Emotional dysfunction in schizophrenia spectrum psychosis: the role of illness perceptions

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ABSTRACT

Background. Assessing illness perceptions has been useful in a range of medical disorders. This study of people with a recent relapse of their psychosis examines the relationship between illness perception, their emotional responses and their attitudes to medication.

Method. One hundred patients diagnosed with a non-affective psychotic disorder were assessed within 3 months of relapse. Measures included insight, self-reported illness perceptions, medication adherence, depression, self-esteem and anxiety.

Results. Illness perceptions about psychosis explained 46, 36 and 34 % of the variance in depression, anxiety and self-esteem respectively. However, self-reported medication adherence was more strongly associated with a measure of insight.

Conclusions. Negative illness perceptions in psychosis are clearly related to depression, anxiety and self-esteem. These in turn have been linked to symptom maintenance and recurrence. Clinical interventions that foster appraisals of recovery rather than of chronicity and severity may therefore improve emotional well-being in people with psychosis. It might be better to address adherence to medication through direct attempts at helping them understand their need for treatment.

INTRODUCTION

Psychosis is seen increasingly as the unusual outcome of a concatenation of interacting cognitive and emotional processes that themselves lie within the normal range (Johns & van Os, 2001; Freeman *et al.* 2005). Appraisal is central to cognitive models of the positive symptoms of psychosis (e.g. Garety *et al.* 2001; Morrison, 2001; Byrne *et al.* 2003). The concept of 'illness appraisal' or 'illness perception' can broadly be defined as a collection of beliefs relating to how individuals make sense of, and understand, their health status (see Lobban *et al.* 2003). One form of appraisal concerns the experience of the psychosis itself, whether seen as an illness or otherwise. This has been postulated to influence the maintenance and recurrence of psychotic symptoms. Appraisals are generally held to do this through their effect on coping responses (including medication adherence), emotional impact and cognitive processes.

Insight is the conventional way of conceptualizing how people with a psychiatric illness, particularly schizophrenia, evaluate their experience of it. It implies a degree of acceptance of the idea of illness. Many studies have highlighted the relationship between insight and clinical outcome, possibly mediated through engagement with treatment (Ghaemi & Pope, 1994; Rathod *et al.* 2005). However, several authors (David, 1998; Cooke *et al.* 2005) have

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reported that standard measures of insight are only modestly associated with outcome. David (1998) also suggested that emotional dysfunction in schizophrenia may be related to appraisal of the personal and social consequences of severe mental illness rather than mere acknowledgment of the illness itself. This is essentially the concept of illness perception, a form of meta-cognition applicable to both physical and mental disorders.

In recent years, illness perception has been investigated in a wide range of medical conditions. Leventhal et al. (1984) proposed that people faced with a health threat assume the role of an 'active problem solver', in that they formulate a cognitive representation of their illness based on five core constructs. These are identity (the symptoms and label associated with the illness), cause (the aetiological attribution of the illness), cure/control (the extent to which they think their condition is amenable to cure or control), consequences (the personal, social and financial consequences of the illness) and timeline (how long they believe their illness will last). The model postulates that these cognitions will predict the practical and emotional responses to a health threat. Weinman et al. (1996) developed the Illness Perception Questionnaire (IPQ) to measure the illness perceptions in the model proposed by Leventhal et al. (1984). Bishop and Converse (1986) confirmed the validity and consistency of these illness constructs, and a recent meta-analysis of 45 studies provided confirmation of the key components and predictions within the model (Hagger & Orbell, 2003).

Leventhal's model emphasizes that the importance of the emotional response to a health threat comes from its effects on practical coping responses. A recent meta-analysis by DiMatteo et al. (2000) provides support for this view; depressed mood made it three times less likely that medical patients would take medication.

In psychosis, however, there have been very few investigations of the role of patients' illness appraisals. One exception was the study by Iqbal et al. (2000), who used the Personal Beliefs and Illness Questionnaire (Birchwood et al. 1993) to assess 105 patients presenting with schizophrenia. They concluded that post-psychotic depression results from appraisal of illness, and that depression then leads to more pessimistic illness appraisal.

Although the application of the IPQ to psychosis is in its infancy, the predicted relationships between illness perceptions and emotional dysfunction have been reported (Barrowclough et al. 2001; Jolley & Garety, 2004; Lobban et al. 2004). As illness perceptions seem to be amenable to manipulation (Petrie et al. 2002), this might pave the way for targeted cognitive interventions to promote more adaptive coping strategies and to enhance clinical outcome.

