis.

The first review tested the prediction that metacognitive beliefs are associated with psychological disorder and unhelpful thinking styles (e.g. worry/rumination coping strategies) in general, rather than specific diagnoses. This prediction arises out of the

transdiagnostic basis of the S-REF model and a previous review that found limited evidence of symptom-specific associations between metacognitive beliefs and auditory hallucinations (Varese & Bentall, 2011). This review used quantitative methods (i.e. meta-analysis) to compare levels of unhelpful metacognitive beliefs in people with clinical psychosis, people with emotional disorder and people with no psychiatric diagnosis.

The results revealed that compared with non-psychiatric controls, those with psychosis had significantly elevated scores on all five subscales of the Meta-Cognitions Questionnaire (MCQ: Wells & Cartwright-Hatton, 2004). When compared to people with emotional disorder, those with psychosis showed significantly higher scores on positive beliefs about worry, but they did not differ on the other MCQ subscales. The findings suggest that the metacognitive beliefs implicated in the S-REF model are elevated in people with psychosis compared to people without a diagnosis, and there appears to be a high level of similarity between people with psychosis and those with emotional disorders in their elevated scores. This supports the S-REF model, which suggests a common set of metacognitive beliefs may be associated with a vulnerability to psychological disorder and emotional distress rather than specific diagnoses.

The second review used a mixed methods approach to explore three predictions relating to unhelpful coping strategies (i.e. self-focused attention; worry and rumination; and thought control), outlined by Wells (2000, p. 34). As research is less developed in this area, the review included both clinical and non-clinical experiences of psychosis and relied on narrative and statistical synthesis. In particular, relationships between these coping strategies, symptoms and negative affect were explored.

The majority of research discussed in this review demonstrated relationships between unhelpful coping responses and experiences of psychosis. This suggests that the pattern of strategies called the Cognitive Attentional Syndrome (CAS) postulated by the S-REF

model may extend to understanding the maintenance of symptoms and distress in psychosis. Across the included studies there appeared to be several possibilities regarding different mediating pathways and moderating effects. These findings uncovered two important issues for future consideration. First, it is unclear to what extent the relationship between these coping strategies and psychosis is influenced by emotion (i.e. negative affect). That is, whether there are any direct relationships that are independent of anxiety and depression. Second, the direction of relationships or potential pathways through comorbid factors (such as negative affect) and other symptom-specific processes (such as dissociation) requires further investigation.

9.1.2 Aim two: To investigate the relationship between metacognitive beliefs, positive symptoms and negative affect

The second aim was to begin to explore the specific influence of metacognitive beliefs in psychosis. This study used a cross-sectional design to test the relationship between metacognitive beliefs, positive symptoms and negative affect in a sample of people with a diagnosis of psychotic disorder according to the Diagnostic Statistical Manual of Mental Disorders fourth edition (American Psychiatric Association, 2000). The hypotheses were based on the assumptions of the S-REF model and evidence from study 1 that suggest metacognitive beliefs may underlie a general vulnerability to emotional distress transdiagnostically, irrespective of specific symptoms or the characteristics of symptoms (e.g. frequency of intrusions). It was hypothesised that metacognitive beliefs would predict negative affect (i.e. anxiety and depression) over and above symptom frequency and other dimensions of psychotic symptoms captured by the Psychotic Symptoms Rating Scale (PSYRATS: Haddock et al., 1999).

The results revealed that metacognitive beliefs had small positive relationships with topological features (e.g. frequency, attribution and loudness) of auditory hallucinations

and delusions. Topological features had small to moderate positive relationships with anxiety and depression whilst metacognitive beliefs had moderate to large positive relationships with these variables. As predicted, metacognitive beliefs were independent cross-sectional predictors of negative affect when topological features of symptoms (e.g. frequency, attribution and loudness) were controlled. The findings suggest that metacognitive beliefs may be a more important determinant of negative affect than the characteristics of positive symptoms themselves. This is consistent with the S-REF model that prioritises metacognitive beliefs and process variables, rather than characteristics of intrusions and symptoms, as determinants of enduring negative affective states.

9.1.3 Aim three: To investigate the relationship between the use of unhelpful

metacognitive coping strategies on positive and negative outcomes in psychosis

The third aim was to explore the use of cognitive attentional coping strategies (i.e. the CAS) in psychosis. In this study, the validity of a specific measure of cognitive-attentional responses was also tested (i.e. the CAS-1: Wells, 2009, p. 268). The hypotheses were based on the assumptions of the S-REF model and findings from the systematic review that suggest CAS processing may be associated with both positive symptoms and negative affect. It was hypothesised that higher levels of CAS processing would predict negative outcomes (i.e. positive symptoms and negative affect) and lower levels of CAS processing would predict positive outcomes (i.e. quality of life and recovery), whilst controlling for comorbidities. The study utilised a cross-sectional design with a sample of people with a diagnosis of psychotic disorder according to the Diagnostic Statistical Manual of Mental Disorders fourth edition (American Psychiatric Association, 2000).

The results demonstrated good predictive validity and concurrent validity of the CAS-1 measure. Correlational analyses confirmed a moderate positive relationship between CAS-1 scores and the five sub-scales of the MCQ. Consistent with the S-REF model, this

suggests that higher levels of unhelpful metacognitive beliefs are associated with an increased use of maladaptive coping strategies. Subsequent regression analyses revealed the metacognitive belief sub-scale relating to a lack of cognitive confidence was a unique cross-sectional predictor of positive symptoms, once negative affect was controlled. The addition of CAS processing scores did not contribute any further variance in the final model. Across the remaining outcomes (negative affect, quality of life and recovery), negative metacognitive beliefs relating to the uncontrollability and danger of thoughts emerged as a consistent and unique predictor once comorbidities were controlled. Elevated levels of these beliefs predicted higher levels of negative affect and lower levels of self-reported quality of life and recovery. This important finding suggests metacognitive beliefs may be a stronger determinant of subjective wellbeing, recovery and fulfilment than psychotic symptoms themselves. Again, the addition of CAS processing scores did not contribute any further variance in the final models.

9.1.4 Aim four: To test the effect of manipulating metacognitive beliefs on paranoid thoughts and negative affect

The fourth aim was to test the effect of experimental manipulation of metacognitive beliefs (specifically uncontrollability and danger beliefs) on intrusion frequency and state anxiety. Metacognitive beliefs were manipulated using a fake-EEG paradigm in a sample of students with frequent paranoid ideation. Paranoia was primed using three video clips from Greater Manchester Police relating to student safety. Based on the S-REF model and previous research it was hypothesised that participants allocated to the belief manipulation condition would experience more intrusive threat-related thoughts, because of unhelpful attempts to control them (i.e. rebound effects); would experience greater discomfort in response to a threat-related thought; and would experience higher levels of state anxiety.

The results of the primary analyses did not reveal statistically significant differences between the experimental and control group in self-reported ratings of intrusion frequency, effort in controlling intrusions and general discomfort, following the belief manipulation. In terms of the secondary outcomes, self-reported levels of anxiety at time two did not differ significantly between the experimental and control group when controlling for self-reported anxiety at time one. Between-group differences in physiological ratings of anxiety using Galvanic Skin Response (GSR) approached significance at time two when controlling for baseline GSR readings. Consistent with predictions, physiological anxiety was higher in the experimental condition.

Whilst the findings were not statistically significant, the study was an interesting proof of concept of the experimental paradigm. First, the metacognitive belief manipulation was successful. This demonstrated it is possible to manipulate metacognitive beliefs in an experimental setting. Second, the paranoia prime was effective. This demonstrated the choice of the stimulus was relevant. Third, the direction of effects on outcome variables was as expected. This suggests future research using this paradigm could benefit from a more sensitive measure of intrusions to capture greater variability between the experimental and control groups, a larger sample size to give more statistical power to detect smaller effect sizes, or a clinical sample whereby subtle changes in metacognitive beliefs may have a greater impact.

9.1.5 Aim five: To investigate the role of both cognitive schemas and metacognitive beliefs in non-clinical paranoia

The final aim was to investigate the combined role of cognitive and metacognitive beliefs in non-clinical paranoia. The study used a cross-sectional design in a sample of people from the general population that did not have a history of psychiatric illness. A series of hypothesised structural equation models were tested based on a cognitive and

metacognitive model of paranoia. Specifically, the study investigated whether metacognitive beliefs and/or schemas moderate the relationship between paranoia and negative affect.

The analyses indicated that unhelpful metacognitive beliefs moderated the relationship between paranoia and negative affect. Increased endorsement of negative beliefs about oneself, but not other people, predicted negative affect but did not moderate the relationship between paranoia and affect. Positive beliefs about oneself had a negative relationship with negative affect and positive beliefs about others had a negative moderating effect on negative affect. A final model combining both cognition and metacognition suggested schemas predict paranoid ideation and metacognitive beliefs moderate negative affect.

The findings are consistent with the S-REF model (Wells & Matthews, 1996) that proposes beliefs about thoughts (rather than the content of thoughts) contribute to negative affect. The findings are partially consistent with the cognitive models outlined by Freeman et al. (2002) and Fowler et al. (2012) that suggest people's beliefs about themselves and others have significant relationships with paranoia frequency and negative affect. It adds to these approaches by suggesting that metacognitive beliefs may play a role in determining the strength of these relationships.

9.2 General discussion

The findings of this thesis demonstrate the metacognitive beliefs and coping strategies implicated in the S-REF model share meaningful relationships with experiences of psychosis. A number of key themes have emerged regarding the nature of this relationship. The most consistent finding is metacognitive beliefs appear to influence distress (i.e. negative affect), and this effect is independent of positive symptoms. This may have important clinical implications when working with people with distressing

experiences of psychosis and emotional comorbidities. The second prevailing theme is the emergence of transdiagnostic processes as potentially important predisposing and maintaining factors in relation to positive symptoms and affective response. Some of these relationships require further unravelling; a better understanding is needed of if, and how, these general processes might interact with symptom-specific factors. The third theme relates to the psychosis continuum approach. Given that metacognitive variables appear to influence negative affect, quality of life and recovery, they may be mechanisms of interest that predict greater distress and impact on functioning. These variables, in turn, have been associated with the transition to clinical psychosis (Peters, Day, et al., 1999; Peters, Joseph, & Garety, 1999). The final theme relates to the measurement of metacognition. The studies have demonstrated that the generic measure of metacognitive beliefs (i.e. the MCQ-30: Wells & Cartwright-Hatton, 2004) and associated coping strategies (i.e. the CAS-1: Wells, 2009, p. 268) may be useful assessment tools when working with people with psychosis. However, other symptom-specific measures, such as the Beliefs about Paranoia Scale (BaPS: Gumley et al., 2011) and the Interpretation of Voices Inventory (IVI: Morrison, Nothard, et al., 2004) may be beneficial to understanding symptom frequency and engagement with specific phenomena.

9.2.1 Psychosis, metacognition and emotion

The findings in this thesis suggest metacognitive beliefs, and the coping strategies they drive, may have an important relationship with emotion. On the one hand, the observed relationships between metacognition and psychosis may be an artefact of emotional comorbidities (i.e. anxiety and depression). Even so, these findings are still highly relevant because negative affective states appear to have an influential role in the onset and course of psychosis. Several studies have noted that anxiety and depression seem to increase during the psychosis prodrome (Yung & McGorry, 1996), and a recent cohort study found a dose-response relationship between affective dysregulation and sub-clinical experiences

of psychosis (Van Rossum et al., 2011). A recent meta-analytic review found that anxiety and depression are common in people with psychosis (Hartley et al., 2013). Moreover, evidence suggests that negative affect may directly influence the content of symptoms such as auditory hallucinations and delusional beliefs (Freeman & Garety, 2003). Therefore, the investigation of factors associated with negative affect may have important implications for psychological models and treatment of psychosis.

These findings are consistent with previous studies that found unhelpful metacognitive beliefs are associated with increased distress (e.g. Hill et al., 2012; van Oosterhout et al., 2013) and a more severe and chronic course of illness (Austin et al., 2015) in psychosis. These findings also extend previous research as they demonstrate new links between metacognition, emotion and psychosis. In particular, they build on a previous review by Varese and Bentall (2011) that found limited evidence of symptom-specific associations between metacognitive beliefs and experiences of psychosis. Instead, the findings demonstrate that metacognitive beliefs may have important relationships with negative affect, quality of life and recovery. Moreover, this relationship appears to be independent of the frequency or severity of positive symptoms. Furthermore, exploratory analyses using structural equation modelling demonstrated how cognition (i.e. schemas) and metacognition (i.e. metacognitive beliefs) may jointly influence paranoia frequency and negative affect.

These findings have implications for theory and clinical practice. Consistent with the S-REF model, the findings indicate that metacognitive beliefs may be associated with a vulnerability to psychological disorder and emotional dysregulation, rather than specific diagnoses or symptoms. They support the prediction unhelpful coping strategies may be used in response to emotional distress, and may inadvertently enhance or maintain negative affective states rather than reduce them, although this latter part requires further

investigation. The findings are also consistent with the idea that the separation between psychosis and emotional disorders may not be useful (Freeman & Garety, 2003), as they seem to share the same underlying metacognitions.

9.2.2 *Psychosis and transdiagnostic factors*

Across the studies in this thesis, there was limited evidence of a direct relationship between particular beliefs or strategies and particular psychotic symptoms. As such, it is clear symptom specific factors remain important. The way transdiagnostic metacognitive beliefs and coping strategies interact with other disorder-specific factors is an interesting and important area of enquiry.

The symptom-based approach to psychosis highlights associations between specific symptoms and particular misattributions or reasoning biases (e.g. Bentall, 1993; Morrison et al., 1995). For example, auditory hallucinations are proposed to arise from the misattribution of internally generated events to an external source (Bentall, 1990) and have also been closely linked to dissociative experiences (Pilton, Varese, Berry, & Bucci, 2015). Delusional beliefs are thought to be related to biases in reasoning whereby a person is more likely to make decisions based on limited evidence (Dudley & Over, 2003). These relationships have been supported by systematic reviews and meta-analyses (Brookwell, Bentall, & Varese, 2013; Dudley et al., 2015; Pilton et al., 2015).

In the studies in this thesis, the evidence that particular aspects of metacognition might predict particular diagnoses or symptoms was inconsistent. In the meta-analysis, positive beliefs about worry emerged as higher in psychosis samples compared to emotional disorder samples whilst other metacognitive beliefs did not. However, this was not consistent with the findings of the second review and meta-analysis that found people with psychosis used significantly less worry than people with emotional disorder did. If people with psychosis hold stronger positive beliefs about worry then we might have expected to

see a greater use of worry strategies in this group. Given these beliefs reflect the advantages of engaging in enhanced cognitive processing (i.e. worry, rumination and threat monitoring) they may reflect a response to distressing intrusions (e.g. persecutory ideas or auditory hallucinations). Therefore, it is possible that these findings are the result of emotional factors (such as anxiety and depression) that could not be controlled in the meta-analyses (e.g. using meta-regression). This explanation is commensurate with study 3 that found positive beliefs about worry predicted anxiety when characteristics of hallucinations and delusions were controlled.

In study 4, the metacognitive belief relating to a lack of cognitive confidence emerged as a unique cross-sectional predictor of positive symptoms when negative affect was controlled. There are plausible explanations for this finding that require further investigation. One possibility is that people who lack confidence in their memory and attention may be more likely to make external attributions of their intrusive experiences. These judgements may arise from actual or perceived problems with memory, attention and reasoning. Cognitive deficits, such as reduced performance on tasks related to memory and executive function (Heydebrand et al., 2004), have demonstrated relationships with negative symptoms of psychosis (P. D. Harvey, Koren, Reichenberg, & Bowie, 2006). This relationship is consistent with people that have been treated with antipsychotic medication as well as those that are untreated (Malla et al., 2002). Moreover, it has recently been suggested that the relationship between cognitive impairment and negative symptoms is mediated by defeatist beliefs (Grant & Beck, 2009). Defeatist beliefs refer to overly generalised negative beliefs about one's task performance (Beck et al., 2009, p. 152). Therefore, heightened levels of metacognitive beliefs relating to a lack of cognitive confidence may reflect the consequences of comorbid symptoms or processes, such as negative symptoms or cognitive impairment. Alternatively, research that has examined the subjective experience of people taking antipsychotic medication has highlighted common themes

which relate to feelings of sedation and cognitive impairment (Longden & Read, 2016; Moncrieff, Cohen, & Mason, 2009). As such, these metacognitive beliefs may reflect the sedative effects of antipsychotic medications that can also affect cognitive processes.

In the narrative review, some aspects of attentional focus (i.e. public self-consciousness) appeared to predict paranoia and delusional beliefs, whilst other's (i.e. private self-consciousness and cognitive self-consciousness) appeared to predict hallucinations. This finding appears logical given that public self-consciousness refers to a heightened awareness of the self as a social object (Fenigstein, 1984), whilst cognitive self-consciousness refers to an enhanced awareness of inner events and thoughts (Palmier-Claus et al., 2013). For example, people who are more focussed on themselves in a social context may be more hyper-vigilant towards signs of threat from others, and may consequently misinterpret the actions or intentions of others. Likewise, people who pay greater attention to their thoughts and inner events may detect a greater number of anomalies or may experience them with greater intensity, which may result in a predisposition to hallucinatory experiences.

There was less consistency in associations between particular types of perseveration and particular experiences of psychosis (e.g. hallucinations). This suggests that some general attentional biases may be more predisposing to particular experiences depending on whether attention is directed towards internal or external stimuli, whilst a perseverative processing style may lead to a general proneness to increased intrusions and distress, rather than to specific symptoms. However, general CAS processing did not appear to predict positive or negative outcomes in study 4 once the effect of metacognitive beliefs was controlled. This may be a reflection of the sensitivity of the CAS-1 measure used in the study, and future studies may instead use measures of self-focused attention as generic markers of the CAS.

These findings expand on current transdiagnostic research as they highlight the importance of underlying metacognitive beliefs in relation to negative affect across diagnoses, and when the effect of positive symptoms are controlled in psychosis. The findings also demonstrate that negative metacognitive beliefs may influence perceptions of quality of life and recovery, which is a novel finding. In study 3 and 4, negative metacognitive beliefs had stronger positive correlations with negative affect, and stronger negative correlations with quality of life and recovery, than symptoms of psychosis. Negative metacognitive beliefs were also a unique cross-sectional predictor of negative affect, quality of life and recovery when symptoms of psychosis were controlled. In these two studies, two different measures of psychotic symptoms were used (i.e. the PANSS that captures global symptoms and the PSYRATS that captures topological characteristics of positive symptoms). These findings suggest the way that a person relates to their thoughts may be a more important determinant of subjective wellbeing than the severity or characteristics of positive symptoms themselves. It further highlights the potential importance of examining the beliefs that underlie the interpretation of intrusive thoughts, as well as the content of them. However, this clearly does not undermine the importance of disorder-specific or symptom-specific factors to understand the variable and often complex presentation of people with psychosis. It remains to be seen whether attentional biases (i.e. private and public self-consciousness) may interact with symptom-specific processes that implicate attention (such as source monitoring or dissociation) in relation to hallucinatory phenomena. Alternatively, there may be relationships between cognitively demanding coping strategies (i.e. threat monitoring and perseverative processing) or beliefs in one's cognitive ability (i.e. cognitive confidence), and one's ability to reason and consider evidence (e.g. a tendency to jump to conclusions).

9.2.3 *The psychosis continuum*

The studies in this thesis support a continuum approach to psychosis. The approach assumes that people may experience symptoms of psychosis (such as hallucinations or unusual beliefs) at differing levels of severity in the absence of a psychiatric disorder (Van Os et al., 2009). The two non-clinical studies found evidence of paranoid ideation in a student sample and a general population sample. This fits with previous research that suggests paranoia lies on a continuum of severity that can be observed and measured in people without a psychiatric diagnosis (Freeman, 2006; Freeman, Dunn, et al., 2005).

Previous research has suggested that distress is a key factor that distinguishes clinical from non-clinical populations in their unusual beliefs and experiences (Peters, Day, et al., 1999; Peters, Joseph, et al., 1999). A consistent finding across the clinical studies in this thesis was metacognitive beliefs appear to predict higher levels of distress (i.e. negative affect). The experimental manipulation of negative metacognitive beliefs in a student sample did not lead to a statistically significant difference in the number of paranoid intrusions or self-reported anxiety. However, there was some indication this may have also led to an increase in physiological anxiety measured using galvanic skin response. The structural equation models in study 6 revealed metacognitive beliefs moderate the relationship between paranoid ideation and negative affect in the general population.

