The role of metacognitive beliefs in determining the impact of anomalous experiences: a comparison of help-seeking and non-help-seeking groups of people experiencing psychotic-like anomalies

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Background. Current psychological models of psychotic symptoms suggest that metacognitive beliefs impact on an individual's appraisal of anomalous experiences, and thereby influence whether these lead to distress and become clinical symptoms. This study examined the relationship between maladaptive metacognitive beliefs, anomalous experiences, anomaly-related distress, anxiety and depression and diagnostic status.

Method. The Metacognitions Questionnaire (MCQ), Symptom Checklist 90 – Revised, and Appraisals of Anomalous Experiences interview were administered to 27 people diagnosed with a psychotic disorder, 32 people meeting At Risk Mental State (ARMS) criteria, 24 people with psychotic-like experiences but no need for care, and 32 healthy volunteers.

Results. The two clinical groups scored higher than non-patient controls and individuals experiencing psychotic-like anomalies with no need for care on most subscales of the MCQ, particularly the 'general negative beliefs about thoughts' (NEG) subscale. However, most group differences became non-significant when anxiety and depression were controlled for. Few relationships were found between the MCQ subscales and psychotic-like anomalies and anomaly-related distress. Cognitive/attentional difficulty was the only type of anomaly to be significantly associated with maladaptive metacognitive beliefs. Anomaly-related distress was associated with only the NEG subscale of the MCQ.

Conclusions. Maladaptive metacognitive beliefs, as measured by the MCQ, appear to be related more to elevated levels of general psychopathology in psychotic and at-risk groups than to the presence of, and distress associated with, psychotic experiences. Processes by which metacognitions may impact upon the need for care are discussed.

Introduction

Recent psychological models of positive psychotic symptoms suggest that appraisals of anomalous or intrusive experiences play a critical role in the development of psychotic symptoms (Garety *et al.* 2001, 2007; Morrison, 2001). It is proposed that individuals' beliefs about their thought processes and internal experiences, as well as beliefs about themselves, other people and events in the world, determine the kinds of appraisals they will make of anomalous experiences. The model of Garety *et al.* (2001) emphasizes how negative schematic models of self and world, created by early

and current adverse experiences, facilitate external and personal appraisals. In addition to the role of such schema, Morrison (2001) also emphasizes the role of metacognitive beliefs (beliefs about one's thought processes) in determining appraisals: in particular, beliefs about the controllability and causal influence of thoughts, and personal responsibility for their content.

Certain metacognitive beliefs have been evaluated as maladaptive within cognitive theories of anxiety disorders: specifically those likely to increase or maintain anxiety or depression in response to unavoidable cognitive events (Wells, 1997). For example, a belief that one's thoughts should be controllable is likely to lead to distress in response to ego-dystonic thoughts arising. Similarly, a belief that worry is a useful coping strategy is likely to lead to rumination and an escalation of anxiety. Wells & Matthew's Self-Regulative

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Executive Function (S-REF) model (1994) was developed to give an account of the processes underlying affective disorders, and makes no specific predictions with regards to psychotic disorders. Morrison (2001) suggests that such metacognitive processes and beliefs also play a role in the development and maintenance of psychotic symptoms, by affecting the interpretation of 'cognitive intrusions' (such as an auditory verbal hallucination or bodily sensation), alongside schematic models of self and world, in such a way as to cause distress and/or disability. Morrison's model predicts that people experiencing clinically relevant psychotic symptoms will show elevated scores on measures of metacognitive beliefs, compared with people without such symptoms.

There is some experimental evidence to support an association between maladaptive metacognitive beliefs and psychotic symptoms. Morrison & Baker (2000) found that psychotic patients reported more cognitive intrusions than psychiatric and non-patient control groups. Furthermore, the psychotic patients found their intrusive thoughts more uncontrollable and unacceptable than the control groups, as well as more distressing. Paranoid ideation in non-clinical participants has been found to correlate with low cognitive confidence (Garcia-Montes *et al*. 2005).

There are also data linking metacognitions specifically with first-rank symptoms. Morrison and colleagues reported that patients with hallucinations experience their thoughts as less wanted, less controllable, and more dangerous than do patients without hallucinations (Baker & Morrison, 1998; Morrison & Wells, 2003), and Linney & Peters (2007) found an increased frequency of cognitive intrusions and of maladaptive metacognitive appraisals, and lower perceived cognitive control, in patients with symptoms of thought interference. In non-clinical samples, it has been found that hallucination-prone individuals score significantly more highly than non-hallucination-prone individuals on the Metacognitions Questionnaire (MCQ; Cartwright-Hatton & Wells, 1997; Larøi & Van der Linden, 2005), particularly on subscales measuring cognitive self-consciousness and negative beliefs about uncontrollability and danger (Morrison *et al*. 2000).