Individuals with psychosis usually experience some form of emotional dysfunction; for instance, clinical depression, low self-esteem and anxiety are common, and they are highly correlated (Freeman & Garety, 2003). Birchwood (2003) postulated three possible origins of emotional dysfunction in individuals presenting with a first episode of psychosis: (i) those intrinsic to psychosis, (ii) the result of developmental anomaly and trauma or (iii) a psychological reaction to psychosis. It is the third pathway that is of particular relevance here. For example, recognition of the consequences associated with psychosis, such as the loss of social goals, roles and status, might well lead to post-psychotic depression and hopelessness (Iqbal et al. 2000). A perceived loss of control over the illness also appears to be predictive of demoralization and depression (Birchwood et al. 1993). The emphasis here is thus on the individual's appraisal of their illness.

A recent study by Lobban et al. (2004) examined relationships between illness perceptions and anxiety and depression alongside a number of other outcome variables in individuals with psychosis. We wanted to explore further whether these associations are stronger than relationships between emotional dysfunction and insight. This would test the 'emotional response' pathway of the self-regulatory model of Leventhal et al. (1984) and also test the predictions of the cognitive model of positive symptoms of psychosis (Garety et al. 2001). Moreover, given that the first line of treatment in psychosis is medication, we aimed to test the hypothesized link between illness appraisals and coping in terms of adherence behaviour in the context of Leventhal's model.

Therefore, the present cross-sectional study was driven by the notion that incorporating

illness perception constructs into a cognitive model of psychosis might enhance our understanding of emotional dysfunction in people experiencing a relapse of psychosis. We hypothesized that:

(1) illness perceptions would show a stronger association with emotional dysfunction than measures of insight. Specifically, apprehensions of a longer timeline, worse consequences, a heightened perception of symptoms and a low sense of control would be associated with higher levels of depression and anxiety, and lower levels of self-esteem;

(2) illness perceptions would be associated more strongly with a self-reported measure of medication adherence than insight.

We also investigated the association between depression and self-reported medication adherence. Given the limited amount of research investigating the link between causal attributions and behavioural and emotional responses to psychosis, we conducted exploratory analyses of putative causal factors and their relation to our dependent variables.

METHOD

Sample

The study sample consisted of participants recruited for the Psychological Prevention of Relapse in Psychosis (PRP) Trial (ISRCTN-83557988). The PRP is a UK multi-centre randomized controlled trial of cognitive behaviour therapy and family intervention for non-affective psychosis, designed to test hypotheses both about outcome and about the psychological processes associated with psychosis. Studies of psychological processes in psychosis were incorporated into the baseline assessment of participating patients before randomization into the trial took place.

The trial was located in four National Health Service (NHS) Trusts in London and East Anglia. In each Trust, recruitment was from specified clinical teams, both in-patient and out-patient services. These were approached at least fortnightly for patients with psychosis who were relapsing. Patients meeting the eligibility criteria were asked to provide informed consent for participation.

Participants were recruited at the time of a relapse in positive symptoms, either from a previously recovered state or from a state of persisting symptoms. For those with persistent symptoms, a significant exacerbation in positive symptoms was required. The inclusion criteria were: current diagnosis of non-affective psychosis (schizophrenia, schizo-affective psychosis, delusional disorder; ICD-10, F20); age 18–65 years; second or subsequent episode starting not more than 3 months before induction; and a rating of at least 4 (moderate severity) on at least one positive psychotic symptom of the Positive and Negative Syndrome Scale (Kay *et al.* 1991) at first assessment.

The first 100 participants in the PRP trial who had completed all the measures required for this study were included.

Measures

Insight – Scale of Unawareness of Mental Disorder (*SUMD*; *Amador et al. 1993*)

The development of this measure was based on the acknowledgement that insight is a complex phenomenon comprising a number of component dimensions and that degrees of insight are therefore possible. A series of questions were asked in order to rate the first five items of this measure. The items were (i) awareness of mental disorder; (ii) awareness of the achieved effects of medication; (iii) awareness of the social consequences of mental disorder; (iv) awareness/attribution of hallucinations; and (v) awareness/attribution of delusions. These items were chosen to measure the core aspects of insight described by Amador & David (1998), and to assess insight in relation to the main positive symptoms of psychosis (i.e. hallucinations and delusions). Each item was rated on a five-point scale, whereby a score of 1 represented awareness and 5 represented unawareness. The ratings from these five items were summed, pro-rated if necessary, divided by 5 and reverse scored to produce a mean insight score, where a score of 1 represented poor insight, and 5, good insight.

Illness Perception Questionnaire (*IPQ*; *Weinman et al. 1996*)

The IPQ consists of items measuring five core illness constructs: identity, cause, consequences,

cure/control and timeline. The IPQ measure is considered to be a reliable and valid tool with which to assess illness perceptions. The measure used in the present study was a version of the original IPQ modified by Weinman and Garety for use in psychosis samples and subsequently piloted (Jolley & Garety, 2004). The consequences, timeline and cure/control constructs were measured by seven, three and six items, respectively, in accordance with the original IPQ of Weinman *et al.* (1996). Eleven attribution items were included in the questionnaire. Each IPQ item (excluding perceived symptom items) was measured on a scale of 1–5, representing strongly disagree to strongly agree respectively.