These findings support and extend previous research. Collectively, they suggest that unhelpful metacognitive beliefs might be implicated in transition to clinically relevant experiences of psychosis given that they appear to influence distress. Consistent with this, previous research has demonstrated that higher levels of negative metacognitive beliefs are associated with the transition to clinical psychosis in at-risk samples (Barbato et al., 2013; Morrison, Bentall, et al., 2002). The findings also suggest that if paranoid thoughts and hallucinatory phenomena are commonly occurring phenomena, then it may not be the

characteristics of the experiences themselves that make them pre-occupying and distressing but the presence of elevated unhelpful metacognitive beliefs.

9.2.4 Measurement of metacognition in psychosis

Within this thesis, the measurement of metacognition was restricted to those measures that capture beliefs and processes explicitly implicated in the S-REF model. This was because the overarching aim of the thesis was to investigate the applicability of this particular model to distressing experiences of psychosis. Across the studies, the MCQ demonstrated good reliability. In addition, the patterns of relationships in relation to negative affect were as expected. This supports the use of the MCQ in research concerning experiences of psychosis and metacognition.

The CAS-1 (Wells, 2009, p. 268) was validated for the first time in a clinical psychosis sample in study 4. The scale showed good internal consistency, and commensurate with research in emotional disorder (i.e. Fergus et al., 2012) this was improved by adjusting the scores to fit one scale of measurement to produce a total score. The alternative is to have two sub-scales (i.e. beliefs and processes); the reliability of this was lower but acceptable. The total scale also demonstrated good predictive validity and concurrent validity.

However, when the CAS processing subscale was used alongside the MCQ, these scores did not predict symptoms, negative affect, quality of life or recovery. This was unexpected as the S-REF model predicts that the CAS maintains distress. As such, it was expected that when beliefs were controlled the CAS would contribute to these outcomes.

This may be because the MCQ is a trait measure, and captures beliefs that are relatively stable. Conversely, the CAS-1 is a state measure and captures processes in the last week that are likely to fluctuate. Therefore, administering this measure at a single time point may not capture its true variability. Alternatively, given that metacognitive beliefs also demonstrated consistently higher correlations with outcomes (i.e. affect), the underlying

beliefs may be a more important determinant of outcome than processing scores. On balance, it appears the MCQ may be a more comprehensive and reliable measure of metacognitive beliefs. As such, future research aiming to measure metacognitive beliefs should use the MCQ rather than the CAS-1. The CAS-1 may provide an alternative measure where time and participant burden are important factors, such as session-by-session measurement of metacognition during therapy.

Given that the MCQ did not reveal consistent relationships with positive symptoms, alternative symptom-specific measures of metacognitive beliefs should also be considered. For example, metacognitive beliefs relating to paranoia can be measured using the Beliefs about Paranoia Scale (Gumley et al., 2011; Morrison et al., 2005). Research using this scale suggests that positive beliefs about paranoia as a survival strategy are associated with the frequency of paranoid ideation in both non-clinical and clinical samples (Morrison et al., 2005; Morrison et al., 2015; Murphy et al., 2017), whilst negative beliefs about paranoia appear to be implicated in increased negative affect and clinical status (Gumley et al., 2011; Morrison et al., 2011). Similarly, metacognitive beliefs about voices can be measured using the Interpretation of Voices Inventory (IVI: Morrison, Wells, et al., 2002). Research using this scale has revealed a similar pattern of findings whereby positive beliefs about voices appear to predict hallucinations, and negative beliefs about voices tend to be associated with emotional or troublesome dimensions of voices (Morrison, Nothard, et al., 2004; Morrison, Wells, et al., 2002). Therefore, whilst the generic metacognitive beliefs captured by the MCQ may be important markers for unhelpful thinking styles that increase or maintain general negative affective states (i.e. anxiety and depression), other symptom-specific measures may provide important insight into the maintenance of particular symptoms.

9.3 Strengths and limitations

The methodologies utilised in this thesis have a number of strengths and limitations that should be noted prior to considering the applicability of the findings to theory and clinical practice. The core strength of this collective work is the multi-method approach. The methods used were robust and utilised different statistical techniques, which enabled a comprehensive approach to addressing the research questions, which were derived from the S-REF model and existing evidence. The systematic reviews established the current status of empirical work in this area, identified gaps in the literature and informed directions for future research. The cross-sectional studies tested the concurrent relationships between several variables whilst controlling for comorbidities, and investigated hypothesised pathways and moderating effects using structural equation modelling. Finally, the experimental design enabled a direct test of metacognitive belief manipulation, which allows greater certainty regarding causal inferences.

The second strength of this work is the use of different samples (i.e. clinical and non-clinical) and the suitability of the sample sizes. Sample size calculations were conducted to inform recruitment prior to data collection for studies 4, 5 and 6; and to ensure the feasibility of the proposed analysis of secondary data in study 3. Therefore, the statistical analyses undertaken were appropriately powered. The studies used a combination of non-clinical and clinical samples. This allowed for examination of the relationships between experiences of psychosis and metacognition at differing levels of severity. The clinical samples included a diverse range of participants with psychosis (including people taking medication and people not taking medication; as well as participants from two different countries). This may increase the generalizability of the findings across the patient group.

A third strength of this work is the selection of measurement of the variables. The measurement of metacognition was restricted to those measures that are explicitly related

to the S-REF model. This allowed for tests of the specific hypotheses of this particular approach. In addition, the outcome measures were varied. This enabled the relationship between psychosis and metacognition to be investigated in relation to both positive and negative outcomes. This included clinician assessed symptoms using semi-structured interviews, self-reported negative affect, physiological affect (i.e. galvanic skin response), self-reported quality of life and self-reported recovery.

In terms of limitations, the majority of research in this thesis is cross-sectional. Therefore, conclusions about the direction of causality cannot be reliability established. This is particularly relevant to study 3 and 4 but can also be applied to study 6 whereby the direction of the associations in the structural equation models being tested are hypothesised by psychological theory rather than confirmed by the data. However, the use of experimental methods in study 5 was a strength and allowed for a more robust test of the relationships observed in the cross-sectional studies. This area of research would be strengthened by further experimental and longitudinal research. Longitudinal research would allow for temporal relationships between metacognition, symptoms and affect to be tested. Alternatively, subjective qualitative studies may help to understand better how people with psychosis relate to their intrusive thoughts, and how the beliefs they have about them impact on how they feel and try to cope with them. This would enable further exploration beyond self-report measures that only permit limited responses along a Likert scale.

Whilst the benefits of the samples used have been discussed above, the samples may have been limited by the recruitment methods. In terms of the non-clinical samples, the student sample and the general population sample were self-selected. The student sample was comprised exclusively of undergraduate psychology students and they all received course credits for taking part. Hence, this was a specific subset of students that may have prior

knowledge of the subject area and may have been motivated to take part by the course incentive. The general population sample was also self-selected and recruitment took place exclusively online. Whilst this approach had numerous practicalities relating to efficiency, low burden and confidentiality, it may have excluded people that do not have regular access to the internet. In addition, whilst the link to the survey was made available on social media, the primary recruitment method was email circulation by the university and NHS trust. This may limit the potential pool of respondents. Moreover, those that took part may have had a specific interest in the area. Consistent with this, the predominance of respondents were NHS employees.

In terms of the clinical samples, recruitment was predominantly determined by the selection of service-users by their care coordinator or a relevant mental health professional. This could have led to a form of selection bias where only particular sub-groups of service users were approached. For example, care coordinators may be more likely to refer people they believe to be more appropriate, higher functioning, more actively engaged with the team and more motivated. This could affect the generalizability of the results.

The predominant use of self-report outcome measures across the studies may be a limitation. This is open to a range of biases. For example, it relies on respondents giving honest answers and not answering in a way that seems desirable or how they think the researcher may want them to. Moreover, self-report measures comprised of Likert scales are useful to quantify relationships between constructs but they lack qualitative insight into people's subjective experiences. This may limit the extent to which the personal experience of beliefs about intrusions and the use of coping strategies can be understood in relation to symptoms, negative affect and recovery.

Finally, the focus of this thesis was purely on the metacognitive factors incorporated in the S-REF model. Alternative aspects of metacognition were not considered, and it could be

of interest to see how these are related. For example, Moritz and colleagues approach also prioritises information-processing biases. However, they focus on metacognitive awareness of reasoning biases that are associated with delusional beliefs (Moritz et al., 2016). Metacognitive beliefs or unhelpful coping strategies implicated in the S-REF model may be associated with these biases. The approach described by Lysaker and colleagues prioritises a person's knowledge of their own and others mental states, and their ability to use this to cope with distress and manage relational problems (MacBeth et al., 2016). This approach appears especially relevant to negative symptoms in people with psychosis (e.g. Lysaker et al., 2011; MacBeth et al., 2016; Trauelsen et al., 2016), but has also demonstrated transdiagnostic applicability to interpersonal functioning and regulation of affect (Gumley, 2011). It is possible the measurement of metacognitive awareness in this approach (i.e. metacognitive awareness of oneself and others) will relate to metacognitive beliefs (e.g. perceptions of one's own thoughts as uncontrollable and dangerous, or cognitive confidence beliefs), given that both measures have demonstrated transdiagnostic relationships with emotional dysregulation.

9.4 Implications

9.4.1 Theoretical implications

Overall, the findings in this thesis support the application of the S-REF model to understanding distressing experiences of psychosis. Metacognitive beliefs, in particular, appear to be influential. Consistent with the S-REF model, the findings support the assumption that a common set of metacognitive beliefs are associated with a vulnerability to psychological disorder in general and the prolongation of negative affect, rather than being associated with specific diagnoses. The S-REF model prioritises the way a person thinks, rather than the content and characteristics of intrusive experiences, as a determinant of emotional distress. Commensurate with this, the findings of this thesis found that metacognitive beliefs predicted positive and negative outcomes in psychosis over and

above the severity of positive symptoms assessed using the PANSS (Kay et al., 1987) and topological features measured using the PSYRATS (Haddock et al., 1999). This supports the prevailing view that negative metacognitive beliefs may be a better predictor of general (transdiagnostic) psychological distress, rather than specific symptoms (e.g. Hill et al., 2012; Varese & Bentall, 2011).

In terms of metacognitive coping strategies (i.e. the CAS), there was less evidence to support the specific predictions of the S-REF model in relation to psychosis. The systematic review found that the model predictions concerning the effects of worry and rumination were supported in the literature. It found evidence to support the role of self-focused processing in relation to experiences of psychosis. However, there was limited evidence to address specific predictions in relation to thought control strategies, such as how they might influence intrusion frequency and distress. Study 4, which explicitly aimed to test predictions relating to the CAS, found only partial support that this form of processing predicts outcome in psychosis. However, as discussed above this may have been due to measurement issues.

The findings of this thesis also support cognitive models that recognise the importance of pre-morbid and co-occurring emotional factors in psychosis (e.g. Garety et al., 2001; Morrison, 2001). In particular, they support the notion that the separation between psychosis and emotional disorders may not be useful (Freeman & Garety, 2003). This is supported by findings that psychosis and emotional disorder may share important underlying beliefs and processes that maintain affective responses to intrusions. The findings also support the role of a person's beliefs about themselves and others (i.e. cognitive schemas) in experiences of psychosis, as suggested by Fowler et al. (2012). The structural equation models suggested schemas predict paranoid ideation whilst metacognition moderates negative affect.

The shortcomings of the present findings (i.e. the lack of symptom-specific associations) highlight the importance of considering symptom specific mechanisms such as source monitoring (Bentall, 1990), dissociation (Pilton et al., 2015) and reasoning biases (Dudley & Over, 2003), alongside transdiagnostic processes. Finally, the findings support the continuum approach that suggests experiences of psychosis can be observed and measured at different levels of severity within the general population (Van Os et al., 2009). This is evidenced by the measurement of paranoia in the non-clinical samples, and the suggestion that metacognition may be an important mechanism in transition to clinically relevant distressing symptoms of psychosis.

9.4.2 Clinical implications

The findings in this thesis support the consideration of metacognition when working with people with psychosis. In terms of assessment, clinical formulations may benefit from the incorporation of metacognitive beliefs that drive unhelpful cognitive, attentional and behavioural responses. In particular, the MCQ may provide a reliable tool for assessing the way a person relates to their thoughts in terms of their general positive and negative metacognitive beliefs. Given that these beliefs are closely related to distress and subjective well-being, this may be beneficial when working with people with psychosis that have a high level of anxiety or depression. However, alternative symptom-specific measures of metacognition (i.e. the BaPS and IVI) may be valuable to understand the beliefs that underpin particular symptoms.

In terms of metacognitive coping strategies, the two sub-scales of the CAS-1 may be useful as a repeated in-session measure of engagement with unhelpful coping strategies over the past week and changes in metacognitive beliefs. The measure is brief and low burden, and may, therefore, be more easily administered in time-restricted therapy sessions. However, the MCQ appears to be more reliable and may provide a better indication of clinically

meaningful change given that this measure predicted negative affect, quality of life and recovery whilst the CAS-1 did not.

The findings also support consideration of the metacognitive therapy approach in psychosis. The National Institute for Clinical Excellence (NICE) currently recommends Cognitive Behaviour Therapy (CBT) for the psychological treatment of psychosis (National Institute for Health and Care Excellence, 2014). Systematic reviews and meta-analyses of the efficacy of CBT for psychosis have demonstrated small to moderate effect sizes for this treatment approach (e.g. Jauhar et al., 2014; Wykes et al., 2008). This suggests there is room for improvement and refinement of psychological approaches to treating psychosis. Consistent with this, there is a growing trend for CBT for psychosis to focus less on faulty thinking, and to incorporate additional strategies that may address different aspects that contribute to a person's difficulties. This includes techniques that address both cognitive and metacognitive components, such as schemas, interpersonal relationships, emotional regulation and information processing (i.e. attentional biases) (Tai & Turkington, 2009). It has recently been suggested that treating emotional dysregulation in psychosis may lead to reductions in symptoms (Freeman, Dunn, et al., 2013). The metacognitive model provides a specific perspective on emotional regulation that emphasises changing metacognitive knowledge. There are a number of instances where consideration of the application of this approach may be particularly appropriate.

First, metacognitive therapy techniques may be useful in treating people with psychosis that present with a high level of negative affect and, where this is contributing to their difficulties. Previous research has indicated negative emotional states increase during the psychosis prodrome (e.g. Debbane et al., 2009; Yung & McGorry, 1996), and high rates of affective symptoms (such as anxiety and depression) are a common comorbidity of psychosis (Hartley et al., 2013; Marwaha et al., 2014). Moreover, the effect between

negative affect and experiences of psychosis is thought to be bi-directional and follow a dose-response relationship (Van Rossum et al., 2011). Metacognitive therapy specifically targets positive and negative beliefs that drive unhelpful responses by evaluating and questioning the metacognitive beliefs that underpin them (Wells, 2009, p. 51). As such, this may be a useful intervention in people at risk of psychosis where negative affect may exacerbate the emergence of symptoms. It may also be helpful for people with psychosis where anxiety is causing a high level of avoidance that is affecting their functioning, or where excessive perseverative processing is affecting low mood. A recent pilot study of metacognitive therapy in treatment-resistant psychosis indicated that the therapy was feasible and acceptable to deliver. In addition, adherence was good and there were no adverse effects (Morrison et al., 2014). In relation to emotional disorder, a recent meta-analysis suggested that metacognitive therapy is effective in reducing symptoms associated with anxiety and depression, and that changes in metacognitive beliefs may be a better predictor of outcome than changes in schemas (Normann et al., 2014). As such, techniques aimed at changing the higher-order beliefs responsible for attention and processing may be more helpful than evaluating beliefs about oneself and others. Overlooking metacognitive beliefs in traditional CBT may fail to address the factors that influence the implementation of new adaptive coping responses.

Second, given that metacognitive therapy prioritises process over content, this may be helpful for people with psychosis that struggle to talk about their experiences in detail. Attention training techniques (Wells, 1990, 2007) and detached mindfulness (Wells, 2005) can be used to manage intrusions and disengage from prolonged processing that is associated with the maintenance of symptoms and distress. Preliminary investigation of the usefulness of the attention training technique in psychosis has begun. This technique aims to disrupt and modify unhelpful attentional bias towards threat (i.e. intrusive thoughts and voices or environmental monitoring). Two case studies and a pilot randomised

controlled trial have found the technique may reduce distress and increase perceptions of control associated with intrusive thoughts (Levaux et al., 2011; Parker et al., 2016; Valmaggia et al., 2007). However, this research remains in its infancy and the findings should be interpreted with caution due to the small samples.

There is also a growing body of evidence to suggest the modification of coping strategies dominated by perseveration may reduce delusional ideation and distress. In the single symptom approach advocated by Freeman et al. (2015), worry has been therapeutically targeted as a causal factor for the maintenance of persecutory delusions. A recent pilot trial found that a four-session intervention aimed at reducing worry in people with persecutory delusions significantly decreased time spent worrying and reduced distress at the eight-week follow-up. There was also a reduction in paranoid ideation, however, this was not statistically significant (Foster et al., 2010). A recent randomised controlled trial demonstrated that a six-session worry-based intervention led to significant reductions in worry and delusions at the end of treatment. This was maintained at a 24-week follow-up (Freeman et al., 2015).

9.5 Future directions

This thesis has extended findings in the field of metacognition and psychosis. First, the work has demonstrated similarities between the metacognitive beliefs endorsed and the coping strategies used by people with psychosis and people with emotional disorder. Second, it has started to unravel the relationships between metacognitive beliefs, positive symptoms and negative affect. Third, it has explored associations between cognitive beliefs, metacognitive beliefs, symptoms and distress. However, this thesis has also highlighted areas that require further investigation and clarification.

First, there is clearly a need for more longitudinal research. This will address the core criticism uncovered by the systematic reviews, that the majority of work in this area is

cross-sectional. Longitudinal work will help to test the direction of the relationships between metacognition, psychosis and affect revealed in studies 3 and 4. Moreover, it will allow for further tests of the interpretation and direction of the pathways hypothesised in the structural equation models presented in study 6. Whilst the prevailing view is that metacognitive beliefs do not have a causal relationship with particular symptoms, a better understanding of the pathways between metacognition, symptoms and affect would be helpful. This could help to inform psychological intervention for people at risk of developing psychosis to prevent transition. That is, whether negative affect, intrusion content or the way in which people relate to their thoughts (i.e. metacognitive beliefs) should be the focus. It could also help to inform the sequencing of techniques in therapy that may target different problems (e.g. emotions, intrusions or perseverative cognitive attentional processing).

Second, further experimental work is needed. Study 5 demonstrated that metacognitive beliefs could be manipulated in an experimental setting. The results of the primary analyses in this non-clinical sample were not statistically significant. However, this does not undermine the importance of further work of this type. Subsequent research might test the effect of metacognitive belief manipulation on different symptoms (e.g. hallucinatory phenomena) and in different populations (i.e. clinical and non-clinical). Numerous studies have manipulated coping responses (i.e. worry, rumination and attentional focus) but the manipulation of metacognitive beliefs remains relatively novel. This will enable greater confidence in causality between the effect of metacognitive beliefs on negative affect and/or positive symptoms.

Further work should focus on gaining a wider understanding of how transdiagnostic metacognitive variables interact with symptom-specific mechanisms. This research should aim to unravel the pathways through which metacognitive beliefs and coping strategies

interact with other factors known to influence symptoms of psychosis, such as source monitoring, reasoning biases and dissociation. This would provide a more holistic view of clinical experiences, and would help to unpick how these transdiagnostic factors underlie and influence such a diversity of presentations.

Overall, it appears that research concerning metacognitive beliefs is relatively well developed. Relationships between metacognitive beliefs and psychological distress are well established, albeit it in need of further clarification of causation. Likewise, research concerning perseverative processing is expanding. However, investigation of some specific aspects of the S-REF model in relation to psychosis remains under-developed. In particular, the role of thought control strategies requires further investigation. That is, whether they have any specific relationships with the onset and/or maintenance of symptoms and/or distress; or whether they are a response to negative affect.

A final area of future development is the need for further research into the application of metacognitive therapy to psychosis. Currently, this evidence is limited to feasibility studies (i.e. Morrison et al., 2014; Parker et al., 2016) and case studies (i.e. Levaux et al., 2011; Valmaggia et al., 2007). Further research using randomised controlled designs with sample sizes for adequate statistical power are required. Such trials could further test the efficacy of metacognitive therapy as a treatment package, as well as individual techniques incorporated in the therapy, such as attention training and detached mindfulness. In particular, attention training and detached mindfulness may be cost-effective brief interventions that can be delivered within a small therapy window (i.e. across a short number of sessions), within primary and secondary mental health care services.