Recently, Morrison *et al*. (2007) examined metacognitive beliefs in people meeting criteria for an At Risk Mental State (ARMS), as well as those with a diagnosis of psychotic disorder and healthy volunteers. They report higher rates of beliefs in the positive value of worry in people with a psychotic disorder, compared with the other two groups. Both the psychotic and the ARMS groups reported higher rates of negative beliefs about unwanted thoughts compared with the volunteers. The authors interpreted these findings as suggesting that the coexistence of both positive and negative metacognitive beliefs may contribute to the development of a psychotic disorder.

However, it still remains unclear whether metacognitive beliefs play a causal role in the development of psychotic symptoms. The nature of metacognitive beliefs could reflect the experience of the anomalies, or both may share a common underlying cause. It is also unclear whether metacognitive beliefs are implicated in the development of particular forms of experience, such as auditory hallucinations, or whether the metacognitive beliefs predict the distress associated with such experiences.

Other studies indicate that metacognitive beliefs are related to psychopathology in general, and may not explain the development of psychosis in particular. Indeed, Wells & Matthews' S-REF model (1994, 1996) proposes that metacognitions are generic vulnerability factors for psychological distress expressed in many disorders. Morrison & Wells (2003) found that although patients with hallucinations scored more highly than patients with panic disorder on the MCQ, psychotic patients with no hallucinations did not differ from the panic disorder group. Similarly, Lobban *et al*. (2002) compared MCQ scores between people with a diagnosis of schizophrenia with and without auditory hallucinations, a group with anxiety disorders and a group of non-patients. The clinical groups scored more highly than the non-patient controls on some of the subscales, but the groups with schizophrenia did not score higher than the anxiety group on any subscale. Thus, there is no clear evidence that maladaptive metacognitions play a specific role in the development of psychotic symptoms, although they are consistently associated with more general psychopathology.

The current study was therefore designed to clarify the role of metacognitive beliefs in processes related to psychosis: whether maladaptive metacognitive beliefs are associated with the occurrence of psychotic-like anomalies or with the distress and/or disability resulting from them; whether they are related to 'first-rank' symptoms specifically or all psychotic experiences; and whether they are associated primarily with general psychopathology.

Metacognitive beliefs were assessed in four samples: two clinical groups with anomalous experiences (a group diagnosed with a psychotic disorder, and a group meeting criteria for an ARMS), a non-clinical group reporting similar anomalous experiences, and a group of healthy volunteers without these experiences. The inclusion of the two clinical groups allows for a comparison between individuals who have developed sufficiently distressing or disabling interpretations of their anomalies to be diagnosed with psychosis, and individuals who are experiencing some

level of psychotic-like anomalies and are seeking help, but whose interpretations are not considered to be psychotic. The inclusion of the non-clinical group of individuals reporting psychotic-like anomalies allows the current study to separate out the experience of anomalies from the development of distress and/or need for care that is assumed in clinical participants with a diagnosis of a psychotic disorder and ARMS. Anomalous experiences were assessed in depth using the Appraisals of Anomalous Experiences Interview (AANEX) (Brett *et al.* 2007), and distress regarding anomalous experiences was also specifically rated, in addition to general levels of anxiety and depression.

We investigated the association between maladaptive metacognitions and anomalous experiences, anomaly-related distress, and the diagnosis of a psychotic disorder. The following hypotheses (derived from previous research summarized above) were tested:

(1) The two clinical groups will report more maladaptive metacognitive beliefs than the two non-clinical groups [consistent with previous studies, e.g. Morrison & Baker (2000), Lobban *et al.* (2002)].

(2) First-rank symptoms (hallucinations and associated experiences) will be correlated with beliefs about controllability of thoughts, general negative beliefs about thoughts, and cognitive self-consciousness [based on the findings of Baker & Morrison (1998), Morrison & Wells (2003) and Morrison *et al.* (2000)].

(3) Distress about anomalies will be predicted by metacognitive beliefs, controlling for the type of anomalies (as suggested by Morrison, 2001).

(4) Maladaptive metacognitions will be primarily associated with general psychopathology (anxiety or depression), rather than diagnosis of a psychotic disorder *per se* [as suggested by Wells & Matthews' S-REF model (1994), Morrison & Wells (2003) and Lobban *et al.* (2002)].

Method

Participants

The sample comprised four groups: a 'Diagnosed' group, an 'At Risk' group, an 'Undiagnosed' group and a 'Control' group.

Diagnosed group

(1) Twenty-seven participants with a diagnosis of a psychotic disorder were recruited from two local services [Lambeth Early Onset, South London and Maudsley Trust (SLaM), UK, $n=13$; Psychological Intervention Clinic for out-patients with Psychosis, SLaM, $n=14$]. The sample included both in- and out-patients; those experiencing a first episode of psychosis, and those with a longer history of illness. All participants were known to have received a diagnosis of a psychotic disorder from a psychiatrist in the course of clinical treatment within these specialist psychosis services.

At Risk group

Thirty-two participants meeting established ARMS criteria were recruited from a specialist clinical service [Outreach And Support In South London (OASIS), SLaM (Broome *et al.* 2005)]. The criteria for an ARMS consist of three categories (Yung *et al.* 1998), and participants must meet at least one set of criteria:

(1) Attenuated psychotic symptoms: frequent symptoms that deviate from normal phenomena but which are not yet frankly psychotic, e.g. paranoid ideation, magical thinking, perceptual disturbances. These symptoms must have occurred within the last year, but not been present for longer than 5 years.