The modified IPQ lists 18 symptoms in the identity (perceived symptom) component. However, in the current analysis we used only the six items specific to positive symptoms of psychosis: (i) seeing images; (ii) feeling confused; (iii) hearing voices; (iv) having paranoid thoughts; (v) holding beliefs not shared by others; and (vi) feeling that one's mind is being controlled. Negative symptoms were not included because of the correlation between negative symptoms and depression. For each item, the response format was 0–3, with a score of 0 representing 'never' and 3 representing 'all the time'. Therefore, the mean composite identity score had a range of 0–3.

Rosenberg Self-Esteem Scale – (RSE; Rosenberg, 1965)

The RSE consists of 10 items, each measured on a four-point scale from strongly agree to strongly disagree. After reverse scoring, the items were totalled and divided by 10 to produce a mean self-esteem score, where a high score represents low self-esteem.

Beck Depression Inventory-II (BDI-II; Beck et al. 1996)

This established measure consists of 21 items each measured on a scale of 0–3. Therefore, the total BDI-II score ranges from 0 to 63, with a high score representing more symptoms. Depression is measured in relation to the previous 2 weeks. Birchwood *et al.* (2000) reported a high correlation ($r = 0.91$) between the BDI and the interview-based Calgary Depression Scale for Schizophrenia (Addington *et al.* 1993),

confirming that the BDI can be used to assess depression in psychosis.

Beck Anxiety Inventory (BAI; Beck et al. 1988)

This measure consists of 21 items, each measuring common anxiety symptoms. The total anxiety score ranges from 0 to 63, with a higher score indicating more anxiety. Anxiety is measured in relation to the previous week.

Medication Adherence Rating Scale (MARS; Thompson et al. 2000)

This self-report measure consists of 10 dichotomous yes/no items, measuring behavioural aspects of adherence and attitudes towards medication. Total scores ranged from 0 to 10, where 0 and 10 represent low and high likelihood of adherence to medication respectively. As many participants were in hospital during the assessment phase, these individuals were asked to complete the behaviour component (four items) of this questionnaire based on the time immediately prior to their admission. During the development of this measure, the MARS was significantly correlated with two other self-report measures (Hogan *et al.* 1983; Morisky *et al.* 1986), thus demonstrating considerable concurrent validity. Internal reliability and test–retest reliability were also shown to be satisfactory. Moreover, significant correlation has been shown between this measure and blood levels of prescribed mood stabilizers ($r = 0.60$, $p < 0.05$).

Data analysis

Analyses were conducted using SPSS for Windows version 12.0 (SPSS Inc., Chicago, IL, USA). Bivariate correlations measured the strength of associations between the independent variables (insight and IPQ constructs) and the dependent variables (depression, anxiety, self-esteem and medication adherence). The IPQ causal attribution items were analysed separately. Independent variables that correlated with the dependent variables at the $p < 0.05$ level were entered into simultaneous multiple regression analyses. It is generally accepted that for each independent variable entered into a regression equation, between five and 20 participants are required. The number of participants in the present study exceeded the number required to obtain 80% power, assuming the

Table 1. *Mean, standard deviations and internal reliability statistics of independent and dependent variables*

	Number of items	Internal reliability (Cronbach's α)	Mean ($n=100$)	Standard deviation
Independent variables				
Insight	5	0·82[a]	3·02	1·21
Identity	6	N.A.	1·20	0·67
Consequences	7	0·64	3·70	0·70
Cure/Control	6	0·64	3·34	0·74
Timeline	3	0·86	3·20	1·14
Dependent variables				
Anxiety (BAI)	21	N.A.	19·19	13·87
Depression (BDI-II)	21	N.A.	23·69	12·56
Self-esteem (RSE)	10	N.A.	2·37	0·70
Medication adherence (MARS)	10	N.A.	0·58	0·23

BAI, Beck Anxiety Inventory; BDI-II, Beck Depression Inventory-II; RSE, Rosenberg Self-Esteem Scale; MARS, Medication Adherence Rating Scale; N.A., not applicable.

[a] This internal reliability value was derived from the first three items of the Scale of Unawareness of Mental Disorder (SUMD), as items 4 and/or 5 are not applicable to every participant.

standard medium effect size of 0·5 and an α significance level of 0·05 (Cohen, 1992).