9.6 Conclusions

The studies in this thesis have produced a number of novel findings, which indicate the metacognitive beliefs and processes implicated in the S-REF model are related to

psychosis in significant and meaningful ways. In particular, it seems that metacognitive beliefs may be an important determinant of negative affect and subjective wellbeing. This is consistent with the transdiagnostic assumptions of the S-REF model that assumes it is the way a person relates to their thoughts, rather than the content of their thoughts, that influences distress. Moreover, the clinical studies demonstrated the relationship between metacognition and negative affect is independent of the severity of positive symptoms captured by the PANSS, or the topological characteristics measured by the PSYRATS. The findings further indicated that cognitive schemas (i.e. unhelpful beliefs about oneself and others) and metacognitive beliefs (i.e. the way a person appraises particular thoughts) might have a differential effect on paranoia. This supports the investigation of both cognition and metacognition in relation to psychosis. Finally, the findings demonstrated that metacognitive beliefs are amenable to experimental manipulation. Overall, it appears that unhelpful metacognitive beliefs may be a maintenance factor for symptoms but are perhaps particularly important in the development of negative affect. What remains to be uncovered is how these transdiagnostic factors interact with symptom-specific factors in psychosis and the direction of causality. This body of work has provided a foundation for exploring these questions that may have important implications for clinical practice.

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Appendix 1: Assessment tool for the quality of observational studies adapted from the Agency for Health Care Research and quality (Williams et al. 2010) and a systematic review of self-harm in people at risk of psychosis (Taylor et al. 2015)

Quality of observational studies

Study ID:

Study design:

General instructions: Grade each criterion as “Yes,” “No,” “Partially,” or “Can’t tell.” Factors to consider when making an assessment are listed under each criterion. Note that some criteria will only apply to specify types of study.

Criterion	Present	Evidence/comments
Unbiased selection of the cohort		
Inclusion/exclusion criteria clearly described		
Criteria for inclusion or sub-samples clearly described		
Sub-samples selected using validated measures		
Recruitment strategy clearly described		
Sample is representative of the population of interest		
Recruitment strategy relatively free from bias (e.g. bias by advertising or convenience etc.)		
Selection minimises baseline differences in prognostic factors (for controlled studies)		

Was selection of comparison group
appropriate?

**Sample size calculated (for controlled studies and where studies test for
predictors/correlates of psychotic experiences)**

Did the authors report a power analysis or
other basis for determining the adequacy of
group sizes?

Did the eventual sample size deviate by
<10% of the sample size suggested

Adequate description of the cohort

Is the cohort well-characterised in terms of
baseline demographics?

Are other characteristics reported such as
SEC and education?

Validated method for ascertaining clinical, at risk or non-clinical status?

Was the method of determining clinical
group described?

Was a valid and reliable measure used?

Validated measure for measuring construct of interest

Were primary outcomes valid and reliable
measures?

Were these measures implemented
consistently?

Outcome assessment to blind exposure

Were assessors of outcomes blind to status

or randomisation (in experiments) of
participants?

Adequate follow-up (longitudinal studies only)

Follow-up period same for all groups

Justification for follow-up period present?

Missing data

Did missing data from any group exceed
20%

Longitudinal attrition rates >20%

Analysis controls for confounding

Does the study control for anxiety and
depression?

Does the study control for other known
confounds?

Does the analysis control for baseline
differences between groups?

Analytic measures appropriate

Was the analysis appropriate for the
outcome data?

Was the number of variables appropriate for
the sample size?

Appendix 2: Quality assessments for the studies included in study 1

Authors	Unbiased selection of cohort	Unbiased selection of control	Sample size calculation	Adequate description of the sample	Validated measure of psychosis	Validated measure of beliefs	Assessor blind	Missing data	Controlled for confounds	Analyses appropriate
AUSTIN2014	Yes	Yes	Unclear	Partial	Yes	Yes	Unclear	Unclear	Yes	Yes
BAKER1998	Unclear	Unclear	Unclear	Partial	Yes	Yes	Unclear	Unclear	Yes	Yes
BRETT2009	Yes	Partial	Unclear	Partial	Yes	Yes	Unclear	<20%	Yes	Yes
FRASER2006	Unclear	Partial	Yes	Partial	Yes	Yes	Unclear	Unclear	No	Yes
GARCIAMONTES 2006	Unclear	Unclear	Unclear	Partial	Yes	Yes	Unclear	Unclear	Yes	Yes
HILL2012	Yes	Partial	Unclear	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes
LOBBAN2002	Partial	Partial	Unclear	Partial	Yes	Yes	Unclear	Unclear	Yes	Yes
MORTIZ2010	Partial	Partial	Unclear	Partial	Yes	Yes	Unclear	Unclear	Yes	Yes
MORRISON2003	Unclear	Unclear	Unclear	Partial	Yes	Yes	Unclear	Unclear	No	Yes
PERONAGARCELA N2012	Unclear	Unclear	Unclear	Partial	Yes	Yes	Unclear	Unclear	Yes	Yes
VALIENTE2012	Partial	Partial	Unclear	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes

Appendix 3: Quality assessments for the studies included in study 2

Study ID	Unbiased selection of cohort	Unbiased selection of control	Sample size calculation	Adequate description of the sample	Validated method for at risk/ clinical	Validated measure of psychosis	Validated measure of metacog	Assessor blind	Adequate follow-up for longitudinal	Missing data	Controlled for anxiety/ depression	Analyses appropriate
CANGAS2006	Unclear	N/a	No	Partial	No	Yes	Yes	N/a	N/a	Unclear	No	Yes
ENSUM2003	Partial	N/a	No	Partial	Yes	Yes	Yes	Unclear	N/a	Unclear	No	Yes
FENIGSTEIN1984	Unclear	Yes	No	No	No	Yes	Yes	Unclear	N/a	Unclear	No	Yes
FENIGSTEIN1992	Unclear	Yes	No	No	No	Yes	Yes	Unclear	N/a	Unclear	No	Yes
FLOWER2013	Partial	Yes	Yes	Partial	Yes	Yes	Yes	Unclear	N/a	Unclear	No	Yes
FREEMAN2005	Partial	N/a	No	Yes	No	Yes	Yes	N/a	N/a	<20%	No	Yes
MCKIE2017	Partial	N/a	Yes	Partial	No	Yes	Yes	Unclear	N/a	<20%	No	Yes
MORRISON1997	Yes	Yes	No	Partial	Yes	Yes	Yes	N/a	N/a	Unclear	No	Yes
NEWMANTAYLOR 2013	Yes	Yes	Partial	Partial	Yes	Yes	Yes	N/a	N/a	Unclear	No	Yes
PERONAGARCELAN 2008	Unclear	Yes	No	Partial	Yes	Yes	Yes	N/a	N/a	Unclear	No	Yes
PERONAGARCELAN 2011	Yes	N/a	No	Yes	Yes	Yes	Yes	N/a	N/a	Unclear	No	Yes
PERONAGARCELAN 2016	Yes	N/a	No	Yes	Yes	Yes	Yes	N/a	N/a	Unclear	No	Yes
STARTUP2008	Yes	N/a	No	Yes	Yes	Yes	Yes	N/a	N/a	Unclear	No	Yes
BASSETT2009	Unclear	Yes	No	Yes	Yes	Yes	Yes	Unclear	N/a	Unclear	No	Yes
CARSE2013	Partial	N/a	No	Partial	No	Yes	Yes	N/a	N/a	Unclear	No	Yes
CERNIS2014	Yes	N/a	No	Yes	Yes	Yes	Yes	N/a	N/a	Unclear	No	Yes
CERNIS2016	Yes	Yes	No	Yes	Yes	Yes	Yes	N/a	N/a	Unclear	No	Yes
FREEMAN1999	Unclear	Yes	No	Yes	Yes	Yes	Yes	N/a	N/a	Unclear	No	Yes
FREEMAN2008	Yes	N/a	No	Yes	No	Yes	Yes	N/a	N/a	Unclear	No	Yes
FREEMAN2010	Yes	Yes	No	Yes	Yes	Yes	Yes	Unclear	N/a	<20%	No	Yes

FREEMAN2011	Yes	N/a	No	Yes	Yes	Yes	Yes	N/a	N/a	Unclear	No	Yes
FREEMAN2012	Yes	N/a	No	No	Yes	Yes	Yes	N/a	Yes	Unclear	No	Yes
HALARI2009	Yes	N/a	No	Yes	Yes	Yes	Yes	N/a	N/a	Unclear	No	Yes
HARTLEY2013	Yes	N/a	No	Yes	Yes	Yes	Yes	N/a	N/a	Partial	No	Yes
KRABBENDAM2005	Yes	N/a	No	Partial	Yes	Yes	Yes	N/a	Yes	Unclear	No	Yes
MORRISON2007	Unclear	Yes	No	Partial	Partial	Yes	Yes	N/a	N/a	Unclear	No	Yes
ROWLAND2013A	Yes	Yes	No	Yes	Yes	Yes	Yes	N/a	N/a	Yes	No	Yes
ROWLAND2013B	Yes	Yes	No	Yes	Yes	Yes	Yes	N/a	N/a	Yes	No	Yes
STARTUP2007	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/a	N/a	Yes	No	Yes
THOMAS2014	Yes	N/a	No	Yes	Yes	Yes	Yes	N/a	N/a	Unclear	No	Yes
VORONTSOVA2013	Yes	N/a	No	Yes	Yes	Yes	Yes	N/a	Yes	Yes	No	Yes
WESTERMAN2013	Partial	N/a	No	Yes	No	Yes	Yes	N/a	Yes	Unclear	No	Yes
CAMPBELL2007	Yes	N/a	No	Partial	No	Yes	Yes	N/a	N/a	Unclear	No	Yes
GARCIAMONTES 2004	Unclear	N/a	No	Partial	No	Yes	Yes	N/a	N/a	Unclear	No	Yes
JONES2006	Yes	N/a	No	Partial	No	Yes	Yes	N/a	N/a	Unclear	No	Yes
MORRISON2000	Unclear	N/a	No	Partial	No	Yes	Yes	N/a	N/a	Unclear	No	Yes
MORRISONWELLS 2000	Unclear	Yes	No	Partial	Partial	Yes	Yes	N/a	N/a	Unclear	No	Yes
RASSIN2006	Unclear	N/a	No	Partial	No	No	No	Unclear	N/a	<20%	No	Yes

Appendix 4: Fisher's r-z transformations for study 3

First, each correlation coefficient is converted into a z-score using Fisher's *r*-to-*z* transformation. Then, making use of the sample size employed to obtain each coefficient, these z-scores are compared using formula 2.8.5 from Cohen and Cohen (1983, p. 54).

By convention, Z values greater than 1.96 are considered significant if a two-tailed test is performed.

	PBW	NBUD	CC	NBRS	CSC
AH Distress	z=0.96 p=0.337	z=-0.75 p=0.453	z=0.26 p=0.795	z=0.9 p=0.368	z=0.65 p=0.516
AH Frequency	z=0.43 p=0.667	z=-0.49 p=0.624	z=-0.15 p=0.881	z=0.58 p=0.561	z=0.81 p=0.418
AH Attribution	z=1.46 p=0.144	z=-0.34 p=0.733	z=0.17 p=0.436	z=0.83 p=0.407	z=1.01 p=0.313
AH Loudness	z=0.48 p=0.631	z=-0.4 p=0.689	z=-0.4 p=0.689	z=0.58 p=0.562	z=0.75 p=0.453
D Distress	z=0.83 p=0.407	z=-0.48 p=0.631	z=1.93 p=0.054	z=-0.08 p=0.936	z=-0.38 p=0.704
D frequency	z=-0.09 p=0.464	z=0.85 p=0.395	z=1.79 p=0.074	z=0.27 p=0.787	z=-1.43 p=0.153
Anxiety	z=0.71 p=0.478	z=0.04 p=0.968	z=-1.17 p=0.242	z=-1.10 p=0.271	z=-0.21 p=0.833
Depression	z=1.25 p=0.211	z=-0.29 p=0.771	z=0.92 p=0.358	z=-0.41 p=0.682	z=1.30 p=0.194

Appendix 5: The Psychotic Symptoms Rating Scales (PSYRATS)

Delusions scoring

1. Amount of preoccupation with delusions

How much time do you spend thinking about your beliefs?

- All the time/daily/weekly etc.?

0. No delusions, or delusions which the subject thinks about less than once a week

1. Subject thinks about beliefs at least once a week

2. Subject thinks about beliefs at least once a day

3. Subject thinks about beliefs at least once an hour

4. Subject thinks about beliefs continuously or almost continuously. Subject can only think about other things for a few seconds or minutes

2. Duration of preoccupation with delusions

When the beliefs come into your mind, how long do they persist?

- Few seconds/minutes/hours?

0. No delusions

1. Thoughts about beliefs last for a few seconds

2. Thoughts about beliefs last for several minutes

3. Thoughts about beliefs last at least one hour

4. Thoughts about delusions usually last for hours at a time

3. Conviction (record for each delusion)

At the present time, how convinced are you that your beliefs are true? Can estimate this on a scale from 0-100, where 100 means that you are totally convinced by your beliefs and 0 being that you are not convinced at all?

0. No conviction at all
1. Very little conviction in reality of beliefs, less than 10%
2. Some doubts relating to conviction in beliefs, between 10-49%
3. Conviction in beliefs is very strong, between 50-99%
4. Conviction is 100%

4. Amount of distress

Do your beliefs cause you distress? How much of the time do they cause you distress?

0. Beliefs never cause distress
1. Beliefs cause distress on the minority of occasions
2. Beliefs cause distress on less than 50% of occasions
3. Beliefs cause distress on the majority of occasions they occur between 51-99% of the time
4. Beliefs always cause distress when they occur

5. Intensity of distress

When your beliefs distress you, how severe does this feel?

0. No distress
1. Beliefs cause slight distress
2. Beliefs cause moderate distress
3. Beliefs cause marked distress
4. Beliefs cause extreme distress, it couldn't be worse

6. Disruption to life caused by beliefs

How much disruption do your beliefs cause you?

- Do they prevent you working or carrying out a daytime activity?

- Do they interfere with your relationships with family or friends?
- Do they interfere with your ability to look after yourself, e.g. washing, changing clothes, etc.?

0. No disruption to life, able to maintain independent living with no problems in daily living skills. Able to maintain social and family relationships (if present)

1. Beliefs cause minimal amount of disruption to life, e.g. interferes with concentration although able to maintain daytime activity and social and family relationships and be able to maintain independent living without support

2. Beliefs cause a moderate amount of disruption to life causing some disturbance to daytime activity and/or family or social activities. The patient is not in hospital although may live in supported accommodation or receive additional help with daily living skills

3. Beliefs cause severe disruption to life so that hospitalisation is usually necessary. The patient is able to maintain some daily activities, self-care and relationships whilst in hospital. The patient may also be in supported accommodation but experiencing severe disruption of life in terms of activities, daily living skills and/or relationships.

4. Beliefs cause complete disruption of daily life requiring hospitalisation. The patient is unable to maintain any daily living activities and social relationships. Self-care is also severely disrupted.

Delusions score sheet

ID Number _____

Time point _____

Date _____

Score

1. Amount of preoccupation

2. Duration of preoccupation

3. Conviction

4. Amount of distress

5. Intensity of distress

Hallucinations scoring

1. Frequency

How often do you experience voices?

- Every day, all day long etc.?

0. Voice not present, or present less than once a week (specify frequency if present)

1. Voices occur at least once a week

2. Voices occur at least once a day

3. Voices occur at least once an hour

4. Voices occur continuously or almost continuously, i.e. stop for only a few seconds or minutes

2. Duration

When you hear voices, how long do they last?

- Few seconds/minutes/hours/all day long?

0. Voices not present

1. Voices last for a few seconds, fleeting voices

2. Voices last for several minutes

3. Voices last for at least one hour

4. Voices last for hours at a time

3. Location

When you hear your voices, where do they sound like they're coming from?

- Inside your head/and or outside your head?

- If voices sound like they are outside your head, whereabouts do they sound like they are coming from?

0. Voices not present

1. Voices sound like they are inside head only

2. Voices are outside the head, but close to the ears or head. Voices inside the head may also be present

3. Voices sound like they are inside or close to ears and outside head away from ears

4. Voices sound like they are from outside the head only

4. Loudness

How loud are your voices? Are they louder than your voice, about the same loudness, quieter or just a whisper?

0. Voices not present

1. Quieter than own voice, whispers

2. About the same loudness as own voice

3. Louder than own voice

4. Extremely loud, shouting

5. Beliefs re: origin of voices

What do you think has caused your voices?

- Are the voices caused by factors related to yourself or solely due to other people or factors?

If the patient expresses an external origin:

- How much do you believe that your voices are caused by..... on a scale from 0-100 with 100 being that you are totally convinced, have no doubts and 0 being that it is completely untrue?

0. Voices not present

1. Believes voices to be solely internally generated and related to self

2. Holds less than 50% conviction that voices originate from external causes
3. Holds a 50% or more conviction (but less than 100%) that voices originate from external causes
4. Believes voices are solely due to external causes (100% conviction)

6. Amount of negative content of voices

Do your voices say unpleasant things or negative things?

- Can you give me some examples of what the voices say?
- How much of the time do the voices say these types of unpleasant or negative items?

0. No unpleasant content
1. Occasional unpleasant content
2. Minority of voice content is unpleasant or negative (less than 50%)
3. Majority of voice content is unpleasant or negative (50% or more)
4. All of the voice content is unpleasant or negative

7. Degree of negative content

Rate using criteria on scale, asking more detail if necessary

0. None unpleasant or negative
1. Some degree of negative content, but not personal comments relating to self or family
e.g. swear words or comments not directed to self, e.g. “the milkman’s ugly”
2. Personal verbal abuse, comments on behaviour, e.g. “shouldn’t do that or say that”
3. Personal verbal abuse relating to self-concept, e.g. “you’re lazy, ugly, mad, perverted”
4. Personal threats to self, e.g. threat to harm self or family, extreme instructions or commands to harm self or others and personal verbal abuse as in (3)

8. Amount of distress

Are your voices distressing? How much of the time?

0. Voices not distressing at all
1. Voices occasionally distressing, majority not distress (<10%)
2. Minority of voices distressing (<50%)
3. Majority of voices distressing (51-99%)
4. Voices always distressing

9. Intensity of distress

When voices are distressing, how distressing are they?

- Do they cause you minimal, moderate or severe distress?
- Are they the most distressing they have ever been?

0. Voices not distressing at all
1. Voices slightly distressing
2. Voices are distressing to a moderate degree
3. Voices are very distressing, although subject could feel worse
4. Voices are extremely distressing, feel the worse he/she could possibly feel

10. Disruption to life caused by voices

How much disruption do the voices cause to your life?

- Do the voices stop you from working or other daytime activity?
- Do they interfere with your relationships with family or friends?
- Do they prevent you from looking after yourself, e.g. washing, changing clothes, etc.?

0. No disruption to life, able to maintain social and family relationships (if present)
1. Voices cause minimal amount of disruption to life, e.g. interferes with concentration although able to maintain daytime activity and social and family relationships and be able

to maintain independent living without support

2. Voices cause a moderate amount of disruption to life causing some disturbance to daytime activity and/or family or social activities. The patient is not in hospital although

may live in supported accommodation or receive additional help with daily living skills

3. Voices cause severe disruption to life so that hospitalisation is usually necessary. The patient is able to maintain some daily activities, self-care and relationships whilst in

hospital. The patient may also be in supported accommodation but experiencing severe disruption of life in terms of activities, daily living skills and/or relationships.

4. Voices cause complete disruption of daily life requiring hospitalisation. The patient is unable to maintain any daily living activities and social relationships. Self-care is also severely disrupted.

11. Controllability of voices

Do you think you have any control over when your voices happen?

- Can you dismiss or bring on your voices?