(2) Brief limited intermittent psychotic symptoms: symptoms of psychotic intensity that spontaneously remit in under a week. These symptoms must have occurred within the last year.

(3) Trait and state risk factors: a trait risk factor for psychosis, such as schizotypal personality disorder or a first-degree relative with a psychotic disorder, together with a significant decline in function for at least a month within the last year.

All participants had been assessed by experienced clinicians using the Comprehensive Assessment of ARMS (CAARMS; Phillips *et al.* 2000), and the diagnosis confirmed at a clinical team meeting.

Undiagnosed group

Twenty-four participants reporting psychotic-like anomalous experiences, who had never sought or received clinical care, were recruited from the Greater London area. Advertisements were posted on special interest websites, email groups, and a special interest magazine (accessing subcultural populations likely to endorse anomalous experiences, such as groups interested in altered states, psychism, witchcraft, etc). A 'snowball' method was also adopted, i.e. participants were encouraged to pass on information sheets about the study to acquaintances.

All of this group were screened for suitability using a questionnaire enquiring about the lifetime incidence of a range of anomalous experiences ('Transpersonal Experiences Questionnaire')[1]†. Particular attention

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† The notes appear after the main text.

was paid to the frequency and duration of experiences, and any relationship to drug use or hypnogogic/hypnopompic states. Only individuals with at least 'occasional' experiences of any Schneiderian 'first-rank' symptom, in the absence of drug use and in clear consciousness, were invited to participate (to ensure comparable experiences with those diagnosed with a psychotic disorder). Those who reported any history of clinical intervention for psychotic symptoms were excluded. In order to differentiate them from the 'At Risk' group (who have a high risk of developing a psychotic disorder within 1–2 years), only participants whose anomalous experiences had commenced more than 5 years before participation were included.

Control group

Thirty-two participants with no history of psychotic disorder were recruited from the same geographical area as groups 1 and 2 (South London), through a job centre and a volunteer database. All participants were screened with the Transpersonal Experiences Questionnaire, and any participants endorsing more than 'rare' occurrences of any 'first-rank' symptom were excluded from taking part ($n=4$).

Measures

MCQ (*Cartwright-Hatton & Wells, 1997*)

This is a 65-item self-report questionnaire assessing a range of beliefs about worrying thoughts and thought processes; it is a 'trait' measure assessing individual differences. It generates scores for five subscales:

(1) Positive beliefs about worry ('POS'), e.g. 'Worrying helps me cope': 19 items.
(2) Negative beliefs about the controllability of thoughts and corresponding danger ('CONTROL'), e.g. 'Worrying is dangerous for me'; 'I cannot control my worrying thoughts': 16 items.
(3) Cognitive confidence ('COGCON'), e.g. 'I have a poor memory': 10 items.
(4) Negative beliefs about thoughts in general, including responsibility, punishment and superstition ('NEG'), e.g. 'If I did not control a worrying thought, and then it happened, it would be my fault': 13 items.
(5) Cognitive self-consciousness ('SELF'), e.g. 'I think a lot about my thoughts': 7 items.

Items are scored between 1 and 4 based on strength of agreement with each statement, and the relevant scores are summed to give the five subscale scores (ranges: POS=1–76; CONTROL=1–64; COGCON= 1–40; NEG=1–52; SELF=1–28).

AANEX (*Brett et al. 2007*)

AANEX inventory. The presence of anomalous experiences was assessed using an inventory that formed the first part of the AANEX, a semi-structured interview that elicits detailed accounts of psychotic and psychotic-like experiences, and has been shown to be a reliable measure (Brett *et al.* 2007). The inventory includes 40 items assessing Schneiderian first-rank symptoms, and anomalies of perception, cognition and affect. Each item received two ratings:

(1) 'lifetime' rating from 1 to 5 based on the frequency/duration of occurrence across the lifetime.
(2) 'state' rating between 0 and 2 based on the presence/absence of the anomalous experience at the time of the interview.

Two sets of summary variables were then derived from the data: a set of five lifetime scores, and a set of four state (current anomaly) scores. These were calculated using the results of two principal components analyses based on the two sets of ratings obtained from a larger sample ($n=96$) and described in detail elsewhere (C. M. C. Brett *et al.* unpublished observations). These two sets of scores were derived in order to measure the individual's experience of anomalies (lifetime), and the anomalies experienced by the individual to which the 'anomaly-related distress' scores were anchored (state), to allow the impact of specific types of anomalies to be controlled for. Table 1 shows the items contributing to the lifetime and state anomaly scores.

Anomaly-related distress. Distress directly related to the occurrence of anomalies was assessed using the AANEX. For each anomalous experience, participants' emotional response to it was elicited with the question: 'When you experience(d) [that], how do/did you feel?' If a positive or neutral response was described, the interviewer asked, 'and do/did you have any bad feelings about it: any worries or fears?' The participants' negative emotional responses were then rated between 1 and 5: 1 corresponding to 'no negative feelings reported' and 5 corresponding to 'only strong negative feelings reported'.

Symptom Checklist 90 – Revised (SCL-90-R; *Derogatis, 1983*)

The emotional status of the participants was investigated using the SCL-90-R. This is a self-report questionnaire that assesses the degree of current distress (in the past week) using 90 items in nine symptom dimensions. The questionnaire asks the participant to rate 'How much has that problem bothered or distressed you during the past week including today?

Table 1. *Summary of contributing items to each factor of the lifetime and state scores from the AANEX interview*

Lifetime scores	State scores
Meaning/reference: experiences of sudden 'insights' and ideas of reference, often characteristic of spiritual experience, manic or hypomanic states	Revelation: conceptually similar to meaning/reference
Paranormal/hallucinatory: hallucinations in all modalities except auditory	Anomalous perception: somatic and visual hallucinations
Cognitive/attentional: changes or difficulties with attentional control and thinking	Awareness: experiences characterized by changes in the quality of awareness, such as depersonalization, heightened distractibility, and oversensitivity to light or sound
Dissociative/perceptual: changes in quality of awareness such as depersonalization and derealization	
First-rank symptoms: auditory hallucinations, thought broadcast and passivity phenomena	Mental boundary: conceptually similar to first-rank symptoms

AANEX, Appraisals of Anomalous Experiences Interview (Brett *et al.* 2007).

Table 2. *Demographic and clinical characteristics of the participant groups*

Variable	Diagnosed ($n=27$)	At Risk ($n=32$)	Undiagnosed ($n=24$)	Control ($n=32$)	Group comparisons p
Age (years)	32.4 (11.2)	24.3 (3.6)	34.8 (7.6)	27.7 (7.5)	<0.05
Age range (years)	17–62	20–33	25–51	18–44	
Gender (% male)	44	66	63	56	0.390
SCL-90-R					
Global Severity Index	0.96 (0.90)	N.A.	0.63 (0.56)	0.29 (0.21)	0.005
Anxiety subscale	0.92 (1.03)	N.A.	0.53 (0.59)	0.19 (0.22)	0.024
Depression subscale	1.10 (1.07)	N.A.	0.91 (0.89)	0.34 (0.29)	0.037

SCL-90-R, Symptom Checklist 90 – Revised (Derogatis, 1983); N.A., not applicable.
Values are given as mean (standard deviation).

Each item is rated on a five-point scale of distress (0–4). Three indices of distress were calculated:

(1) Global distress (Global Severity Index): the sum of all item scores, divided by the total number of responses (range 0–4).
(2) and (3) Anxiety and depression subscale scores: the sum of the item responses for these two symptom dimensions, divided by the number of items contributing to that dimension (range for each dimension: 0–4).

Procedures

The measures were administered by C.M.C.B., with the questionnaires being completed before the AANEX. All participants gave written informed consent to participate and they received an honorarium for their time. A subset of the At-Risk group ($n=11$) were not assessed with the AANEX, as they were recruited by L.C.J. after C.M.C.B. had completed data collection using this measure. AANEX data were also missing for two Diagnosed participants. The At Risk participants were not given the SCL-90-R, as levels of distress had already been assessed in detail by their clinical team, using the CAARMS (Phillips *et al.* 2000), Hamilton Anxiety Rating Scale and Hamilton Depression Rating Scale (Schutte & Malouff, 1995), and it was considered undesirable to administer measures that duplicated the information already given by this vulnerable population.

Results

Demographic and clinical characteristics of the groups

Table 2 shows the personal characteristics and SCL-90-R scores for each group.

Since the groups differed on age, the association between age and each of the MCQ subscales was investigated using Pearson's product-moment correlation,

Table 3. *Mean scores on each MCQ subscale, for each group*

Subscale	Diagnosed group	At Risk group	Undiagnosed group	Control group	ANOVA F ratio (d.f.)	Significance of F, p
POS	34.0 (11.1)*	32.5 (9.8)	27.3 (10.3)	28.8 (7.2)	3.36 (3, 111)	0.021
POS range	19–62	20–61	19–64	21–43		
CONTROL	34.6 (12.0)	40.6 (12.2)††	33.7 (12.1)	26.8 (8.9)	7.99 (3, 111)	0.000
CONTROL range	16–58	19–63	19–59	16–53		
COGCON	18.3 (6.9)	20.5 (6.9)††	18.3 (5.5)	15.2 (3.5)	4.64 (3, 111)	0.004
COGCON range	10–35	12–40	10–33	10–22		
NEG	26.8 (8.01)*†	28.3 (7.1)**††	20.8 (6.9)	21.7 (7.5)	7.77 (3, 111)	0.000
NEG range	14–45	15–42	13–38	13–47		
SELF	17.9 (4.1)	20.2 (4.2)††	18.1 (5.0)	15.3 (4.9)	6.35 (3, 111)	0.001
SELF range	10–25	12–26	10–28	9–28		

MCQ, Metacognitions Questionnaire (Cartwright-Hatton & Wells, 1997); ANOVA, analysis of variance; d.f., degrees of freedom; POS, positive beliefs about worry; CONTROL, negative beliefs about controllability of thoughts; COGCON, cognitive confidence; NEG, general negative beliefs about thoughts; SELF, cognitive self-consciousness.