0. Subject believes they can have control over they voices and can always bring on or dismiss them at will

1. Subject believes they can have some control over the voices on the majority of occasions

2. Subject believes they can have some control over their voices approximately half of the time

3. Subject believes they can have some control over their voices but only occasionally. The majority of the time the subject experiences voices which are uncontrollable

4. Subject has no control over when the voices occur and cannot dismiss or bring them on at all.

Auditory hallucinations score sheet

ID Number _____

Time point _____

Date _____

Score

1 Frequency

2 Duration

3 Location

4 Loudness

5 Beliefs re: origin of voices

6 Amount of negative content of voices

7 Degree of negative content of voices

8 Amount of distress

9 Intensity of distress

10 Disruption

11 Control

GENERAL RATING INSTRUCTIONS

Data gathered from this assessment procedure are applied to the PANSS ratings. Each of the 30 items is accompanied by a specific definition as well as detailed anchoring criteria for all seven rating points. These seven points represent increasing levels of psychopathology, as follows:

- 1- absent
- 2- minimal
- 3- mild
- 4- moderate
- 5- moderate-severe
- 6- severe
- 7- extreme

In assigning ratings, one first considers whether an item is at all present, as judging by its definition. If the item is absent, it is scored 1, whereas if it is present one must determine its severity by reference to the particular criteria from the anchoring points. The highest applicable rating point is always assigned, even if the patient meets criteria for lower points as well. In judging the level of severity, the rater must utilise a holistic perspective in deciding which anchoring point best characterises the patient's functioning and rate accordingly, whether or not all elements of the description are observed.

The rating points of 2 to 7 correspond to incremental levels of symptom severity:

- A rating of 2 (minimal) denotes questionable or subtle or suspected pathology, or it also may allude to the extreme end of the normal range.
- A rating of 3 (mild) is indicative of a symptom whose presence is clearly established but not pronounced and interferes little with day-to-day functioning.
- A rating of 4 (moderate) characterises a symptom which, though representing a serious problem, either occurs only occasionally or intrudes on daily life only to a moderate extent.
- A rating of 5 (moderate-severe) indicates marked manifestations that distinctly impact on one's functioning but are not all-consuming and usually can be contained at will.
- A rating of 6 (severe) represents gross pathology that is present very frequently, proves highly disruptive to one's life, and often calls for direct supervision.

- A rating of 7 (extreme) refers to the most serious level of psychopathology, whereby the manifestations drastically interfere in most or all major life functions, typically necessitating close supervision and assistance in many areas.

Each item is rated in consultation with the definitions and criteria provided in this manual. The ratings are rendered on the PANSS rating form overleaf by encircling the appropriate number following each dimension.

SCORING INSTRUCTIONS

Of the 30 items included in the PANSS, 7 constitute a **Positive Scale**, 7 a **Negative Scale**, and the remaining 16 a **General Psychopathology Scale**. The scores for these scales are arrived at by summation of ratings across component items. Therefore, the potential ranges are 7 to 49 for the Positive and Negative Scales, and 16 to 112 for the General Psychopathology Scale. In addition to these measures, a Composite Scale is scored by subtracting the negative score from the positive score. This yields a bipolar index that ranges from -42 to +42, which is essentially a difference score reflecting the degree of predominance of one syndrome in relation to the other.

POSITIVE SCALE (P)

P1. DELUSIONS - Beliefs which are unfounded, unrealistic and idiosyncratic.

Basis for rating - Thought content expressed in the interview and its influence on social relations and behaviour.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Presence of one or two delusions which are vague, uncrystallised and not tenaciously held. Delusions do not interfere with thinking, social relations or behaviour.
- 4 **Moderate** - Presence of either a kaleidoscopic array of poorly formed, unstable delusions or a few well-formed delusions that occasionally interfere with thinking, social relations or behaviour.
- 5 **Moderate Severe** - Presence of numerous well-formed delusions that are tenaciously held and occasionally interfere with thinking, social relations and behaviour.
- 6 **Severe** - Presence of a stable set of delusions which are crystallised, possibly systematised, tenaciously held and clearly interfere with thinking, social relations and behaviour.
- 7 **Extreme** - Presence of a stable set of delusions which are either highly systematised or very numerous, and which dominate major facets of the patient's life. This frequently results in inappropriate and irresponsible action, which may even jeopardise the safety of the patient or others.

P2. CONCEPTUAL DISORGANISATION - Disorganised process of thinking characterised by disruption of goal-directed sequencing, e.g. circumstantiality, loose associations, tangentiality, gross illogicality or thought block.

Basis for rating - Cognitive-verbal processes observed during the course of interview.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Thinking is circumstantial, tangential or paralogical. There is some difficulty in directing thoughts towards a goal, and some loosening of associations may be evidenced under pressure.
- 4 **Moderate** - Able to focus thoughts when communications are brief and structured, but becomes loose or irrelevant when dealing with more complex communications or when under minimal pressure.
- 5 **Moderate Severe** - Generally has difficulty in organising thoughts, as evidenced by frequent irrelevancies, disconnectedness or loosening of

associations even when not under pressure.

- 6 **Severe** - Thinking is seriously derailed and internally inconsistent, resulting in gross irrelevancies and disruption of thought processes, which occur almost constantly.
- 7 **Extreme** - Thoughts are disrupted to the point where the patient is incoherent. There is marked loosening of associations, which result in total failure of communication, e.g. “word salad” or mutism.

P3. **HALLUCINATORY BEHAVIOUR** - Verbal report or behaviour indicating perceptions which are not generated by external stimuli. These may occur in the auditory, visual, olfactory or somatic realms.

Basis for rating - Verbal report and physical manifestations during the course of interview as well as reports of behaviour by primary care workers or family.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - One or two clearly formed but infrequent hallucinations, or else a number of vague abnormal perceptions which do not result in distortions of thinking or behaviour.
- 4 **Moderate** - Hallucinations occur frequently but not continuously, and the patient’s thinking and behaviour are only affected to a minor extent.
- 5 **Moderate Severe** - Hallucinations occur frequently, may involve more than one sensory modality, and tend to distort thinking and/or disrupt behaviour. Patient may have a delusional interpretation of these experiences and respond to them emotionally and, on occasion, verbally as well.
- 6 **Severe** - Hallucinations are present almost continuously, causing major disruption of thinking and behaviour. Patient treats these as real perceptions, and functioning is impeded by frequent emotional and verbal responses to them.
- 7 **Extreme** - Patient is almost totally preoccupied with hallucinations, which virtually dominate thinking and behaviour. Hallucinations are provided a rigid delusional interpretation and provoke verbal and behavioural responses, including obedience to command hallucinations.

P4. **EXCITEMENT** - Hyperactivity as reflected in accelerated motor behaviour, heightened responsivity to stimuli, hypervigilance or excessive mood lability.

Basis for rating - Behavioural manifestations during the course of interview as well as reports of behaviour by primary care workers or family.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal

limits

- 3 **Mild** - Tends to be slightly agitated, hypervigilant or mildly overaroused throughout the interview, but without distinct episodes of excitement or marked mood lability. Speech may be slightly pressured.
- 4 **Moderate** - Agitation or overarousal is clearly evident throughout the interview, affecting speech and general mobility, or episodic outbursts occur sporadically.
- 5 **Moderate Severe** - Significant hyperactivity or frequent outbursts of motor activity are observed, making it difficult for the patient to sit still for longer than several minutes at any given time.
- 6 **Severe** - Marked excitement dominates the interview, delimits attention, and to some extent affects personal functions such as eating or sleeping.
- 7 **Extreme** - marked excitement seriously interferes in eating and sleeping and makes interpersonal interactions virtually impossible. Acceleration of speech and motor activity may result in incoherence and exhaustion.

P5. GRANDIOSITY - Exaggerated self-opinion and unrealistic convictions of superiority, including delusions of extraordinary abilities, wealth, knowledge, fame, power and moral righteousness.

Basis for rating - Thought content expressed in the interview and its influence on behaviour.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Some expansiveness or boastfulness is evident, but without clear-cut grandiose delusions.
- 4 **Moderate** - Feels distinctly and unrealistically superior to others. Some poorly formed delusions about special status or abilities may be present but are not acted upon.
- 5 **Moderate Severe** - Clear-cut delusions concerning remarkable abilities, status or power are expressed and influence attitude but not behaviour.
- 6 **Severe** - Clear-cut delusions of remarkable superiority involving more than one parameter (wealth, knowledge, fame, etc.) are expressed, notably influence interactions and may be acted upon.
- 7 **Extreme** - Thinking, interactions and behaviour are dominated by multiple delusions of amazing ability, wealth, knowledge, fame, power and/or moral stature, which may take on a bizarre quality.

P6. SUSPICIOUSNESS/PERSECUTION - Unrealistic or exaggerated ideas of persecution, as reflected in guardedness, ad distrustful attitude, suspicious hypervigilance or frank

delusions that others mean harm.

Basis for rating - Thought content expressed in the interview and its influence on behaviour.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Presents a guarded or even openly distrustful attitude, but thoughts, interactions and behaviour are minimally affected.
- 4 **Moderate** - Distrustfulness is clearly evident and intrudes on the interview and/or behaviour, but there is no evidence of persecutory delusions. Alternatively, there may be indication of loosely formed persecutory delusions, but these do not seem to affect the patient's attitude or interpersonal relations.
- 5 **Moderate Severe** - Patient shows marked distrustfulness, leading to major disruption of interpersonal relations, or else there are clear-cut persecutory delusions that have limited impact on interpersonal relations and behaviour.
- 6 **Severe** - Clear-cut pervasive delusions of persecution which may be systematised and significantly interfere in interpersonal relations.
- 7 **Extreme** - A network of systematised persecutory delusions dominates the patient's thinking, social relations and behaviour.

P7. HOSTILITY - Verbal and nonverbal expressions of anger and resentment, including sarcasm, passive-aggressive behaviour, verbal abuse and assaultiveness.

Basis for rating – Interpersonal behaviour observed during the interview and reports by primary care workers or family.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Indirect or restrained communication of anger, such as sarcasm, disrespect, hostile expressions and occasional irritability.
- 4 **Moderate** - Presents an overtly hostile attitude, showing frequent irritability and direct expression of anger or resentment.
- 5 **Moderate Severe** - Patient is highly irritable and occasionally verbally abusive or threatening.
- 6 **Severe** - Uncooperativeness and verbal abuse or threats notably influence the interview and seriously impact upon social relations. Patient may be violent and destructive but is not physically assaultive towards others.
- 7 **Extreme** - Marked anger results in extreme uncooperativeness, precluding other interactions, or in episode(s) of physical assault towards others.

NEGATIVE SCALE (N)

N1. BLUNTED AFFECT - Diminished emotional responsiveness as characterised by a reduction in facial expression, modulation of feelings and communicative gestures.

Basis for rating - Observation of physical manifestations of affective tone and emotional responsiveness during the course of the interview.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Changes in facial expression and communicative gestures seem to be stilted, forced, artificial or lacking in modulation.
- 4 **Moderate** - Reduced range of facial expression and few expressive gestures result in a dull appearance
- 5 **Moderate Severe** - Affect is generally 'flat' with only occasional changes in facial expression and a paucity of communicative gestures.
- 6 **Severe** - Marked flatness and deficiency of emotions exhibited most of the time. There may be unmodulated extreme affective discharges, such as excitement, rage or inappropriate uncontrolled laughter.
- 7 **Extreme** - Changes in facial expression and evidence of communicative gestures are virtually absent. Patient seems constantly to show a barren or 'wooden' expression.

N2. EMOTIONAL WITHDRAWAL - Lack of interest in, involvement with, and affective commitment to life's events.

Basis for rating - Reports of functioning from primary care workers or family and observation of interpersonal behaviour during the course of the interview.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Usually lack initiative and occasionally may show deficient interest in surrounding events.
- 4 **Moderate** - Patient is generally distanced emotionally from the milieu and its challenges but, with encouragement, can be engaged.
- 5 **Moderate Severe** - Patient is clearly detached emotionally from persons and events in the milieu, resisting all efforts at engagement. Patient appears distant, docile and purposeless but can be involved in communication at least briefly and tends to personal needs, sometimes with assistance.
- 6 **Severe** - Marked deficiency of interest and emotional commitment results in limited conversation with others and frequent neglect of personal functions, for which the patient requires supervision.

- 7 **Extreme** – Patient is almost totally withdrawn, uncommunicative and neglectful of personal needs as a result of profound lack of interest and emotional commitment.

N3. POOR RAPPORT - Lack of interpersonal empathy, openness in conversation and sense of closeness, interest or involvement with the interviewer. This is evidenced by interpersonal distancing and reduced verbal and nonverbal communication.

Basis for rating - Interpersonal behaviour during the course of the interview.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Conversation is characterised by a stilted, strained or artificial tone. It may lack emotional depth or tend to remain on an impersonal, intellectual plane.
- 4 **Moderate** - Patient typically is aloof, with interpersonal distance quite evident. Patient may answer questions mechanically, act bored, or express disinterest.
- 5 **Moderate Severe** - Disinvolvement is obvious and clearly impedes the productivity of the interview. Patient may tend to avoid eye or face contact.
- 6 **Severe** - Patient is highly indifferent, with marked interpersonal distance. Answers are perfunctory, and there is little nonverbal evidence of involvement. Eye and face contact are frequently avoided.
- 7 **Extreme** - Patient is totally uninvolved with the interviewer. Patient appears to be completely indifferent and consistently avoids verbal and nonverbal interactions during the interview.

N4. PASSIVE/APATHETIC SOCIAL WITHDRAWAL - Diminished interest and initiative in social interactions due to passivity, apathy, anergy or avolition. This leads to reduced interpersonal involvements and neglect of activities of daily living.

Basis for rating - Reports on social behaviour from primary care workers or family.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Shows occasional interest in social activities but poor initiative. Usually engages with others only when approached first by them.
- 4 **Moderate** - Passively goes along with most social activities but in a disinterested or mechanical way. Tends to recede into the background.
- 5 **Moderate Severe** - Passively participates in only a minority of activities and shows virtually no interest or initiative. Generally spends little time with others.

- 6 **Severe** - Tends to be apathetic and isolated, participating very rarely in social activities and occasionally neglecting personal needs. Has very few spontaneous social contacts.
- 7 **Extreme** – Profoundly apathetic, socially isolated and personally neglectful.

N5. DIFFICULTY IN ABSTRACT THINKING - Impairment in the use of the abstract-symbolic mode of thinking, as evidenced by difficulty in classification, forming generalisations and proceeding beyond concrete or egocentric thinking in problem-solving tasks.

Basis for rating - Responses to questions on similarities and proverb interpretation, and use of concrete vs. abstract mode during the course of the interview.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Tends to give literal or personalised interpretations to the more difficult proverbs and may have some problems with concepts that are fairly abstract or remotely related.
- 4 **Moderate** - Often utilises a concrete mode. Has difficulty with most proverbs and some categories. Tends to be distracted by functional aspects and salient features.
- 5 **Moderate Severe** - Deals primarily in a concrete mode, exhibiting difficulty with most proverbs and many categories.
- 6 **Severe** - Unable to grasp the abstract meaning of any proverbs or figurative expressions and can formulate classifications for only the most simple of similarities. Thinking is either vacuous or locked into functional aspects, salient features and idiosyncratic interpretations.
- 7 **Extreme** - Can use only concrete modes of thinking. Shows no comprehension of proverbs, common metaphors or similes, and simple categories. Even salient and functional attributes do not serve as a basis for classification. This rating may apply to those who cannot interact even minimally with the examiner due to marked cognitive impairment.

N6. LACK OF SPONTANEITY AND FLOW OF CONVERSATION - Reduction in the normal flow of communication associated with apathy, avolition, defensiveness or cognitive deficit. This is manifested by diminished fluidity and productivity of the verbal interactional process.

Basis for rating - Cognitive-verbal processes observed during the course of interview.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits

- 3 **Mild** - Conversation shows little initiative. Patient's answers tend to be brief and unembellished, requiring direct and leading questions by the interviewer.
- 4 **Moderate** - Conversation lacks free flow and appears uneven or halting. Leading questions are frequently needed to elicit adequate responses and proceed with conversation.
- 5 **Moderate Severe** - Patient shows a marked lack of spontaneity and openness, replying to the interviewer's questions with only one or two brief sentences.
- 6 **Severe** - Patient's responses are limited mainly to a few words or short phrases intended to avoid or curtail communication. (e.g. "I don't know", "I'm not at liberty to say"). Conversation is seriously impaired as a result and the interview is highly unproductive.
- 7 **Extreme** - Verbal output is restricted to, at most, an occasional utterance, making conversation not possible.

N7. STEREOTYPED THINKING - Decreased fluidity, spontaneity and flexibility of thinking, as evidenced in rigid, repetitious or barren thought content.

Basis for rating - Cognitive-verbal processes observed during the interview.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Some rigidity shown in attitude or beliefs. Patient may refuse to consider alternative positions or have difficulty in shifting from one idea to another.
- 4 **Moderate** - Conversation revolves around a recurrent theme, resulting in difficulty in shifting to a new topic.
- 5 **Moderate Severe** - Thinking is rigid and repetitious to the point that, despite the interviewer's efforts, conversation is limited to only two or three dominating topics.
- 6 **Severe** - Uncontrolled repetition of demands, statements, ideas or questions which severely impairs conversation.
- 7 **Extreme** - Thinking, behaviour and conversation are dominated by constant repetition of fixed ideas or limited phrases, leading to gross rigidity, inappropriateness and restrictiveness of patient's communication.

GENERAL PSYCHOPATHOLOGY SCALE (G)

G1. SOMATIC CONCERN - Physical complaints or beliefs about bodily illness or malfunctions. This may range from a vague sense of ill-being to clear-cut delusions of catastrophic physical disease.

Basis for rating - Thought content expressed in the interview.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Distinctly concerned about health or bodily malfunction, but there is no delusional conviction and over concern can be allayed by reassurance.
- 4 **Moderate** - Complains about poor health or bodily malfunction, but there is no delusional conviction, and over concern can be allayed by reassurance.
- 5 **Moderate Severe** - Patient expresses numerous or frequent complaints about physical illness or bodily malfunction, or else patient reveals one or two clear-cut delusions involving these themes but is not preoccupied by them.
- 6 **Severe** - Patient is preoccupied by one or a few clear-cut delusions about physical disease or organic malfunction, but affect is not fully immersed in these themes, and thoughts can be diverted by the interviewer with some effort.
- 7 **Extreme** - Numerous and frequently reported somatic delusions, or only a few somatic delusions of a catastrophic nature, which totally dominate the patient's affect or thinking.

G2. ANXIETY - Subjective experience of nervousness, worry, apprehension or restlessness, ranging from excessive concern about the present or future to feelings of panic.

Basis for rating - Verbal report during the course of interview and corresponding physical manifestations.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Expresses some worry, over concern or subjective restlessness, but no somatic and behavioural consequences are reported or evidenced.
- 4 **Moderate** - Patient reports distinct symptoms of nervousness, which are reflected in mild physical manifestations such as fine hand tremor and excessive perspiration.
- 5 **Moderate Severe** - Patient reports serious problems of anxiety which have significant physical and behavioural consequences, such as marked tension, poor concentration, palpitations or impaired sleep.
- 6 **Severe** - Subjective state of almost constant fear associated with phobias, marked restlessness or numerous somatic manifestations.
- 7 **Extreme** - Patient's life is seriously disrupted by anxiety, which is present almost constantly and at times reaches panic proportion or is manifested in actual panic attacks.

G3. GUILT FEELINGS - Sense of remorse or self-blame for real or imagined misdeeds in the past.

Basis for rating - Verbal report of guilt feelings during the course of interview and the influence on attitudes and thoughts.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** – Questioning elicits a vague sense of guilt or self-blame for a minor incident, but the patient clearly is not overly concerned.
- 4 **Moderate** - Patient expresses distinct concern over his responsibility for a real incident in his life but is not pre-occupied with it and attitude and behaviour are essentially unaffected.
- 5 **Moderate Severe** - Patient expresses a strong sense of guilt associated with self-deprecation or the belief that he deserves punishment. The guilt feelings may have a delusional basis, may be volunteered spontaneously, may be a source of preoccupation and/or depressed mood, and cannot be allayed readily by the interviewer.
- 6 **Severe** - Strong ideas of guilt take on a delusional quality and lead to an attitude of hopelessness or worthlessness. The patient believes he should receive harsh sanctions as such punishment.
- 7 **Extreme** - Patient's life is dominated by unshakable delusions of guilt, for which he feels deserving of drastic punishment, such as life imprisonment, torture, or death. There may be associated suicidal thoughts or attribution of others' problems to one's own past misdeeds.

G4. TENSION -Overt physical manifestations of fear, anxiety, and agitation, such as stiffness, tremor, profuse sweating and restlessness.