Values are given as mean (standard deviation) and range.

Mean value was significantly higher than that of the Undiagnosed group: * $p < 0.05$, ** $p < 0.005$ (Bonferroni corrected).

Mean value was significantly higher than that of the Control group: † $p < 0.05$, †† $p < 0.005$ (Bonferroni corrected).

and age was found not to be significantly associated with any of the subscale scores. Consequently, none of the analyses incorporated age as a covariate. There was no significant difference between the groups on gender distribution ($p = 0.39$).

Effect of group on MCQ subscale scores

Hypothesis 1: the clinical groups (Diagnosed and At Risk) will score significantly more highly on the MCQ questionnaire than the non-clinical groups (Undiagnosed and Control).

A multivariate analysis of variance (mANOVA) was performed to see if there was an overall significant difference between the groups on the MCQ subscales. The Wilks' lambda statistic showed an overall significant effect of group [$F(15, 293) = 3.461$, $p < 0.001$]. A series of one-way ANOVAs was then conducted to compare the group mean scores on each subscale of the MCQ. A significant effect of group was found for all five subscales (see Table 3).

Post hoc comparisons were carried out to test the differences between the clinical and non-clinical groups, using the Bonferroni test to adjust the observed significance level for multiple comparisons. These comparisons showed that the At Risk group scored significantly more highly than the Control group on four of the five MCQ subscales (CONTROL, COGCON, NEG and SELF). The At Risk group also scored significantly more highly than the Undiagnosed group on the NEG subscale, but did not differ from the Diagnosed group on any subscale. The

Diagnosed group showed significantly higher scores than the Control group on the NEG subscale and significantly higher scores than the Undiagnosed group on the POS and NEG subscales. The Undiagnosed group did not differ significantly from the Control group on any of the subscales.

The prediction that the clinical groups (Diagnosed and At Risk) would score more highly on the MCQ subscales than the Control and Undiagnosed groups was therefore largely supported. The most consistent difference between the clinical and non-clinical groups was on the general negative beliefs (NEG) subscale.

Relationship between anomalous experiences and scores on the MCQ subscales, across the three 'symptomatic' groups

Hypothesis 2: first-rank symptoms will be correlated with the MCQ subscales CONTROL, NEG and SELF.

Both MCQ and lifetime anomaly data were available for sample sizes as follows: Undiagnosed = 23; Diagnosed = 24; At Risk = 21. Lifetime, rather than state (current anomaly) scores were used to summarize anomalous experiences since they reflect the full range of experiences and severity, including experiences that had occurred in the past even if they were not occurring at the time of the interview. Bivariate correlations were performed to test the association between each of the five lifetime anomaly scores, and the five MCQ subscale scores. To maintain a family-wise error rate of $p = 0.05$, individual comparisons were only accepted as significant if $p < 0.002$.

Table 4. *Significant correlations between trait factors and MCQ subscales, across groups*

MCQ subscale	Meaning/ reference	Cognitive/ attentional	Paranormal/ hallucinatory	Dissociative/ perceptual	First-rank symptoms
POS			0.277*		
CONTROL		0.386**			
COGCON	−0.253*	0.395**			
NEG		0.333**	−0.250*		
SELF				0.268*	

MCQ, Metacognitions Questionnaire (Cartwright-Hatton & Wells, 1997); POS, positive beliefs about worry; CONTROL, negative beliefs about controllability of thoughts; COGCON, cognitive confidence; NEG, general negative beliefs about thoughts; SELF, cognitive self-consciousness.

* $p < 0.05$, ** $p < 0.002$.

For the three 'symptomatic' groups combined, the cognitive/attentional (CogAtt) factor was significantly correlated with beliefs about the controllability of thoughts, cognitive confidence, and general negative beliefs about one's thoughts and thinking (see Table 4). Contrary to the specific hypothesis, there were no significant correlations between first-rank symptoms and MCQ scores.

In order to explore whether these relationships between the variables were similar for each of the three groups (Undiagnosed, Diagnosed, At Risk), grouped scatterplots were created for the three significant correlations, and fitted with the regression lines for each group and the combined sample. Examination of the scatterplots showed that the correlations between MCQ subscales CONTROL and COGCON and the CogAtt factor were similar across the three groups, indicating that this association applies for individuals experiencing such anomalies, regardless of diagnostic status. However the correlations between NEG and CogAtt differed between the groups: the relationship in the Diagnosed group was close to that calculated for the total dataset, while the At Risk and Undiagnosed groups showed low correlation between these variables. There were no significant correlations between any of the other lifetime anomaly scores and MCQ subscale scores when examined for each participant group.