Basis for rating - Verbal report attesting to anxiety and thereupon the severity of physical manifestations of tension observed during the interview.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Posture and movements indicate slight apprehensiveness, such as minor rigidity, occasional restlessness, shifting of position, or fine rapid hand tremor.
- 4 **Moderate** - A clearly nervous appearance emerges from various manifestations, such as fidgety behaviour, obvious hand tremor, excessive perspiration, or nervous mannerisms.
- 5 **Moderate Severe** - Pronounced tension is evidenced by numerous manifestations, such as nervous shaking, profuse sweating and restlessness, but can conduct in the

interview is not significantly affected.

- 6 **Severe** - Pronounced tension to the point that interpersonal interactions are disrupted. The patient, for example, may be constantly fidgeting, unable to sit still for long, or show hyperventilation.
- 7 **Extreme** - Marked tension is manifested by signs of panic or gross motor acceleration, such as rapid restless pacing and inability to remain seated for longer than a minute, which makes sustained conversation not possible.

G5. MANNERISMS AND POSTURING – Unnatural movements or posture as characterised be an awkward, stilted, disorganised, or bizarre appearance.

Basis for rating - Observation of physical manifestations during the course of interview as well as reports from primary care workers or family.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Slight awkwardness in movements or minor rigidity of posture
- 4 **Moderate** – Movements are notably awkward or disjointed, or an unnatural posture is maintained for brief periods.
- 5 **Moderate Severe** - Occasional bizarre rituals or contorted posture are observed, or an abnormal position is sustained for extended periods.
- 6 **Severe** - Frequent repetition of bizarre rituals, mannerisms or stereotyped movements, or a contorted posture is sustained for extended periods.
- 7 **Extreme** - Functioning is seriously impaired by virtually constant involvement in ritualistic, manneristic, or stereotyped movements or by an unnatural fixed posture which is sustained most of the time.

G6. DEPRESSION - Feelings of sadness, discouragement, helplessness and pessimism.

Basis for rating - Verbal report of depressed mood during the course of interview and its observed influence on attitude and behaviour.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Expresses some sadness of discouragement only on questioning, but there is no evidence of depression in general attitude or demeanour.
- 4 **Moderate** - Distinct feelings of sadness or hopelessness, which may be spontaneously divulged, but depressed mood has no major impact on behaviour or social functioning and the patient usually can be cheered up.

- 5 **Moderate Severe** - Distinctly depressed mood is associated with obvious sadness, pessimism, loss of social interest, psychomotor retardation and some interference in appetite and sleep. The patient cannot be easily cheered up.
- 6 **Severe** - Markedly depressed mood is associated with sustained feelings of misery, occasional crying, hopelessness and worthlessness. In addition, there is major interference in appetite and or sleep as well as in normal motor and social functions, with possible signs of self-neglect.
- 7 **Extreme** - Depressive feelings seriously interfere in most major functions. The manifestations include frequent crying, pronounced somatic symptoms, impaired concentration, psychomotor retardation, social disinterest, self neglect, possible depressive or nihilistic delusions and/or possible suicidal thoughts or action.

G7. MOTOR RETARDATION – Reduction in motor activity as reflected in slowing or lessening of movements and speech, diminished responsiveness of stimuli, and reduced body tone.

Basis for rating - Manifestations during the course of interview as well as reports by primary care workers as well as family.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Slight but noticeable diminution in rate of movements and speech. Patient may be somewhat underproductive in conversation and gestures.
- 4 **Moderate** - Patient is clearly slow in movements, and speech may be characterised by poor productivity including long response latency, extended pauses or slow pace.
- 5 **Moderate Severe** - A marked reduction in motor activity renders communication highly unproductive or delimits functioning in social and occupational situations. Patient can usually be found sitting or lying down.
- 6 **Severe** - Movements are extremely slow, resulting in a minimum of activity and speech. Essentially the day is spent sitting idly or lying down.
- 7 **Extreme** - Patient is almost completely immobile and virtually unresponsive to external stimuli.

G8. UNCOOPERATIVENESS - Active refusal to comply with the will of significant others, including the interviewer, hospital staff or family, which may be associated with distrust, defensiveness, stubbornness, negativism, rejection of authority, hostility or belligerence.

Basis for rating - Interpersonal behaviour observed during the course of the interview as well as reports by primary care workers or family.

- 1 **Absent** - Definition does not apply

- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Complies with an attitude of resentment, impatience, or sarcasm. May inoffensively object to sensitive probing during the interview.
- 4 **Moderate** - Occasional outright refusal to comply with normal social demands, such as making own bed, attending scheduled programmes, etc. The patient may project a hostile, defensive or negative attitude but usually can be worked with.
- 5 **Moderate Severe** - Patient frequently is in compliant with the demands of his milieu and may be characterised by other as an “outcast” or having “a serious attitude problem”. Uncooperativeness is reflected in obvious defensiveness or irritability with the interviewer and possible unwillingness to address many questions.
- 6 **Severe** - Patient is highly uncooperative, negativistic and possibly also belligerent. Refuses to comply with the most social demands and may be unwilling to initiate or conclude the full interview.
- 7 **Extreme** - Active resistance seriously impact on virtually all major areas of functioning. Patient may refuse to join in any social activities, tend to personal hygiene, converse with family or staff and participate even briefly in an interview.

G9. UNUSUAL THOUGHT CONTENT - Thinking characterised by strange, fantastic or bizarre ideas, ranging from those which are remote or atypical to those which are distorted, illogical and patently absurd.

Basis for rating - Thought content expressed during the course of interview.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Thought content is somewhat peculiar, or idiosyncratic, or familiar ideas are framed in an odd context.
- 4 **Moderate** - Ideas are frequently distorted and occasionally seem quite bizarre.
- 5 **Moderate Severe** - Patient expresses many strange and fantastic thoughts, (e.g. Being the adopted son of a king, being an escapee from death row), or some which are patently absurd (e.g. Having hundreds of children, receiving radio messages from outer space from a tooth filling).
- 6 **Severe** - Patient expresses many illogical or absurd ideas or some which have a distinctly bizarre quality (e.g. having three heads, being a visitor from another planet).
- 7 **Extreme** - Thinking is replete with absurd, bizarre and grotesque ideas.

G10 DISORIENTATION - Lack of awareness of one’s relationship to the milieu, including persons, place and time, which may be due to confusion or withdrawal.

Basis for rating - Responses to interview questions on orientation.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - General orientation is adequate but there is some difficulty with specifics. For example, patient knows his location but not the street address, knows hospital staff names but not their functions, knows the month but confuses the day of the week with an adjacent day, or errs in the date by more than two days. There may be narrowing of interest evidenced by familiarity with the immediate but not extended milieu, such as ability to identify staff but not the mayor, governor, or president.
- 4 **Moderate** - Only partial success in recognising persons, places and time. For example, patient knows he is in a hospital but not its name, knows the name of the city but not the borough or district, knows the name of his primary therapist but not many other direct care workers, knows the year or season but not sure of the month.
- 5 **Moderate Severe** - Considerable failure in recognising persons, place and time. Patient has only a vague notion of where he is and seems unfamiliar with most people in his milieu. He may identify the year correctly or nearly but not know the current month, day of week or even the season.
- 6 **Severe** - Marked failure in recognising persons, place and time. For example, patient has no knowledge of his whereabouts, confuses the date by more than one year, can name only one or two individuals in his current life.
- 7 **Extreme** - Patient appears completely disorientated with regard to persons, place and time. There is gross confusion or total ignorance about one's location, the current year and even the most familiar people, such as parents, spouse, friends and primary therapist.

G11 POOR ATTENTION - Failure in focused alertness manifested by poor concentration, distractibility from internal and external stimuli, and difficulty in harnessing, sustaining or shifting focus to new stimuli.

Basis for rating – Manifestations during the course of interview.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Limited concentration evidenced by occasional vulnerability to distraction and faltering attention toward the end of the interview.
- 4 **Moderate** - Conversation is affected by the tendency to be easily distracted, difficulty in long sustaining concentration on a given topic, or problems in shifting attention to new topics.
- 5 **Moderate Severe** - Conversation is seriously hampered by poor concentration, distractibility, and difficulty in shifting focus appropriately.
- 6 **Severe** - Patient's attention can be harnessed for only brief moments or with great effort, due to marked distraction by internal or external stimuli.

7 Extreme - Attention is so disrupted that even brief conversation is not possible.

G12 LACK OF JUDGEMENT AND INSIGHT - Impaired awareness or understanding of one's own psychiatric condition and life situation. This is evidenced by failure to recognise past or present psychiatric illness or symptoms, denial of need for psychiatric hospitalisation or treatment, decisions characterised by poor anticipation or consequences, and unrealistic short-term and long-range planning.

Basis for rating - Thought content expressed during the interview.

- 1 Absent** - Definition does not apply
- 2 Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 Mild** - Recognises having a psychiatric disorder but clearly underestimates its seriousness, the implications for treatment, or the importance of taking measures to avoid relapse. Future planning may be poorly conceived.
- 4 Moderate** - Patient shows only a vague or shallow recognition of illness. There may be fluctuations in acknowledgement of being ill or little awareness of major symptoms which are present, such as delusions, disorganised thinking, suspiciousness and social withdrawal. The patient may rationalise the need for treatment in terms of its relieving lesser symptoms, such as anxiety, tension and sleep difficulty.
- 5 Moderate Severe** - Acknowledges past but not present psychiatric disorder. If challenged, the patient may concede the presence of some unrelated or insignificant symptoms, which tend to be explained away by gross misinterpretation or delusional thinking. The need for psychiatric treatment similarly goes unrecognised.
- 6 Severe** - Patient denies ever having had a psychiatric disorder. He disavows the presence of any psychiatric symptoms in the past or present and, though compliant, denies the need for treatment and hospitalisation.
- 7 Extreme** - Emphatic denial of past and present psychiatric illness. Current hospitalisation and treatment are given a delusional interpretation (e.g. as punishment for misdeeds, as persecution by tormentors, etc.), and the patient thus refuse to cooperate with therapists, medication or other aspects of treatment.

G13 DISTURBANCE OF VOLITION - Disturbance in the wilful initiation, sustenance and control of one's thoughts, behaviour, movements and speech.

Basis for rating - Thought content and behaviour manifested in the course of interview.

- 1 Absent** - Definition does not apply
- 2 Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 Mild** - There is evidence of some indecisiveness in conversation and thinking, which may impede verbal and cognitive processes to a minor extent.

- 4 **Moderate** - Patient is often ambivalent and shows clear difficulty in reaching decisions. Conversation may be marred by alteration in thinking, and in consequence, verbal and cognitive functioning are clearly impaired.
- 5 **Moderate Severe** - Disturbance of volition interferes in thinking as well as behaviour. Patient shows pronounced indecision that impedes the initiation and continuation of social and motor activities, and which also may be evidence in halting speech.
- 6 **Severe** - Disturbance of volition interferes in the execution of simple automatic motor functions, such as dressing or grooming, and markedly affects speech.
- 7 **Extreme** – Almost complete failure of volition is manifested by gross inhibition of movement and speech resulting in immobility and/or mutism.

G14 POOR IMPULSE CONTROL - Disordered regulation and control of action on inner urges, resulting in sudden, unmodulated, arbitrary or misdirected discharge of tension and emotions without concern about consequences.

Basis for rating – Behaviour during the course of interview and reported by primary care workers or family.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Patient tends to be easily angered and frustrated when facing stress or denied gratification but rarely acts on impulse.
- 4 **Moderate** - Patient gets angered and verbally abusive with minimal provocation. May be occasionally threatening, destructive, or have one or two episodes involving physical confrontation or a minor brawl.
- 5 **Moderate Severe** - Patient exhibits repeated impulsive episodes involving verbal abuse, destruction of property, or physical threats. There may be one or two episodes involving serious assault, for which the patient requires isolation, physical restraint, or p.r.n. sedation.
- 6 **Severe** - Patient frequently is impulsive aggressive, threatening, demanding, and destructive, without any apparent consideration of consequences. Shows assaultive behaviour and may also be sexually offensive and possibly respond behaviourally to hallucinatory commands.
- 7 **Extreme** - Patient exhibits homicidal, sexual assaults, repeated brutality, or self-destructive behaviour. Requires constant direct supervision or external constraints because of inability to control dangerous impulses.

G15 PREOCCUPATION - Absorption with internally generated thoughts and feelings and with autistic experiences to the detriment of reality orientation and adaptive behaviour.

Basis for rating - Interpersonal behaviour observed during the course of interview.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Excessive involvement with personal needs or problems, such that conversation veers back to egocentric themes and there is diminished concern exhibited toward others.
- 4 **Moderate** - Patient occasionally appears self-absorbed, as if daydreaming or involved with internal experiences, which interferes with communication to a minor extent.
- 5 **Moderate Severe** - Patient often appears to be engaged in autistic experiences, as evidenced by behaviours that significantly intrude on social and communicational functions, such as the presence of a vacant stare, muttering or talking to oneself, or involvement with stereotyped motor patterns.
- 6 **Severe** - Marked preoccupation with autistic experiences, which seriously delimits concentration, ability to converse, and orientation to the milieu. The patient frequently may be observed smiling, laughing, muttering, talking, or shouting to himself.
- 7 **Extreme** - Gross absorption with autistic experiences, which profoundly affects all major realms of behaviour. The patient constantly may be responding verbally or behaviourally to hallucinations and show little awareness of other people or the external milieu.

G16 ACTIVE SOCIAL AVOIDANCE - Diminished social involvement associated with unwarranted fear, hostility, or distrust.

Basis for rating - Reports of social functioning primary care workers or family.

- 1 **Absent** - Definition does not apply
- 2 **Minimal** - Questionable pathology; may be at the upper extreme of normal limits
- 3 **Mild** - Patient seems ill at ease in the presence of others and prefers to spend time alone, although he participates in social functions when required.
- 4 **Moderate** - Patient begrudgingly attends all or most social activities but may need to be persuaded or may terminate prematurely on account of anxiety, suspiciousness, or hostility.
- 5 **Moderate Severe** - Patient fearfully or angrily keeps away from many social interactions despite others' efforts to engage him. Tends to spend unstructured time alone.
- 6 **Severe** - Patient participates in very few social activities because of fear, hostility, or distrust. When approached, the patient shows a strong tendency to break off interactions, and generally he tends to isolate himself from others.
- 7 **Extreme** - Patient cannot be engaged in social activities because of pronounced fears, hostility, or persecutory delusions. To the extent possible, he avoids all interactions and

remains isolated from others.

Appendix 7: The Metacognitions Questionnaire 30 (MCQ-30)

Meta-Cognitions Questionnaire (Cartwright-Hatton et al. 2003)

Participant ID: _____ Date: _____

Listed below are a number of beliefs that people have.

Please read each item and say how much you generally agree with it by circling a number.

Please respond to all the items. There are no right or wrong answers.

		Do not agree	Agree slightly	Agree moderately	Agree very much
1.	Worrying helps me to avoid problems in the future	1	2	3	4
2.	My worrying is bad for me	1	2	3	4
3.	I think a lot about my thoughts	1	2	3	4
4.	I could make myself sick with worrying	1	2	3	4
5.	I am aware of the way my mind works when I am thinking through a problem	1	2	3	4
6.	If I did not control a worrying thought, and then it happened, it would be my fault	1	2	3	4
7.	I need to worry in order to be organised	1	2	3	4
8.	I have little confidence in my memory for words and names	1	2	3	4
9.	My worrying thoughts persist, no matter how I try to stop them	1	2	3	4
10.	Worrying helps me to get things sorted out in my mind	1	2	3	4
11.	I cannot ignore my worrying thoughts	1	2	3	4
12.	I monitor my thoughts	1	2	3	4
13.	I should be in control of my thoughts all of the time	1	2	3	4
14.	My memory can mislead me at times	1	2	3	4

		Do not agree	Agree slightly	Agree moderately	Agree very much
15.	My worrying could make me go mad	1	2	3	4
16.	I am constantly aware of my thinking	1	2	3	4
17.	I have a poor memory	1	2	3	4
18.	I pay close attention to the way my mind works	1	2	3	4
19.	Worrying helps me cope	1	2	3	4
20.	Not being able to control my thoughts is a sign of weakness	1	2	3	4
21.	When I start worrying, I cannot stop	1	2	3	4
22.	I will be punished for not controlling certain thoughts	1	2	3	4
23.	Worrying helps me to solve problems	1	2	3	4
24.	I have little confidence in my memory for places	1	2	3	4
25.	It is bad to think certain thoughts	1	2	3	4
26.	I do not trust my memory	1	2	3	4
27.	If I could not control my thoughts, I would not be able to function	1	2	3	4
28.	I need to worry, in order to work well	1	2	3	4
29.	I have little faith in my memory for actions	1	2	3	4
30.	I constantly study my thoughts	1	2	3	4

Appendix 8: The Beck Depression Inventory-7 (BDI-7)

BDI-7

Participant ID: _____ Date: _____

This questionnaire consists of groups of statements. Please read each group of statements carefully, then pick out the **one statement** in each group which best describes the way you have been feeling during the **past 2 weeks, including today!** Circle the number beside the statement you picked. If several statements in the group seem to apply equally well, circle the statement which has the largest number.

- 1 0** I do not feel sad.
 - 1** I feel sad much of the time.
 - 2** I am sad all the time.
 - 3** I am so sad or unhappy that I can't stand it.

- 2 0** I am not discouraged about my future.
 - 1** I feel more discouraged about my future than I used to be.
 - 2** I do not expect things to work out for me.
 - 3** I feel my future is hopeless and will only get worse.

- 3 0** I do not feel like a failure.
 - 1** I have failed more than I should have.
 - 2** As I look back, I see a lot of failures.
 - 3** I feel I am a total failure as a person.

- 4 0** I get as much pleasure as I ever did from the things I enjoy.
 - 1** I don't enjoy things as much as I used to.
 - 2** I get very little pleasure from the things I used to enjoy.
 - 3** I can't get any pleasure from the things I used to enjoy.

- 5 0** I feel the same about myself as ever.
 - 1** I have lost confidence in myself.
 - 2** I am disappointed in myself.
 - 3** I dislike myself.

- 6 0** I don't criticize or blame myself more than usual.
 - 1** I am more critical of myself than I used to be.
 - 2** I criticize myself for all of my faults.
 - 3** I blame myself for everything bad that happens.

- 7 0** I don't have any thoughts of killing myself.
 - 1** I have thoughts of killing myself, but I would not carry them out.
 - 2** I would like to kill myself.
 - 3** I would kill myself if I had the chance.

Appendix 9: The Social Interaction Anxiety Scale (SIAS)

The Social Interaction Anxiety Scale

Participant ID: _____ Date: _____

For each question, please circle a number to indicate the degree to which you feel the statement is characteristic or true of you. The rating scale is as follows:

- 0** = **Not at all characteristic or true of me**
- 1** = **Slightly characteristic or true of me**
- 2** = **Moderately characteristic or true of me**
- 3** = **Very characteristic or true of me**
- 4** = **Extremely characteristic or true of me**

1) I get nervous if I have to speak to someone in authority (teacher, boss)	0	1	2	3	4
2) I have difficulty making eye contact with others	0	1	2	3	4
3) I become tense if I have to talk about myself or my feelings	0	1	2	3	4
4) I find it difficult mixing comfortably with the people I work with	0	1	2	3	4
5) I find it easy to make friends of my own age	0	1	2	3	4
6) I tense up if I meet an acquaintance in the street	0	1	2	3	4
7) When mixing socially, I am uncomfortable	0	1	2	3	4
8) I feel tense if I am alone with just one person	0	1	2	3	4
9) I am at ease meeting people at parties etc.	0	1	2	3	4
10) I have difficulty talking with other people	0	1	2	3	4
11) I find it easy to think of things to talk about	0	1	2	3	4
12) I worry about expressing myself in case I feel awkward	0	1	2	3	4
13) I find it difficult to disagree with another's point of view	0	1	2	3	4
14). I have difficulty talking to attractive persons of the opposite sex	0	1	2	3	4

15) I find myself worrying that I won't know what to say in social situations	0	1	2	3	4
16) I am nervous mixing with people I don't know well	0	1	2	3	4
17). I feel I'll say something embarrassing when talking	0	1	2	3	4
18) When mixing in a group I find myself worrying I will be ignored	0	1	2	3	4
19. I am tense mixing in a group	0	1	2	3	4
20) I am unsure whether to greet someone I know only slightly	0	1	2	3	4

Appendix 10: The State-Trait Anxiety Inventory (STAI)

State-Trait Anxiety Inventory

Participant ID: _____ Date: _____

A number of statements which people have used to describe themselves are given below. Please indicate how well the statement describes how you feel **AT THE MOMENT** (and not how you usually feel). You must choose one of the four possible replies.

Work quickly and don't spend too much time thinking about your answer. The first answer you think of is the best one. Answer every word, even if you find it difficult. Answer as honestly as you can, and what is true to you. Please do not choose an answer because it seems like the right thing to say. Your answers will be kept entirely confidential.

	Not at all	Somewhat	Moderately so	Very much so
1. I feel calm	1	2	3	4
2. I feel secure	1	2	3	4
3. I am tense	1	2	3	4
4. I feel strained	1	2	3	4
5. I feel at ease	1	2	3	4
6. I feel upset	1	2	3	4
7. I am presently worrying over possible misfortunes	1	2	3	4
8. I feel satisfied	1	2	3	4
9. I feel frightened	1	2	3	4
10. I feel comfortable	1	2	3	4
11. I feel self-confident	1	2	3	4
12. I feel nervous	1	2	3	4
13. I am jittery	1	2	3	4
14. I feel indecisive	1	2	3	4
15. I am relaxed	1	2	3	4
16. I feel content	1	2	3	4
17. I am worried	1	2	3	4
18. I feel confused	1	2	3	4
19. I feel steady	1	2	3	4
20. I feel pleasant	1	2	3	4

A number of statements which people have used to describe themselves are given below. Please indicate how well the statement describes how you GENERALLY FEEL. You must choose one of the four possible replies.

Answer as honestly as you can, and what is true to you. Please do not choose an answer because it seems like the right thing to say. Your answers will be kept entirely confidential.

	Not at all	Somewhat	Moderately so	Very much so
1. I feel pleasant	1	2	3	4
2. I feel nervous and restless	1	2	3	4
3. I feel satisfied with myself	1	2	3	4
4. I wish I could be as happy as others seem to be	1	2	3	4
5. I feel like a failure	1	2	3	4
6. I feel rested	1	2	3	4
7. I am "cool, calm and collected"	1	2	3	4
8. I feel that difficulties are piling up so that I cannot overcome them	1	2	3	4
9. I worry too much over something that really doesn't matter	1	2	3	4
10. I am happy	1	2	3	4
11. I have disturbing thoughts	1	2	3	4
12. I lack self-confidence	1	2	3	4
13. I feel secure	1	2	3	4
14. I make decisions easily	1	2	3	4
15. I feel inadequate	1	2	3	4
16. I am content	1	2	3	4
17. Some unimportant thought runs through my mind and bothers me	1	2	3	4
18. I take disappointments so keenly that can't put them out of my mind	1	2	3	4
19. I am a steady person	1	2	3	4
20. I get in a state of tension or turmoil as I think over my recent concerns and interests	1	2	3	4

Appendix 11: The Cognitive Attentional Syndrome Scale (CAS-1)

Cognitive Attentional Syndrome Scale: CAS (Wells, 2009)

Participant ID: _____ Date: _____

1. How much time in the last week have you found yourself dwelling on or worrying about your problems? (circle a number below.)

0	1	2	3	4	5	6	7	8
<i>None of the time</i>			<i>Half of the time</i>			<i>All of the time</i>		

2. How much time in the last week have you been focusing attention on the things you find threatening (e.g., symptoms, thoughts, danger)? (Circle a number below.)

0	1	2	3	4	5	6	7	8
<i>None of the time</i>			<i>Half of the time</i>			<i>All of the time</i>		

3a. How often in the last week have you done the following in order to cope with your negative feelings or thoughts? (Place a number from the scale below next to each item.)

0	1	2	3	4	5	6	7	8
<i>None of the time</i>			<i>Half of the time</i>			<i>All of the time</i>		

- a. Avoided situations _____
- b. Tried not to think about things _____
- c. Used alcohol/drugs _____
- d. Asked for reassurance _____
- e. Tried to control my emotions _____
- f. Controlled my symptoms _____

3b. Below are a number of beliefs people have. Indicate how much you believe each one by placing a number from the scale below next to each item.

0	10	20	30	40	50	60	70	80	90	100
<i>I do not believe this at all</i>					<i>I'm completely convinced this is true</i>					

- a. Worrying too much could harm me _____
- b. Worrying helps me cope _____
- c. Strong emotions are dangerous _____
- d. Focusing on possible threat can keep me safe _____
- e. I cannot control my thoughts _____
- f. It is important to control my thoughts _____

Appendix 12: The Hospital Anxiety and Depression Scale (HADS)

HADS (Zigmond & Snaith, 1983)

Participant ID: _____ Date: _____

Please read each item and tick the box next to the reply which comes closest to how you have been feeling in the last week.

1. I feel tense or 'wound up':

- Most of the time
- A lot of the time
- From time to time, occasionally
- Not at all

2. I still enjoy doing the things I used to enjoy:

- Definitely as much
- Not quite so much
- Only a little
- Hardly at all

3. I get a sort of frightened feeling as if something awful is about to happen:

- Very definitely and quite badly
- Yes, but not too badly
- A little, but it doesn't worry me
- Not at all

4. I can laugh and see the funny side of things:

- As much as I always could
- Not quite so much now
- Definitely not so much now
- Not at all

5. Worrying thoughts go through my mind:

- A great deal of the time
- A lot of the time
- From time to time but not too often
- Only occasionally

6. I feel cheerful:

- Not at all
- Not often
- Sometimes
- Most of the time

- 7. I can sit at ease and feel relaxed:**
- Definitely
- Usually
- Not often
- Not at all
- 8. I feel as if I am slowed down:**
- Nearly all the time
- Very often
- Sometimes
- Not at all
- 9. I get a sort of frightened feeling like 'butterflies' in the stomach:**
- Not at all
- Occasionally
- Quite often
- Very often
- 10. I have lost interest in my appearance:**
- Definitely
- I don't take as much care as I should
- I may not take quite as much care
- I take just as much care as ever
- 11. I feel restless as if I have to be on the move:**
- Very much indeed
- Quite a lot
- Not very often
- Not at all
- 12. I look forward with enjoyment to things:**
- As much as I ever did
- Rather less than I used to
- Definitely less than I used to
- Hardly at all
- 13. I get sudden feelings of panic:**
- Very often indeed
- Quite often
- Not very often
- Not at all

14. I can enjoy a good book or radio or TV programme:

- Often
- Sometimes
- Not often
- Very seldom

Appendix 13: The Process of Recovery Questionnaire (QPR)

The Process of Recovery Questionnaire: QPR (Neil, Kilbride, Pitt et al. 2009)

Participant ID: _____ Date: _____

We developed this questionnaire in order to understand more about the process of recovery; what's helpful and what's not so helpful. Everyone is different and there will be differences for everyone. The items on this questionnaire were developed through a process of interviewing service users about their recovery journeys. We hope that by filling in this questionnaire you will help us find out information that is important to you and your own recovery. Not all factors will be important to you since everyone is different. This questionnaire is not intended to be used to impose anything against your wishes.

If you would like to fill in the questionnaire, please take a moment to consider and sum up how things stand for you at the present time, in particular over the last 7 days, with regards to your mental health and recovery. Please respond to the following statements by putting a tick in the box which best describes your experience.

	Disagree strongly	Disagree	Neither agree nor disagree	Agree	Agree strongly
1) I feel better about myself					
2) I feel able to take chances in life					
3) I am able to develop positive relationships with other people					
4) I feel part of society rather than isolated					
5) I am able to assert myself					
6) I feel that my life has purpose					
7) My experiences have changed me for the better					
8) I have been able to come to terms with things that have happened to me in the past and moved on with my life					
9) I am basically strongly motivated to get better					

10) I can recognise the positive things I have done					
11) I am able to understand myself better					
12) I can take charge of my life					
13) I can actively engage with life					
14) I can take control of aspects of my life					
15) I can find time to do the things I enjoy					

**THE WORLD HEALTH ORGANIZATION QUALITY OF LIFE (WHOQOL) -
BREF**

The World Health Organization Quality of Life (WHOQOL)-BREF

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WHOQOL-BREF

The following questions ask how you feel about your quality of life, health, or other areas of your life. I will read out each question to you, along with the response options. **Please choose the answer that appears most appropriate.** If you are unsure about which response to give to a question, the first response you think of is often the best one.

Please keep in mind your standards, hopes, pleasures and concerns. We ask that you think about your life **in the last four weeks.**

		Very poor	Poor	Neither poor nor good	Good	Very good
1	How would you rate your quality of life?	1	2	3	4	5

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
2	How satisfied are you with your health?	1	2	3	4	5

The following questions ask about **how much** you have experienced certain things in the last four weeks.

		Not at all	A little	A moderate amount	Very much	An extreme amount
3	To what extent do you feel that physical pain prevents you from doing what you need to do?	5	4	3	2	1
4	How much do you need any medical treatment to function in your daily life?	5	4	3	2	1
5	How much do you enjoy life?	1	2	3	4	5
6	To what extent do you feel your life to be meaningful?	1	2	3	4	5

		Not at all	A little	A moderate amount	Very much	Extremely
7	How well are you able to concentrate?	1	2	3	4	5
8	How safe do you feel in your daily life?	1	2	3	4	5
9	How healthy is your physical environment?	1	2	3	4	5

The following questions ask about how completely you experience or were able to do certain things in the last four weeks.

		Not at all	A little	Moderately	Mostly	Completely
10	Do you have enough energy for everyday life?	1	2	3	4	5
11	Are you able to accept your bodily appearance?	1	2	3	4	5
12	Have you enough money to meet your needs?	1	2	3	4	5
13	How available to you is the information that you need in your day-to-day life?	1	2	3	4	5
14	To what extent do you have the opportunity for leisure activities?	1	2	3	4	5

		Very poor	Poor	Neither poor nor good	Good	Very good
15	How well are you able to get around?	1	2	3	4	5

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
16	How satisfied are you with your sleep?	1	2	3	4	5
17	How satisfied are you with your ability to perform your daily living activities?	1	2	3	4	5
18	How satisfied are you with your capacity for work?	1	2	3	4	5
19	How satisfied are you with yourself?	1	2	3	4	5

20	How satisfied are you with your personal relationships?	1	2	3	4	5
21	How satisfied are you with your sex life?	1	2	3	4	5
22	How satisfied are you with the support you get from your friends?	1	2	3	4	5
23	How satisfied are you with the conditions of your living place?	1	2	3	4	5
24	How satisfied are you with your access to health services?	1	2	3	4	5
25	How satisfied are you with your transport?	1	2	3	4	5

The following question refers to how often you have felt or experienced certain things in the last four weeks.

		Never	Seldom	Quite often	Very often	Always
26	How often do you have negative feelings such as blue mood, despair, anxiety, depression?	5	4	3	2	1

Do you have any comments about the assessment?

[The following table should be completed after the interview is finished]

	Equations for computing domain scores	Raw score	Transformed scores*	
			4-20	0-100
Domain 1	$(6-Q3) + (6-Q4) + Q10 + Q15 + Q16 + Q17 + Q18$ $\square + \square + \square + \square + \square + \square + \square$	a. =	b:	c:
Domain 2	$Q5 + Q6 + Q7 + Q11 + Q19 + (6-Q26)$ $\square + \square + \square + \square + \square + \square$	a. =	b:	c:
Domain 3	$Q20 + Q21 + Q22$ $\square + \square + \square$	a. =	b:	c:
Domain 4	$Q8 + Q9 + Q12 + Q13 + Q14 + Q23 + Q24 + Q25$ $\square + \square + \square + \square + \square + \square + \square + \square$	a. =	b:	c:

* See Procedures Manual, pages 13-15

Appendix 15: The Paranoia Checklist (PCL)

Paranoia Checklist (PCL)

Participant ID: _____ Date: _____

Many people have thoughts, worries or suspicions that others may be trying to upset them. It is a common experience, just as people can sometimes feel anxious or low in mood. Below are listed some of the thoughts that people report. For each one please indicate how often you have had thought **in the past week**, how strongly you believe it, and how upsetting the experience is for you.

1. I need to be on my guard against others.	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

2. There might be negative comments being circulated about me.	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

3. People deliberately try to irritate me.	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

4. I might be being observed or followed.	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

5. People are trying to make me upset.	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

6. People communicate about me in subtle ways.	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

7. Strangers and friends look at me critically.	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

8. People might be hostile towards me.	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

9. Bad things are being said about me behind my back.	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

10. Someone I know has bad intentions towards me.	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

11. I have a suspicion that someone has it in for me.	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

12. People would harm me if given an opportunity	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

13. Someone I don't know has bad intentions towards me.	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

14. There is a possibility of a conspiracy against me.	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

15. People are laughing at me.	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

16. I am under threat from others.	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

17. I can detect coded messages about me in the press/TV/radio.	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

18. My actions and thoughts might be controlled by others.	a) How often in the past week have you had this thought?				
	Never <input type="checkbox"/>	Rarely <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
	b) How much do you believe it?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	A lot <input type="checkbox"/>	Absolutely <input type="checkbox"/>
	c) How distressing is the thought?				
	Not at all <input type="checkbox"/>	A little <input type="checkbox"/>	Somewhat <input type="checkbox"/>	Moderately <input type="checkbox"/>	Very much <input type="checkbox"/>

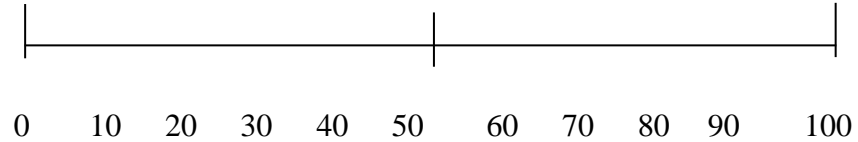
Appendix 16: Experimental study manipulation check

Manipulation Check

Participant no: _____ Participant group: _____ Date: _____

This questionnaire is about your beliefs. Please answer honestly and indicate your response by circling an answer on each scale below:

	Do not agree	Agree slightly	Agree moderately	Agree Very much
1. My worrying is dangerous for me	1	2	3	4
2. I could make myself sick with worrying	1	2	3	4
3. My worrying thoughts persist, no matter how I try to stop them	1	2	3	4
4. I cannot ignore my worrying thoughts	1	2	3	4
5. My worrying could make me go mad	1	2	3	4
6. When I start worrying, I cannot stop	1	2	3	4
7. I need to be on my guard against others				



I did not believe this

I believed it totally

Appendix 17: The State Anxiety Inventory (STAI)

State Anxiety Inventory

Participant no: _____ Participant group: _____ Date: _____

A number of statements which people have used to describe themselves are given below. Please indicate how well the statement describes how you feel **AT THE MOMENT** (and not how you usually feel). You must choose one of the four possible replies.

Work quickly and don't spend too much time thinking about your answer. The first answer you think of is the best one. Answer every word, even if you find it difficult. Answer as honestly as you can, and what is true to you. Please do not choose an answer because it seems like the right thing to say. Your answers will be kept entirely confidential.

	Not at all	Somewhat	Moderately so	Very much so
1. I feel calm	1	2	3	4
2. I feel secure	1	2	3	4
3. I am tense	1	2	3	4
4. I feel strained	1	2	3	4
5. I feel at ease	1	2	3	4
6. I feel upset	1	2	3	4
7. I am presently worrying over possible misfortunes	1	2	3	4
8. I feel satisfied	1	2	3	4
9. I feel frightened	1	2	3	4
10. I feel comfortable	1	2	3	4
11. I feel self-confident	1	2	3	4
12. I feel nervous	1	2	3	4
13. I am jittery	1	2	3	4
14. I feel indecisive	1	2	3	4
15. I am relaxed	1	2	3	4
16. I feel content	1	2	3	4
17. I am worried	1	2	3	4
18. I feel confused	1	2	3	4
19. I feel steady	1	2	3	4
20. I feel pleasant	1	2	3	4

Appendix 18: Experimental study measure of participant experiences

Measure of experiences

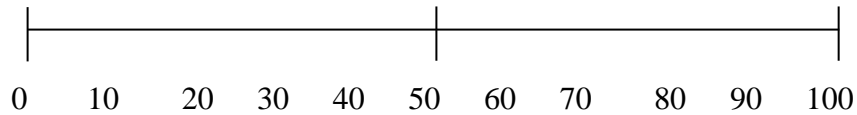
Participant no: _____ Participant group: _____ Date: _____

This questionnaire is about your thoughts and your experiences of discomfort during the EEG. Please answer honestly and indicate your response by placing an X on the scales below.

1) How many threat related thoughts did you have during the EEG?

None A couple Several Lots
(0 thoughts) (Between 1 and 5) (Between 5 and 10) (More than 10)

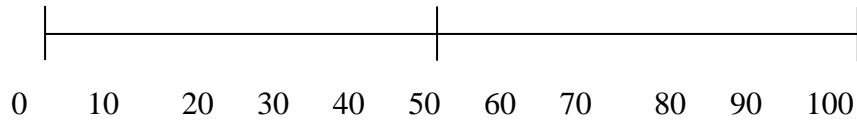
2) How much time did you spend thinking about water or drinking?



None of the time

All of the time

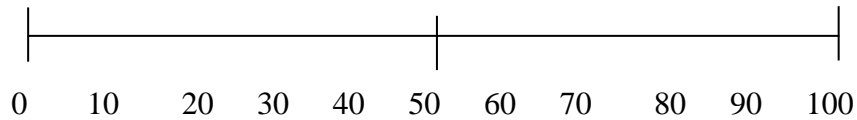
3) How much effort did you put into not thinking about threat related thoughts/the film stimuli?



No effort

All of my effort

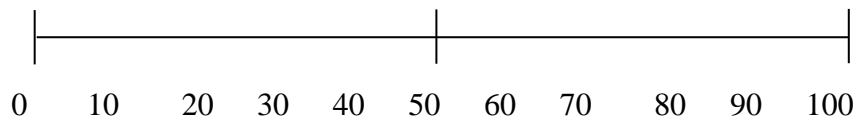
4) How much discomfort did you feel when a threat related thought occurred?



No discomfort

The most discomfort
I could have

5) How much discomfort did you feel overall during the EEG?



No discomfort

The most discomfort
I could have

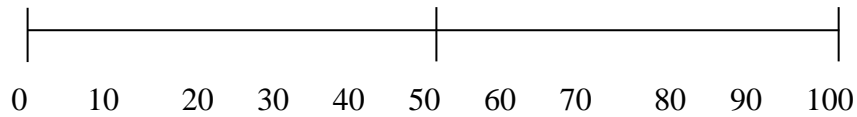
Appendix 19: Experimental study validity check

Measure of beliefs about the EEG

Participant no: _____ Participant group: _____ Date: _____

This questionnaire is about your beliefs about the EEG device. Please answer honestly and indicate your response by placing an X on the scales below.

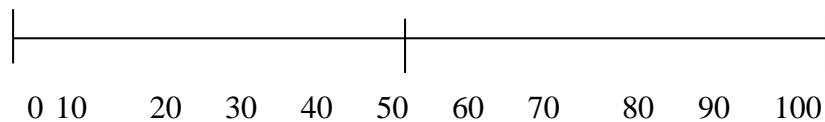
1) How much did you believe that you were connected to a working EEG?



I did not believe this

I believed it totally

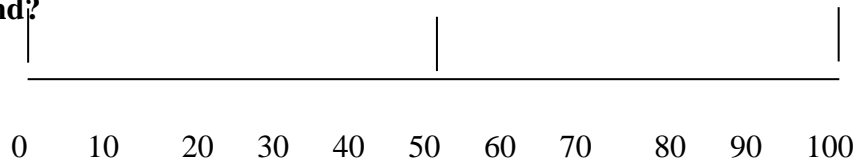
2) How much did you believe that the EEG could detect your thoughts?



I did not believe this
totally

I believed it

3) How much did you believe that the EEG might deliver a loud high pitched sound?



I did not believe this

I believed it totally

Appendix 20: The Depression Anxiety and Stress Scale (DASS)

Depression Anxiety and Stress Scale

Depression, anxiety and stress are a common experience. Below are a number of thoughts people have reported. Please read each statement and select a response which indicates how much the statement applied to you **over the past week**. There are no right or wrong answers. Do not spend too much time on any statement.