Relationship between anomaly-related distress and metacognitive beliefs

Hypothesis 3: distress about anomalous experiences will be predicted by metacognitive beliefs, controlling for the type of anomalies.

Relationship between types of anomalies and distress

First, the relationship between state scores and anomaly-related distress was tested, in order to examine whether certain types of anomalies were more distressing than others. A multiple ordinal logistic regression analysis was performed to test the association between the four state scores (revelation, awareness, mental boundary, anomalous perception), and anomaly-related distress pertaining to the same time-point, across all three 'symptomatic' groups.

The scores for awareness and revelation were significantly associated with current distress about anomalies, when controlling for the effects of the other state scores. A higher score on awareness was predictive of higher distress [odds ratio (OR) 0.25, 95% confidence interval (CI) 0.08–0.76, $p = 0.015$], while a higher score on revelation predicted lower distress (OR 3.18, 95% CI 1.19–8.53, $p = 0.021$). Experiences making up the mental boundary and anomalous perception scores were not associated with distress, across the three symptomatic groups.

Prediction of anomaly-related distress by MCQ subscale scores, controlling for state scores

A multiple ordinal logistic regression analysis was conducted, incorporating all the MCQ subscales simultaneously, to test the predictive value of each subscale, when holding constant the effects of the other subscales. Only the negative beliefs about thoughts subscale (NEG) significantly predicted distress (OR 1.13, 95% CI 1.02–1.25, $p = 0.021$) when controlling for the effects of the other subscales. A higher NEG score was associated with greater distress.

A second ordinal logistic regression analysis was then conducted, testing the predictive value of the MCQ subscale NEG on anomaly-related distress, when partialling out the effects of the state scores. The NEG subscale still had significant predictive value, when controlling for the effects of the state scores (OR 1.10, 95% CI 1.03–1.17, $p = 0.006$).

Relationship between MCQ scores and psychotic symptoms when controlling for anxiety and depression

Hypothesis 4: maladaptive metacognitions will be primarily associated with psychopathology in general rather than diagnosis of a psychotic disorder in particular.

Levels of anxiety, depression and general psychopathology were assessed using the SCL-90-R, and compared across the groups. The At Risk group and a subset of the Control group ($n = 15$) did not complete the questionnaire. The distributions for the anxiety and depression scores were skewed, and therefore normalized with log 10 transformations. A one-way ANOVA showed a significant effect of group on self-reported anxiety [$F(2, 66) = 3.951$, $p = 0.024$]. *Post hoc* Bonferroni tests indicated that the Diagnosed group had significantly higher scores than the Control group ($p = 0.02$), while the Undiagnosed group did not differ from either the Diagnosed or Control groups. A one-way ANOVA also showed a significant effect of group on self-reported depression [$F(2, 66) = 3.469$, $p = 0.037$], with *post hoc* comparisons indicating that the Diagnosed group scored significantly more highly than the Control group on this subscale ($p = 0.039$). Again, the Undiagnosed group did not differ significantly from either group.

Effect of group on MCQ subscales, controlling for anxiety and depression

A series of one-way analyses of covariance was performed, with the MCQ subscales entered as the dependent variables, group as the fixed factor, and anxiety and depression entered individually as covariates in separate analyses.

As a preliminary step, the correlations between the MCQ variables, and the SCL-90-R variables anxiety and depression, were examined. A highly significant correlation between anxiety and depression was observed (Pearson's $R = 0.89$; $p < 0.000$), and this relationship was comparable for each of the three groups; anxiety and depression were therefore not included together as covariates to avoid loss of power through collinearity. Significant correlations were also found between anxiety and the following MCQ subscales: NEG (0.628); COGCON (0.657); SELF (0.423); CONTROL (0.725) (all $p < 0.01$). A weak correlation was found between anxiety and POS (0.265; $p < 0.05$). The homogeneity of regression coefficients was examined to assess whether these relationships were similar between the three groups, and the associations were homogeneous for all subscales except for POS, in which the Control group showed little association.

With only the Diagnosed, Undiagnosed and Control groups included in the analysis, a significant effect of group was observed for POS [$F(2, 83) = 3.704$, $p = 0.029$], CONTROL [$F(2, 83) = 4.709$, $p = 0.012$], NEG [$F(2, 83) = 4.918$, $p = 0.01$] and SELF [$F(2, 83) = 3.535$, $p = 0.034$], with a near-significant effect for COGCON ($p = 0.054$).

When anxiety was entered as a covariate, the effect of group became non-significant for all subscales, although trends were still observed for POS ($p = 0.061$) and NEG ($p = 0.056$). When depression was entered as a covariate, the effect of group remained significant only for the POS and NEG subscales [POS: $F(2, 66) = 3.314$, $p = 0.043$; NEG: $F(2, 66) = 3.764$, $p = 0.029$]. *Post hoc* comparisons showed that the Diagnosed group scored more highly on these subscales than the Undiagnosed group, when controlling for depression scores, but that this difference was statistically significant only for the NEG subscale (POS: $p = 0.059$; NEG: $p = 0.027$).