1. I found it hard to wind down

Did not apply to me at all

Applied to me to some degree

Applied to me a considerable degree, or a good part of the time

Applied to me very much, or most of the time

2. I was aware of dryness in my mouth

Did not apply to me at all

Applied to me to some degree

Applied to me a considerable degree, or a good part of the time

Applied to me very much, or most of the time

3. I couldn't seem to experience any positive feeling at all

Did not apply to me at all

Applied to me to some degree

Applied to me a considerable degree, or a good part of the time

Applied to me very much, or most of the time

4. I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)

Did not apply to me at all

Applied to me to some degree

Applied to me a considerable degree, or a good part of the time

Applied to me very much, or most of the time

5. I found it hard to work up the initiative to do things

Did not apply to me at all

Applied to me to some degree

Applied to me a considerable degree, or a good part of the time

Applied to me very much, or most of the time

6. I tended to over-react to situations

Did not apply to me at all

Applied to me to some degree

Applied to me a considerable degree, or a good part of the time
Applied to me very much, or most of the time

7. I experienced trembling (e.g. in the hands)

Did not apply to me at all
Applied to me to some degree
Applied to me a considerable degree, or a good part of the time
Applied to me very much, or most of the time

8. I felt that I was using a lot of nervous energy

Did not apply to me at all
Applied to me to some degree
Applied to me a considerable degree, or a good part of the time
Applied to me very much, or most of the time

9. I was worried about situations in which I might panic and make a fool of myself

Did not apply to me at all
Applied to me to some degree
Applied to me a considerable degree, or a good part of the time
Applied to me very much, or most of the time

10. It felt I had nothing to look forward to

Did not apply to me at all
Applied to me to some degree
Applied to me a considerable degree, or a good part of the time
Applied to me very much, or most of the time

11. I found myself getting agitated

Did not apply to me at all
Applied to me to some degree
Applied to me a considerable degree, or a good part of the time
Applied to me very much, or most of the time

12. I found it difficult to relax

Did not apply to me at all
Applied to me to some degree
Applied to me a considerable degree, or a good part of the time
Applied to me very much, or most of the time

13. I felt down-hearted and blue

Did not apply to me at all
Applied to me to some degree

Applied to me a considerable degree, or a good part of the time
Applied to me very much, or most of the time

14. I was intolerant of anything that kept me from getting on with what I was doing

Did not apply to me at all
Applied to me to some degree
Applied to me a considerable degree, or a good part of the time
Applied to me very much, or most of the time

15. I felt I was close to panic

Did not apply to me at all
Applied to me to some degree
Applied to me a considerable degree, or a good part of the time
Applied to me very much, or most of the time

16. I was unable to become enthusiastic about anything

Did not apply to me at all
Applied to me to some degree
Applied to me a considerable degree, or a good part of the time
Applied to me very much, or most of the time

17. I felt I wasn't worth much as a person

Did not apply to me at all
Applied to me to some degree
Applied to me a considerable degree, or a good part of the time
Applied to me very much, or most of the time

18. I felt that I was rather touchy

Did not apply to me at all
Applied to me to some degree
Applied to me a considerable degree, or a good part of the time
Applied to me very much, or most of the time

19. I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increases, heart missing a beat)

Did not apply to me at all
Applied to me to some degree
Applied to me a considerable degree, or a good part of the time
Applied to me very much, or most of the time

20. I felt scared without any good reason

Did not apply to me at all
Applied to me to some degree

Applied to me a considerable degree, or a good part of the time
Applied to me very much, or most of the time

21. I felt that life was meaningless

Did not apply to me at all

Applied to me to some degree

Applied to me a considerable degree, or a good part of the time

Applied to me very much, or most of the time

Appendix 21: The Brief Core Schema Scales (BCSS)

The Brief Core Schema Scales (BCSS)

This questionnaire lists beliefs that people can hold about themselves and other people. Please indicate to what extent you hold each belief by selecting a response. Try to judge 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

1. I am unloved

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

2. I am worthless

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

3. I am weak

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

4. I am vulnerable

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

5. I am bad

Do not believe it
Believe it slightly
Believe it moderately

Believe it very much
Believe it totally

6. I am a failure

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

7. I am respected

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

8. I am valuable

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

9. I am talented

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

10. I am successful

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

11. I am good

Do not believe it
Believe it slightly
Believe it moderately

Believe it very much
Believe it totally

12. I am interesting

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

Other people

13. Other people are hostile

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

14. Other people are harsh

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

15. Other people are unforgiving

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

16. Other people are bad

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

17. Other people are devious

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

18. Other people are nasty

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

19. Other people are fair

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

20. Other people are good

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

21. Other people are trustworthy

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

22. Other people are accepting

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

23. Other people are supportive

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

24. Other people are truthful

Do not believe it
Believe it slightly
Believe it moderately
Believe it very much
Believe it totally

National Research Ethics Service

North West - Greater Manchester East Research Ethics Committee

3rd Floor, Barlow House
4 Minshull Street
Manchester
M1 3DZ

07 March 2016

Miss Rachel Sellers
Psychosis Research Unit
Research and Development, Harrop House
Greater Manchester West NHS Foundation Trust
Bury New Road, Prestwich
M25 3BL

Dear Miss Sellers

Study title: **Investigating the Cognitive Attentional Syndrome
in psychosis: Associations with distress, quality
of life and recovery.**

REC reference: **16/NW/0091**

IRAS project ID: **195086**

Thank you for your email of 7 March 2016, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair. We plan to publish your research summary wording for the above study on the HRA website, together with your contact details. Publication will be no earlier than three months from the date of this opinion letter. Should you wish to provide a substitute contact point, require further information, or wish to make a request to postpone publication, please contact the REC Manager, Rachel Heron nrescommittee.northwest-gmeast@nhs.net

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Conditions of the favourable opinion

The REC favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission must be obtained from each host organisation prior to the start of the study at the site concerned

Management permission should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements. Each NHS organisation must confirm through the signing of agreements and/or other documents that it has given permission for the research to proceed (except where explicitly specified otherwise).

Guidance on applying for NHS permission for research is available in the Integrated

Research Application System, www.hra.nhs.uk or at <http://www.rdforum.nhs.uk>.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of management permissions from host organisations

Registration of Clinical Trials

All clinical trials (defined as the first four categories on the IRAS filter page) must be registered on a publically accessible database within 6 weeks of recruitment of the first participant (for medical device studies, within the timeline determined by the current registration and publication trees).

There is no requirement to separately notify the REC but you should do so at the earliest opportunity e.g. when submitting an amendment. We will audit the registration details as part of the annual progress reporting process.

To ensure transparency in research, we strongly recommend that all research is registered but for non-clinical trials this is not currently mandatory.

If a sponsor wishes to contest the need for registration they should contact Catherine Blewett (catherineblewett@nhs.net), the HRA does not, however, expect exceptions to be made. Guidance on where to register is provided within IRAS.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Ethical review of research sites

NHS sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Approved documents

The final list of documents reviewed and approved by the Committee is as follow

<i>Document</i>	<i>Version</i>	<i>Date</i>
Covering letter on headed paper [Cover letter]		
Evidence of Sponsor insurance or indemnity (non NHS Sponsors)		28 November 2015
Interview schedules or topic guides for participants [Interview]	1	02 January 2014
Letter from sponsor [Letter from sponsor]		28 November 2015
Letters of invitation to participant [Letter invitation to Other [CV A Wells]	1	30 November 2015
Other [Demographics Form]		20 January 2015
Other [A6 Summary]	1	08 November 2015
Other [Response to ethics queries]	2	02 March 2016
Participant consent form	1	02 March 2016
Participant information sheet (PIS)	3	02 March 2016
REC Application Form [REC_Form_22012016]		22 January 2016
Research protocol or project proposal [Research protocol]	3	02 March 2016
Summary CV for Chief Investigator (CI) [CV R Sellers]		
Summary CV for student [CV R Sellers]		
Summary CV for supervisor (student research) [CV T]		
Validated questionnaire [Attention Control Scale (ACS)]		
Validated questionnaire [Cognitive Attentional Syndrome Scale]		
Validated questionnaire [Hospital Anxiety and Depression]		
Validated questionnaire [Metacognitions Questionnaire]		
Validated questionnaire [Process of Recovery Questionnaire (QPR)]		
Validated questionnaire [WHOQOL]		

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document “*After ethical review – guidance for researchers*” gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol

Progress and safety reports

Notifying the end of the study

The HRA website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website:

<http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/>

HRA Training

We are pleased to welcome researchers and R&D staff at our training days – see details at <http://www.hra.nhs.uk/hra-training/>

16/NW/0091

Please quote this number on all correspondence

With the Committee's best wishes for the success of this project.

Yours sincerely



Signed on behalf of **Mr Francis Chan**

Chair

Email: nrescommittee.northwest-gmeast@nhs.net

Copy to: *Ms Lynne Macrae*

Ms Kathryn Harney, Greater Manchester West NHS Foundation Trust



An investigation of thought processes and attention in experiences of psychosis

INFORMATION FOR PARTICIPANTS

You are being invited to take part in a research study. It is important for you to understand why the research is being done and what it will involve. Please take time to read the information below carefully, and discuss it with others if you wish. The Research Assistant who gave you this sheet will be happy to answer any questions that you might have about the information set out below. Feel free to ask if there is anything that is not clear, or if you would like more information. You may wish to read the information sheet more than once, and you should take time to decide whether or not you wish to take part.

1. Who will conduct the research?

This research is being carried out by Rachel Sellers (School of Psychological Sciences, Zochonis Building, Brunswick Street, University of Manchester, M13 9PT) under supervision from Professor Anthony Morrison and Professor Adrian Wells.

2. What is the purpose of the study?

This study is being conducted as part of a PhD project focussing on thought processes and attention in people with experiences of psychosis. The aim of this project is to explore whether the way people think about their experiences and the way they pay attention to their thoughts and their environment can affect how much distress they experience, and how they perceive their recovery and quality of life.

3. Why have I been given this information?

We are looking for people to take part in this study who have experience of schizophrenia, schizoaffective disorder, psychosis or other psychotic-like experiences who would be willing to discuss some of their distressing experiences and how they respond to these with the researcher.

4. What would I be asked to do to if I took part?

You will be invited to meet the researcher, Rachel Sellers, at a convenient location for you to discuss the study in more detail. Here she will explain the exact nature of the research, explain the reasons for conducting this study and answer any questions you may have. If you decide that you wish to participate in this study you will be asked to sign a consent form. Following this, you will be met again by the researcher to complete an interview about your experiences of psychosis and complete six questionnaires. This will take approximately 1 and a half hours and be completed at one meeting or spread across two meetings if you prefer. Interviews will be audio recorded by the researcher and will be kept confidentially on an encrypted NHS computer.

5. **Do I have to take part?**

No. As entry to the study is entirely voluntary, **it is up to you to decide** whether or not to take part. You should not feel under any pressure to make the decision. If you do decide to take part, you will be asked to sign a consent form. Even after signing you are still free to withdraw at any time and without giving a reason. This will not affect any care you may receive now or in the future.

6. **What are the advantages and disadvantages to taking part?**

If you take part in the study, it is hoped that the opportunity to discuss your experiences might be helpful to you. However, it is also possible that talking about some of these issues may be upsetting. You will have the opportunity to discuss any concerns you have with the researcher and you are free to withdraw from the study at any point. You can also talk to your CPN, GP or psychiatrist about participation in this study and any concerns you may have.

7. **Will taking part in the study cost me anything?**

No. The study will only involve your time. In order to compensate you for this and any expenses incurred, you will receive a payment of £10 at the end of the interview.

8. **Will my taking part in the study be kept confidential?**

Yes. We will follow ethical and legal practice and all information about you will be handled in confidence. Personally identifying information will be stored in paper and electronic format and will be stored separately from research data (the interviews and questionnaires you complete). All personally identifiable information will be kept confidentially and securely; information that is in paper format will be kept in a locked filing cabinet in a locked office on NHS or University premises. Personally identifiable information that is stored electronically will be kept on a secure, encrypted USB drive. All transmission and storage of participant identifying data complies with current relevant NHS security standards.

9. **Who will have access to information collected about me during this study?**

Your information (written and audiotaped) from the study will be as confidential as your medical records. The information that you provide (research data such as interviews and audio recordings) will not be shared with other people i.e. medical staff or people involved in your care unless you say it is OK to do so. The only instance in which information you provide may be shared is if you provide us with information which indicates that either yourself or another person is at risk of harm, in which case we would need to share this information with another person involved in your care such as your care coordinator, psychiatrist or your GP. However, we would ALWAYS discuss this with you beforehand.

Individuals from the University of Manchester, NHS Trust or regulatory authorities may need to look at the data collected during the study to make sure the research is being carried out as planned. With your agreement, they may look at information with a name or other identifiable information on it. All individuals have a duty of confidentiality to you as a research participant.

The data collected during this study could be used to support research in the future. We may use the anonymous data in future studies or share it with other researchers working on

other studies. All of the data used for future research will be anonymised and so no-one will be able to identify you.

10. **What will happen to the results of the research?**

After the study is completed, we will analyse the results and submit them for publication in a scientific journal. Presentations may also be given at scientific conferences. Results will also be included in the final PhD thesis. You will not be identified in any publication or presentation. If you wish to know the outcome of our research please let us know.

11. **Who has reviewed the research?**

This study has been approved by the NRES Committee North West – Greater Manchester West (**reference: 16/NW/0091**).

12. **What do I do if I wish to make a complaint?**

If you have a minor complaint then you should contact the Chief Investigator (Rachel Sellers) or her supervisor (Tony Morrison) who will do their best to respond to you concerns. If you wish to make a formal complaint or if you are not satisfied with the response you have gained then please contact a Research Governance and Integrity Manager, Research Office, Christie Building, University of Manchester, Oxford Road, Manchester, M13 9PL, by emailing: research.complaints@manchester.ac.uk or by telephoning 0161 275 2674 or 275 2046.

Please keep this information sheet for future reference.

Thank you for considering this proposal.

If you want to discuss this study any further, please contact either:

Rachel Sellers (Chief Investigator) Professor Tony Morrison (Supervisor):

07798852289 / 0161 358 1395

0161 358 1395

rachel.sellers@postgrad.manchester.ac.uk tony.morrison@manchester.ac.uk



CONSENT FORM

Title of Project: **An investigation of thought processes and attention in experiences of psychosis**

Name of Researcher: **Rachel Sellers**

Please initial all boxes

1. I confirm that I have read and understand the information sheet dated 02/03/2016 (version 3) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without my medical care or legal rights being affected.
3. I understand that data collected during the study may be looked at by individuals from The University of Manchester, from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records.
4. I understand that the information collected about me will be used to support other research in the future, and may be shared anonymously with other researchers.
5. I agree to interviews being audio-recorded by the researcher.
6. I agree to take part in the above study.
7. Please initial this box if you would like to receive a summary of the results once the study has been completed

Name of Participant

Date

Signature

Name of Researcher

Date

Signature

Appendix 25: Study 4 demographic information sheet

Demographics Form

Gender	Male <input type="checkbox"/>	Female <input type="checkbox"/>		
Date of birth (dd/mm/yyyy)	/ /			
Age (years)				
Highest level of education	Primary <input type="checkbox"/>	Secondary <input type="checkbox"/>	Further <input type="checkbox"/>	Higher <input type="checkbox"/>
Employment status	Full time <input type="checkbox"/>	Part time <input type="checkbox"/>	Voluntary <input type="checkbox"/>	Retired <input type="checkbox"/>
	Student <input type="checkbox"/>	Unemployed <input type="checkbox"/>		
Marital status	Single <input type="checkbox"/>	Married <input type="checkbox"/>	Divorced <input type="checkbox"/>	
	Separated <input type="checkbox"/>	Widowed <input type="checkbox"/>	Cohabiting <input type="checkbox"/>	Civil partnership <input type="checkbox"/>
Living arrangements (Who does the person live with?)	Partner only <input type="checkbox"/>	Partner + children <input type="checkbox"/>	Children only <input type="checkbox"/>	Parent/s only <input type="checkbox"/>
	Alone <input type="checkbox"/>	Friend/s only <input type="checkbox"/>	Partner plus other/s (not children) <input type="checkbox"/>	
	Supported accommodation/ hostel <input type="checkbox"/>		Other <input type="checkbox"/>	Specify _____
Ethnicity				
Asian or Asian British <input type="checkbox"/> Bangladeshi <input type="checkbox"/> Indian <input type="checkbox"/> Pakistani <input type="checkbox"/> Any other Asian background Black or Black British <input type="checkbox"/> African <input type="checkbox"/> Caribbean <input type="checkbox"/> Any other Black background		Mixed <input type="checkbox"/> White & Asian <input type="checkbox"/> White & Black African <input type="checkbox"/> White & Black Caribbean <input type="checkbox"/> Any other mixed background White <input type="checkbox"/> British <input type="checkbox"/> Irish <input type="checkbox"/> Any other White background		Other Ethnic Group <input type="checkbox"/> Chinese <input type="checkbox"/> Any other ethnic group Specify _____ <input type="checkbox"/> Prefer not to answer
Religion or belief				
<input type="checkbox"/> Atheism <input type="checkbox"/> Buddhism <input type="checkbox"/> Christianity <input type="checkbox"/> Islam		<input type="checkbox"/> Jainism <input type="checkbox"/> Sikhism <input type="checkbox"/> Judaism <input type="checkbox"/> Hinduism		<input type="checkbox"/> Other Specify _____ -
Name of CC	Name of service	Site of service		
Do you consider yourself to be experiencing mental health problems?				
Yes <input type="checkbox"/>	No <input type="checkbox"/>			
Duration of untreated psychosis (months)			Duration of illness (months)	
Have you ever been prescribed antipsychotic medication?				
Yes <input type="checkbox"/>	No <input type="checkbox"/>			
Have you ever received CBT?				
Yes <input type="checkbox"/>	No <input type="checkbox"/>			

Appendix 26: Study 5 ethical approval



Faculty of Medical and Human Sciences

The University of Manchester

Oxford Road

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Secretary to Research Ethics Committee 1

Email: katy.boyle@manchester.ac.uk

Phone: 0161 275 1360

Ref: ethics/15455

Miss Rachel Sellers

PhD Student

School of Psychological Sciences

University of Manchester

M13 9PL

rachel.sellers@postgrad.manchester.ac.uk

12 November 2015

Dear Miss Sellers

Study title: Ref 15455: An experimental manipulation of negative metacognitive beliefs in paranoia: effects on emotion

Research Ethics Committee 1

Thank you for attending the University Research Ethics Committee meeting held on 15th October 2015 to discuss the above study. I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form and supporting documentation, as submitted to and approved by the Committee.

This approval is effective for a period of five years. If the project continues beyond that period an application for amendment must be submitted for review. Likewise, any proposed changes to the way the research is conducted must be approved via the

amendment process (see below). Failure to do so could invalidate the insurance and constitute research misconduct.

You are reminded that, in accordance with University policy, any data carrying personal identifiers must be encrypted when not held on a secure university computer or kept securely as a hard copy in a location which is accessible only to those involved with the research.

Reporting Requirements:

You are required to report to us the following:

1. [Amendments](#)
2. [Breaches and adverse events](#)
3. [Notification of Progress/End of the Study](#)

Feedback

It is our aim to provide a timely and efficient service that ensures transparent, professional and proportionate ethical review of research with consistent outcomes, which is supported by clear, accessible guidance and training for applicants and committees. In order to assist us with our aim, we would be grateful if you would give your view of the service that you have received from us by completing a feedback sheet

<https://survey.manchester.ac.uk/pssweb/index.php/197138/lang-en>.

We hope the research goes well.

Yours sincerely,



Katy Boyle

Secretary to University Research Ethics Committee 1



An investigation of thought processes in paranoia

INFORMATION FOR PARTICIPANTS

You are being invited to take part in a research study as part of a PhD project that is looking at the application of the metacognitive model to experiences of psychosis. Before you decide to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the information below carefully, and discuss it with others if you wish. Feel free to ask if there is anything that is not clear, or if you would like more information. You should take time to decide whether or not you wish to take part.

1. Who will conduct the research?

This research is being carried out by Rachel Sellers (School of Psychological Sciences, Zochonis Building, Brunswick Street, University of Manchester, M13 9PT) under supervision from Professor Anthony Morrison and Professor Adrian Wells.

2. What is the purpose of the study?

Paranoia is a common experience. **Did you know** previous research has suggested that paranoid thinking may be a regular experience in **1 out of 3 people** in the general population? And approximately **1 in 20** feel persecuted at some time in their life? Some people find these experiences more distressing and harder to cope with than others. We would like to find out whether the way people process information and the beliefs that they have can affect the number of paranoid thoughts they have and the amount of distress they experience.