Discussion

This study examined the relationship between metacognitive beliefs, anomalous experiences, distress regarding these experiences, and diagnostic status.

Effect of diagnostic group on MCQ scores

The clinical groups endorsed more metacognitive beliefs than the non-clinical groups on the subscales of the MCQ. This supports an association between need for care (as indicated by involvement with a clinical service) and maladaptive metacognitive beliefs, in the context of anomalous experiences. Negative beliefs about thoughts in general, including superstition, responsibility and punishment, and positive beliefs about worry, most clearly differentiated the At Risk and Diagnosed groups from the Undiagnosed and Control groups. These findings corroborate previous data reporting elevated rates of maladaptive metacognitions in ARMS and 'diagnosed' populations (e.g. Morrison *et al.* 2002, 2007). However, negative beliefs about the uncontrollability of thoughts were not specifically elevated in these groups, as predicted by Morrison *et al.* (2007); neither was the ARMS group reliably distinguished from the Diagnosed group by any metacognitive subscales. Although only the Diagnosed group showed elevated positive beliefs about worry relative to the Undiagnosed group, this did not emerge as a discriminating variable between the ARMS and Diagnosed groups. As such, these data do not clearly support the suggestion by Morrison *et al.* (2007) that the combination of elevated positive and negative beliefs about worry is specifically

implicated in the development of distressing psychotic symptoms.

While these findings broadly support the idea that certain metacognitive beliefs interact with the occurrence of anomalies to produce clinically relevant psychotic symptoms, the other analyses conducted suggest that the mechanism by which this happens may not be direct. First, the elevated rates of maladaptive metacognitions in the Diagnosed group compared with the Undiagnosed and Control groups were associated with elevated rates of general anxiety and, to an extent, depression. These findings support the S-REF model, which, although not targeted specifically at explaining processes in psychosis, predicts that such metacognitive beliefs are associated with, and implicated in the development and maintenance of emotional disorders including anxiety. As such, it is possible that the elevation in unhelpful metacognitive beliefs was related to the presence of anxiety in the clinical groups, independent of the anomalous experiences and their appraisal. Indeed, the data showed that only the general negative beliefs actually predicted anomaly-related distress, with an OR (1.1) that indicated only a small increase in distress associated with an increase in negative beliefs. The other subscales were not implicated specifically in the impact of the anomalous experiences.

However, it is possible that the presence of unhelpful metacognitive beliefs may influence the subsequent impact of anomalies through other processes shared with anxiety disorders, such as the heightened self-focused attention, activation of self-beliefs and self-appraisal, attentional bias (threat monitoring) and capacity limitations specified by the S-REF model (Wells & Matthews, 1996, p. 883), which could in turn influence the individual's coping and need for care. In other words, having higher levels of general anxiety and an associated metacognitive processing style may be a risk factor for need for care in the context of psychotic-like experiences; this style of response could also lead to further anxiety and an increase in the subjective awareness and salience of intrusions. This would be consistent with a model of psychosis that views it as continuous with emotional disorders, rather than a discrete disorder with a specific aetiology. The idea that clinically relevant psychotic symptoms reflect an interaction of 'neurotic' factors, including both affective and metacognitive aspects, and anomalous experiences, is supported by the high prevalence of axis I disorders in both 'diagnosed' psychotic (Freeman & Garety, 2003) and putatively 'at-risk' populations (Svirskis *et al.* 2005).

It is notable that the ARMS group had the highest scores of all the groups on four of the five subscales. This result may be an important characteristic of this group, who are likely to be the most help seeking of the groups, as being actively help seeking was a requirement for recruitment to the OASIS clinical service. It seems likely that individuals who are especially prone to concerns about their thoughts will be more liable to seek help in the context of anomalous experiences.

It should also be noted that, although the differences in MCQ scores were marginally non-significant after controlling for levels of anxiety, there remained clear trends towards group differences in positive beliefs about worry, and general negative beliefs. While weight cannot be put on such data, the results nevertheless suggest that these metacognitive beliefs may have a specific impact on the sequelae of anomalies that could be elucidated by further research, perhaps with larger sample sizes.

Relationship between anomalous experiences and MCQ scores

The data concerning the relationship between particular types of anomalies and metacognitive beliefs also suggest that most psychotic-like anomalies are not causally related to metacognitive processing. It has been suggested (e.g. Morrison, 2001, p. 261) that voices, thought insertion, thought broadcasting and passivity phenomena may be intrusions that have been externally misattributed due to co-existing maladaptive metacognitive beliefs. According to that model, these types of anomalous experiences would be expected to covary with metacognitive beliefs, rather than being independent of them. Within the current study, metacognitive beliefs assessed by the MCQ had no relationship with the experience of anomalies contributing to the lifetime first-rank symptom component[2], implying that these processes are not involved in the evolution of these particular kinds of psychotic experience.