3. Why have I been given this information?

We are looking for people from the general population that are willing to take part in a short experiment looking at whether the way people process information affects paranoia and distress. We would like to invite you to take part in a short experiment where you will be asked to watch three video clips whilst connected to an EEG. You will also be asked to wear a Galvanic Skin Response receptor that measures emotional responses.

4. What would I be asked to do to if I took part?

You will be invited to meet the researcher, Rachel Sellers, at a convenient location for you to discuss the study in more detail. Here the researcher will explain the nature of the research, the reasons for conducting this study and answer any questions you may have. If

you decide that you wish to participate in this study you will be asked to sign a consent form. Following this, you will meet with the researcher again for approximately an hour and a half.

During this time you will complete two short questionnaires before being connected to an EEG. Whilst connected to the EEG you will watch three short video clips and then remain connected to the EEG for a further four minutes during which you may hear a burst of white noise. After these four minutes, you will be asked to complete four short questionnaires.

After the EEG, we would like to give you a little bit more information about the study and allow you the opportunity to ask any further questions you might have.

5. Do I have to take part?

No. As entry to the study is entirely voluntary, **it is up to you to decide** whether or not to take part. You should not feel under any pressure to make the decision. If you do decide to take part, you will be asked to sign a consent form. Even after signing you are still free to withdraw at any time and without giving a reason.

6. What are the advantages and disadvantages to taking part?

If you take part in the study, it is hoped that you might find the experience interesting. However, it is also possible that you may experience some distress. You will have the opportunity to discuss any concerns you have with the researcher and you are free to withdraw from the study at any point. Whilst the current study will not have any direct patient benefit, it is an attempt to build on our understanding of a metacognitive model of paranoia with potential implications for conceptualisation, assessment and treatment. We hope that learning more about the way people process information and whether the beliefs that they have about their thoughts can affect distress might help to inform the way clinicians work with people distressed by beliefs in the future.

7. How is confidentiality maintained?

We will follow ethical and legal practice and all information about you will be handled in confidence. Personally identifying information will be stored in paper and electronic format and will be stored separately from research data (the questionnaires you complete). All personally identifiable information will be kept confidentially and securely; information that is in paper format will be kept in a locked filing cabinet in a locked office on NHS or University premises. Personally identifiable information that is stored electronically will be kept on a secure, encrypted university computer and may be stored temporarily on an encrypted USB for safe and immediate transfer.

8. What happens to the data collected?

After the study is completed, we will analyse the results and submit them for publication in a scientific journal. Presentations may also be given at scientific conferences. Results will be used to improve our understanding of the processes and beliefs underlying paranoia and

distress. You will not be identified in any publication or presentation. If you wish to know the outcome of our research please let us know.

9. Will I be paid for participating in the research?

Unfortunately, we are unable to provide payment participants taking part in this research. However, if you are part of the School of Psychological Sciences you will be offered 4 course credits for completing the study.

10. Where will the research be conducted?

This research will be carried out in the School of Psychological Sciences EEG lab on the lower ground level of the Zochonis Building.

11. Who has reviewed the research?

This project has been reviewed by the University of Manchester Research Ethics Committee (**Reference number: 15455**).

12. What do I do if I wish to make a complaint?

If you have a concern about any aspect of this study, you should ask to speak to the Chief Investigator (Rachel Sellers) who will do her best to answer your questions. If she is unable to resolve your concerns you wish to speak to her supervisor (Tony Morrison). If you remain concerned and wish to make a formal complaint regarding the study, please contact a Research Governance and Integrity Manager, Research Office, Christie Building, University of Manchester, Oxford Road, Manchester, M13 9PL, by emailing: research.complaints@manchester.ac.uk or by telephoning 0161 275 2674 or 275 8093

Please keep this information sheet for future reference.

Thank you for considering this proposal.

If you want to discuss this study any further, please contact either:

Rachel Sellers (Chief Investigator) Professor Tony Morrison (Supervisor):

07798852289 / 0161 358 1395

0161 358 1395

rachel.sellers@postgrad.manchester.ac.uk tony.morrison@manchester.ac.uk

Appendix 28: Study 5 consent form



Consent form

Title of Project: **An investigation of thought processes in paranoia**

Chief Investigator: **Rachel Sellers**

Please initial all boxes

1. I confirm that I have read and understand the information sheet dated 24.08.2015 (version 1) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without detriment to myself.
3. I understand that my data will remain confidential.
4. I understand that data collected about me during the study may be looked at by individuals from The University of Manchester where it is relevant to my taking part in this research. I give permission for these individuals to have access to my research data.
5. I understand that the data collected may be published as part of a research project. My identity will not be revealed in any publication.
6. In line with The University of Manchester policy on storage of personal data I understand that my personal data will be stored securely for 5 years after the last publication of the study or 10 years, whichever is greater
7. I agree to take part in the above study.

Name of Participant	Date	Signature

Name of Researcher	Date	Signature

This Project Has Been Approved by the University of Manchester’s Research Ethics Committee [Reference number: 15455].



The University of Manchester

Re-Consent form

Participant Identification Number:

Title of Project: **An investigation of thought processes in paranoia**

Chief Investigator: **Rachel Sellers**

Please initial all boxes

1. I confirm that I have read and understand the debrief sheet dated 18.07.2015 (version 1) for the above study and have had the opportunity to ask further questions about the study and have had these answered satisfactorily.
2. I understand that my participation is voluntary and that I am free to withdraw without giving any reason.
3. After receiving the debrief I agree for the data I have provided to be used in study.

Name of Participant

Date

Signature

Name of Researcher

Date

Signature

This Project Has Been Approved by the University of Manchester's Research Ethics Committee [Reference number: 15455].

An investigation of thought processes in paranoia

Debrief

Thank you for completing this study. At the beginning, you were told that after the EEG we would like to give you a little bit more information. I will briefly tell you what this research is about and then it is up to you whether you would like to talk about your experience and ask more questions.

What is this study about?

The aim of this study is to investigate whether the beliefs that people have about their thoughts can affect the number of threatening thoughts they have and the amount of distress they experience.

The EEG that you were connected to was not working and it is not possible for an EEG to read your thoughts. There was also no burst of white noise. We needed to say this so that we could influence your beliefs.

Some people in this study were told that a threat related thought might cause a loud noise and some people in this study were told that a loud noise might occur randomly. We think that the people who were told that the EEG would make a loud noise in response to a threat related thought might have more threatening thoughts and might be more distressed by them.

We measured this using the self-report questionnaires that you filled out and the skin response receptor on your hand.

Why is this important?

It is common for people to experience paranoia. We would like to try and understand why this can be more distressing and more problematic for some people. Sometimes people believe that having a certain thought is dangerous because it could make a bad thing happen or that they should try and stop themselves from having these thoughts. By looking at how people in the general population relate to their thoughts and how this affects emotional distress we hope to increase our understanding of more severe forms of paranoia (for example persecutory beliefs associated with psychosis). We hope that this could lead to the development of different ways of helping people that experience more severe forms of paranoia in the future.

If you would like to ask some more questions or talk about your experience of the study you are welcome to do so. If you are content with the information provided then that is okay too.

Now that you know a little bit more about the study we would like to check with you that it is still okay for us to use the information you have provided. You are still free to withdraw at any time. If you are happy for us to use the data you have provided please sign attached form 're-consent form' and return it to the researcher.

Also attached to this page are some useful telephone numbers should you feel that you need to talk to somebody. I will also give you a follow-up telephone call in the next 24 hours just to check that you are not feeling distressed about the study.

Thank you for your time.

We hope that you have found this study interesting and have not been upset by any of the topics raised. However, if you have found any part of this experience to be distressing or you feel that you may need help with any of the issues raised you can contact the Chief Investigator or her supervisor. There are also a number of organisations listed below that you can contact:

Student Health: 0161 275 2864 (52864 internal) **Support Line:** 01708 765 200

NHS Direct: 111

The Samaritans: 08457 909090

Your local A&E department: Manchester Royal Infirmary A&E, Oxford Road, Manchester, M13 9WL (0161 276 4147)

Rachel Sellers (Chief Investigator) Professor Tony Morrison (Supervisor):

07798852289 / 0161 358 1395

0161 358 1395

rachel.sellers@postgrad.manchester.ac.uk tony.morrison@manchester.ac.uk



Psychosis Research Unit
Research and Development
Harrop House
Greater Manchester West NHS Foundation Trust
Bury New Road
Prestwich
Manchester
M25 3BL

[Date]

Dear *[Name of GP]*,

An investigation of thought processes in paranoia

Re: *[Patient Name]*

We are writing to inform you that your patient, *[Patient's Name]*, consented to take part in the above study. The study is looking at factors that contribute to distress in people from the general population that experience paranoid thoughts. We enclose an information sheet about the study for your information. The results of the study suggest that the participant may experience high levels of paranoid thoughts and we have advised that they speak to their GP.

The Chief Investigator for the study is Miss Rachel Sellers, School of Psychological Sciences, University of Manchester. The project is supervised by Professor Tony Morrison – Professor of Clinical Psychology (tel. 0161 358 1395).

All members of the research team are based in Harrop House, Prestwich (see above for address details).

Please contact a member of the team if you require further information about the study.

Yours sincerely,

Rachel Sellers

Chief Investigator

Appendix 32: Study 5 demographic information sheet

Demographics Form

Gender	Male <input type="checkbox"/>	Female <input type="checkbox"/>		
Date of birth (dd/mm/yyyy)	/ /			
Age (years)				
Highest level of education	Primary <input type="checkbox"/>	Secondary <input type="checkbox"/>	Further <input type="checkbox"/>	Higher <input type="checkbox"/>
Employment status	F/T <input type="checkbox"/>	P/T <input type="checkbox"/>	Voluntary <input type="checkbox"/>	
	Unemployed <input type="checkbox"/>	Student <input type="checkbox"/>	Retired <input type="checkbox"/>	
Marital status	Single <input type="checkbox"/>	Married <input type="checkbox"/>	Divorced <input type="checkbox"/>	
	Separated <input type="checkbox"/>	Widowed <input type="checkbox"/>	Cohabiting <input type="checkbox"/>	
	Civil partnership <input type="checkbox"/>			
Living arrangements (Who does the person live with?)	Partner only <input type="checkbox"/>	Partner + children <input type="checkbox"/>	Children only <input type="checkbox"/>	
	Partner plus other/s (not children) <input type="checkbox"/>		Alone <input type="checkbox"/>	
	Parent/s only <input type="checkbox"/>	Friend/s only <input type="checkbox"/>	Other <input type="checkbox"/>	
	Specify _____			
Ethnicity				
Asian or Asian British <input type="checkbox"/> Bangladeshi <input type="checkbox"/> Indian <input type="checkbox"/> Pakistani <input type="checkbox"/> Any other Asian background		Mixed <input type="checkbox"/> White & Asian <input type="checkbox"/> White & Black African <input type="checkbox"/> White & Black Caribbean <input type="checkbox"/> Any other mixed background		<input type="checkbox"/> Any other ethnic group Specify _____ <input type="checkbox"/> Prefer not to answer
Black or Black British <input type="checkbox"/> African <input type="checkbox"/> Caribbean <input type="checkbox"/> Any other Black background		White <input type="checkbox"/> British <input type="checkbox"/> Irish <input type="checkbox"/> Any other White background		
		Other Ethnic Group <input type="checkbox"/> Chinese		
Religion or belief				
<input type="checkbox"/> Atheism <input type="checkbox"/> Buddhism <input type="checkbox"/> Christianity <input type="checkbox"/> Islam		<input type="checkbox"/> Jainism <input type="checkbox"/> Sikhism <input type="checkbox"/> Judaism <input type="checkbox"/> Hinduism		<input type="checkbox"/> Other Specify _____



Research, Governance, Ethics and Integrity

2nd Floor Christie Building

The University of Manchester

Oxford Road

Manchester

M13 9PL

Tel: 0161 275 2206/2674

Email: research.ethics@manchester.ac.uk

Ref: ethics/15458

1st December 2015

Dear Miss Sellers and Prof Morrison

Study title: A Questionnaire Survey of Paranoia and Thought Processes in the General Population: Modelling Cognitive and Metacognitive Beliefs and Responses

Research Ethics Committee 2

I write to thank you for coming to meet the Committee on 19th October 2015. I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form and supporting documentation as submitted and approved by the Committee.

This approval is effective for a period of five years. If the project continues beyond that period an application for amendment must be submitted for review. Likewise, any proposed changes to the way the research is conducted must be approved via the amendment process (see below). Failure to do so could invalidate the insurance and constitute research misconduct.

You are reminded that, in accordance with University policy, any data carrying personal identifiers must be encrypted when not held on a secure university computer or kept securely as a hard copy in a location which is accessible only to those involved with the research.

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3. [Notification of Progress/End of the Study](#)

Feedback

It is our aim to provide a timely and efficient service that ensures transparent, professional and proportionate ethical review of research with consistent outcomes, which is supported by clear, accessible guidance and training for applicants and committees. In order to assist us with our aim, we would be grateful if you would give your view of the service that you have received from us by completing a feedback sheet [<https://survey.manchester.ac.uk/pssweb/index.php/739975/lang-en>]

We hope the research goes well.

Yours sincerely,



Ms. Genevieve Pridham

Secretary to University Research Ethics Committee 2



The University of Manchester

A questionnaire survey of paranoia and thought processes in the general population

INFORMATION FOR PARTICIPANTS

You are being invited to take part in a research study as part of a PhD project that is looking at the application of the metacognitive model (an information processing approach) to experiences of psychosis. Before you decide to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the information below carefully, and discuss it with others if you wish. Feel free to ask if there is anything that is not clear, or if you would like more information. You should take time to decide whether or not you wish to take part.

Who will conduct the research?

This research is being carried out by Rachel Sellers (School of Psychological Sciences, Zochonis Building, Brunswick Street, University of Manchester, M13 9PT) under supervision from Professor Anthony Morrison and Professor Adrian Wells.

What is the purpose of the study?

Previous research has suggested that paranoia is a relatively common experience in the general population. Some people find these experiences more distressing and harder to cope with than others. For this reason, we would like to find out whether the way people process information and the beliefs they have can affect the number of paranoid thoughts they experience and the amount of distress they experience.

Why have I been given this information?

We are looking for 200 people from the general population to complete a questionnaire survey about paranoia and thought processes. You will be able to take part if you are aged over 18 and you do not have a history of severe mental illness. This will include bipolar disorder schizophrenia and severe reactive depression. If you have or have experienced any of these disorders please do not consider taking part.

What would I be asked to do to if I took part?

If you choose to take part we will ask you to complete the online survey. This should take approximately one hour of your time; however, you can take as long as you need. You do not need to complete the survey in one sitting; you may save it and come back to it later. We will ask you to provide us with some basic information about yourself and to complete seven multiple-choice questionnaires.

As part of the consent form, we require you to enter a valid email address so that we are able to identify you should you wish to withdraw your data. We will also ask your permission to use your email address to enter you into a prize draw to win an Amazon voucher and to hear about a future study that may be of interest to you. You do not have to agree to your email address being used for these two additional purposes and you are able to agree to your email address being used for one or both of these additional options. However, you will need to provide an email address to take part in the study.

Do I have to take part?

No. The study is entirely voluntary; **it is up to you to decide** whether or not to take part. You should not feel under any pressure to make the decision. If you do decide to take part, you will be asked to complete a consent form. Even after completing the consent form you are still free to withdraw your data up until the results of the survey have been analysed and submitted for publication without giving a reason and without any consequence.

How is confidentiality maintained?

We will follow ethical and legal practice and all information about you will be handled in confidence. Personally identifiable information (i.e. the email address you provide) will be stored in an electronic format separate from research data (the questionnaires you complete). All personally identifiable information will be kept confidentially and securely; personally identifiable information that is stored electronically will be kept on a secure encrypted server.

What happens to the data collected?

After the study is completed, we will analyse the results and submit them for publication in a scientific journal. Presentations may also be given at scientific conferences. Results will be used to improve our understanding of the processes and beliefs underlying paranoia and distress. You will not be identified in any publication or presentation. If you wish to know the outcome of our research please let us know.

Will I be paid for participating in the research?

Unfortunately, we are unable to provide payment to all participants taking part in this research. However, we will ask you to provide an email address so that we can enter you into a prize draw with the chance of winning a £50 Amazon voucher.

Where will the research be conducted?

This research is available to complete online at:

<https://apps.mhs.manchester.ac.uk/surveys//TakeSurvey.aspx?SurveyID=n4ML38m3>

Who has reviewed the research?

This project has been reviewed by the University of Manchester Research Ethics Committee [Ref: ethics/15458].

What do I do if I wish to make a complaint?



Consent form

Participant Identification Number:

Title of Project: **A questionnaire survey of paranoia and thought processes in the general population**

Name of Researcher: **Rachel Sellers**

Please initial all boxes

1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
2. I understand that my participation is voluntary and that I am free to withdraw my data up until the results of the survey have been analysed and submitted for publication without detriment to myself.
3. I understand that my data will remain confidential.
4. I understand that I can withdraw my data up until the results of the survey have been analysed and submitted for publication. Please provide your email address in the box below
Enter email address: _____
5. I agree to my email address being used for entry into a prize draw to win a £50 Amazon voucher (**please note this is optional**).
6. I agree to my email address being used so that the Chief Investigator of this research can contact me regarding another study (**please note this is optional**).
7. I agree to take part in the above study. By clicking the next button to continue will mean that you are consenting to take part.

This project has been approved by the University of Manchester's Research Ethics Committee [Ref: ethics/15458].



Participant Debrief

Title of Project: **A questionnaire survey of paranoia and thought processes in the general population**

Thank you for participating in this research.

What is this study about?

The aim of this study is to investigate whether the beliefs that people have about paranoia and their coping responses can affect the amount of paranoid thoughts they have and the amount of distress they feel.

The questionnaires that you completed looked at different kinds of beliefs, different emotions and some strategies that people may use to cope.

We think that people who believe paranoia is useful and important will experience more paranoid thoughts and people who think that their paranoia and thoughts are uncontrollable will experience more distress.

Why is this important?

It is common for people to experience paranoia. We would like to try and understand why this can be more distressing and more problematic for some people. By looking at how people in the general population relate to their thoughts and how this affects how they feel we hope to increase our understanding of more severe forms of paranoia (for example persecutory beliefs associated with psychosis).

We hope that you have found this study interesting and have not been upset by any of the topics raised. However, if you have found any part of this experience to be distressing or you feel that you may need help with any of the issues raised you can contact the Chief Investigator or her supervisor. There are also a number of organisations listed below that you can contact:

NHS Direct: 111

Student Health: 0161 275 2864 (52864 internal)

The Samaritans: 08457 909090

Support Line: 01708 765 200

You may also wish to visit your GP or local walk-in centre.

Rachel Sellers (Chief Investigator)

Professor Tony Morrison (Supervisor):

07798852289 / 0161 358 1395

0161 358 1395

rachel.sellers@postgrad.manchester.ac.uk

tony.morrison@manchester.ac.uk

Appendix 37: Study 6 screening and demographic information sheet

Screening Questions

Before you begin we need to ask you a couple of questions.

Are you aged 18 years or above?*

Yes No

Have you ever been hospitalised for assessment and/or treatment of schizophrenia, bipolar disorder or a psychosis-related problem (e.g. depression with psychosis)?*

Yes No

Have you ever been given a diagnosis of any of the above?*

Yes No

Have you ever been advised to take medication for hearing voices, paranoia or unusual thoughts?*

Yes No

Was there ever a period in your life when you were receiving support from an Early Intervention Service?*

Yes No

Demographic Information

Now we would like to know just a little bit about you

Gender*Please select one answer from the choices below

- Male
 Female
 Prefer not to say

Age*Please type your age in years (e.g. 25)

Ethnicity*Please type in the box below what you feel best describes your ethnicity



Religion or belief*Please select one answer from the choices below

- Atheism
- Buddhism
- Christianity
- Islam
- Jainism
- Sikhism
- Judaism
- Hinduism
- Other
- Prefer not to say
- Other, please specify

Marital StatusPlease select one answer from the choices below

- Single
- Married
- Divorced
- Separated
- Widowed
- Co-habiting
- Civil Partnership

Highest Level Of Education*Please select one answer from the choices below

- Primary School
- High School / GCSE equivalent
- College / A-Level equivalent
- Undergraduate Degree
- Postgraduate Degree

Employment Status*Please select the options that currently apply to you

- Unemployed
- Part-time Student
- Full-time Student
- Part-time Employment

- Full-time Employment
- Voluntary Employment
- Retired