In contrast, negative metacognitive beliefs about the controllability of thoughts, general negative beliefs, and cognitive confidence were significantly associated with the experience of CogAtt anomalies. This is suggestive of a relationship between the experience of these anomalies and maladaptive metacognitive beliefs, but the current design cannot elucidate the direction of causality. There is overlap between one of the CogAtt anomalies (distractability) and two items on the MCQ contributing to the cognitive confidence subscale (10 items), but this is the only direct overlap. It is plausible that the experience of spontaneous changes in thinking could lead to low cognitive confidence and a sense that thoughts are uncontrollable. Furthermore, beliefs that thoughts need controlling and negative beliefs about responsibility for thought

content may increase the likelihood of help seeking in the context of cognitive anomalies. Alternatively, certain metacognitive beliefs could lead to the subjective experience of worrying alterations in cognition, and the cognitive–attentional syndrome proposed within the S-REF model would be predicted to increase the incidence of such intrusions via increased self-focused attention, perseverative processing and priming caused by threat monitoring.

The current study examined the relationship between metacognitive beliefs and anomalous experiences occurring across the lifetime. Future research that assessed metacognitive beliefs and anomalous experiences prospectively across repeated time points could elucidate the direction of causality and the implications of these data more effectively.

Limitations of the study

It is possible that the current form of the MCQ, which was developed to assess beliefs implicated in pathological worrying, does not measure the specific types of metacognitive beliefs that are particularly relevant to distress in the context of 'psychotic' anomalies. The original form of the MCQ was used in order that the data be comparable with the majority of previous work; it also allows for the applicability of the generic S-REF model to be assessed. However, it could be seen as a limitation of the present study that an unmodified form of the MCQ was used, as other studies have used modified versions of the MCQ to measure dimensions of metacognition considered to be relevant to psychosis (Lobban *et al.* 2002; Stirling *et al.* 2007). Although Lobban *et al.* (2002) modified the MCQ specifically to measure metacognitions hypothesized to increase the likelihood of externalising appraisals of intrusive thoughts, the new dimensions did not distinguish between people who experienced hallucinations and those that did not. The version used by Stirling *et al.* (2007) was altered to be more relevant to metacognitions about thinking rather than those involved with worry processes, and certainly appeared to yield useful data in their non-clinical sample. Their study had not been published at the time of the current research being carried out, but their modified MCQ might have been useful in this study. Some other dimensions of metacognition could be considered for future research; for example, it is possible that some protective metacognitions were involved in the tolerance of the Undiagnosed group to their anomalies. For example, beliefs about the authorship of and personal identification with thoughts, as well as metaphysical beliefs about the boundaries between people and causal relationships between mental events and events in the world, could be important, particularly in determining

appraisals of and distress regarding anomalies. Development and application of subscales measuring these dimensions of belief could test this hypothesis.

Another limitation to the study is that not all the participants completed all the assessment instruments. Specifically, a subset of 11 ARMS participants were not assessed with the AANEX, since their data was gathered by the second author (L.C.J.), who did not continue to administer this interview due to time constraints. This means that the analyses incorporating AANEX data (relating anomalies to MCQ scales; controlling for type of anomaly when evaluating the prediction of distress by MCQ scores) are based on a reduced number of participants. Although this still yielded equal sample sizes, it may have affected the power of the study to detect associations between metacognitions, anomalies and distress. It would also have been an advantage if the ARMS participants had completed the SCL-90-R, which was not administered to this group in the interests of reducing research demands upon them by avoiding assessment that replicated the clinical measures they were required to complete. The absence of SCL-90-R data for this group means that the analyses using these data do not reflect the relationships between metacognitions, general psychopathology and psychosis in an at-risk population. However, it is considered that the inclusion of the Undiagnosed group with the Diagnosed and Control groups makes these analyses informative nonetheless.

A further issue concerns the differentiation of processes involved in anxiety disorders or depressive illness from those involved in the development of psychosis. It could be seen as a limitation to the current study that participants were not screened to establish whether they met criteria for the presence of other disorders than psychosis, as might be expected. While the association between metacognitive beliefs and more general psychopathology was taken into consideration by the use of a self-report measure assessing depression and anxiety, the study could have been improved by a more robust assessment of these dimensions of distress in all participants.

Summary

Need for care was associated with elevated levels of unhelpful metacognitive beliefs, in the context of anomalous experiences. However, this appeared to be related to higher levels of general psychopathology, particularly anxiety, rather than presence of, or distress associated with, psychotic experiences. A significant relationship was found between self-reports of cognitive difficulties and maladaptive metacognitive beliefs, although the direction of causality could not be established. The possible roles of metacognitive beliefs

in the development of need for care have been discussed in relation to the S-REF model, and the findings certainly do not undermine the relevance of maladaptive metacognitive beliefs in those experiencing anomalies associated with psychosis.

Acknowledgements

Declaration of Interest

None.

Notes

[1] This questionnaire was developed for use as a screening measure for the present study only, and was not submitted to an examination of psychometric properties, such as tests of validity, reliability or internal consistency.

[2] Receptivity, thought withdrawal, voice experiences, thought transmission, loud thoughts and, to a lesser extent, visual hallucinations, reference experiences, and feeling watched or monitored.

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