RESULTS

Of the first 137 participants with non-affective psychoses recruited into the PRP trial, 100 (73%) completed all measures required to test our hypotheses. The majority of the participants were male (72%), single (68%), unemployed (75%) and white (68%). The mean age was 39·1 (S.D. = 10·6) years. The mean length of illness (as measured from first contact with mental health services) was 12·4 (S.D. = 9·2) years. Symptom severity was rated by independent observers using the positive symptom component of the Positive and Negative Syndrome Scale (PANSS; Kay *et al.* 1991). The mean PANSS positive symptom score for the sample was 18·3 (S.D. = 5·2). The excluded subjects did not differ significantly from the study sample on any of the above measures. The sample consisted of participants presenting with a diagnosis of schizophrenia ($n=84$), schizoaffective disorder ($n=14$) and delusional disorder ($n=2$).

Internal reliability scores (Cronbach, 1951) were calculated for the insight scale, and the three (applicable) illness perceptions constructs of timeline, cure/control and consequences. These were satisfactory (see Table 1).

The mean and standard deviation scores in Table 1 indicate that the sample reported a moderate frequency of psychotic symptoms. Self-reported positive symptoms correlated strongly with observer-rated symptoms. Observer-rated positive symptoms did not correlate significantly with either depression or self-esteem. Although PANSS positive symptoms correlated significantly with anxiety, the relationship was relatively weak ($r=0·27$) compared to subjectively reported symptomatology measured through the 'identity' construct ($r=0·59$). The participants perceived themselves as holding some degree of cure/control, but also appeared to believe that many negative consequences would follow as a direct result of their illness. The respondents varied considerably in their views about the likely duration of their illness. Internal causal attributions were widely endorsed. For example, 68% agreed that 'My state of mind played a major part in causing my current problems/illness'.

Three attribution items (i.e. a germ or virus/diet/pollution caused my illness) were endorsed by a very limited proportion of the sample (5–22%), and did not appear to be popular aetiological explanations of psychosis. They were therefore excluded from further analysis. As the remaining causal attributions were measured by single items, and were therefore not regarded as continuous variables, these

Table 2. *Correlation analysis (Pearson's r): positive symptoms, insight, illness perceptions, medication adherence and emotional dysfunction (n = 100)*

	PANSS	Insight	MARS	Anxiety	Depression	Self-esteem	Identity	Timeline	Consequences
Insight	−0·50**								
MARS	−0·37**	0·24*							
Anxiety	0·27**	−0·02	−0·25*						
Depression	0·17	−0·02	−0·33**	0·58**					
Self-esteem	0·03	0·12	−0·26**	0·43**	0·77**				
Identity	0·46**	−0·11	−0·24*	0·59**	0·56**	0·49**			
Timeline	−0·01	0·10	−0·09	0·27**	0·47**	0·40**	0·25*		
Consequences	0·15	0·01	−0·33**	0·43**	0·54**	0·42**	0·46**	0·42**	
Cure/Control	−0·25*	0·29**	0·29**	−0·26**	−0·35**	−0·35**	−0·15	−0·31**	−0·48**

PANSS, Positive and Negative Syndrome Scale; MARS, Medication Adherence Rating Scale.
* $p < 0.05$, ** $p < 0.01$.

were analysed separately from the other IPQ constructs.

The mean level of insight, as rated by the study assessors, was moderate, with considerable variance (see Table 1). Levels of depression, anxiety and self-esteem were moderate (see Table 1), but showed a considerable degree of variation.

Table 2 shows Pearson *r* correlations between insight and illness perception (predictor variables), medication adherence, and emotional dysfunction (dependent variables). There appears to be little relationship between emotional dysfunction and levels of insight as assessed by the SUMD. However, there are many significant correlations between components of illness perception and aspects of emotional dysfunction. A high symptom score, a longer timeline, a high level of perceived consequences and a low level of cure/control were significantly related to higher levels of depression, and patterns of association with both anxiety and self-esteem were similar. Simultaneous multiple regression analyses were conducted to estimate the proportion of variance accounted for in the dependent variables. Associations between variables that reached the $p < 0.05$ level of significance were entered into the three separate regression equations. Illness perception constructs explained a substantial proportion of the variance in depression (46%), anxiety (36%) and self-esteem (34%). The analyses demonstrated that the proposed illness perception framework produced statistically significant association with anxiety ($F = 15.0$, df = 4, $p < 0.001$), depression ($F = 22.3$, df = 4, $p < 0.001$) and self-esteem ($F = 13.5$, df = 4, $p < 0.001$). In anxiety, perceived symptoms emerged as the single significant correlate ($\beta = 0.50$, $p < 0.001$). For depression, perceived symptoms ($\beta = 0.39$, $p < 0.001$), timeline ($\beta = 0.25$, $p < 0.01$) and perceived consequences ($\beta = 0.20$, $p < 0.05$) were all significant. Perceived symptoms ($\beta = 0.37$, $p = 0.001$), cure/control ($\beta = -0.19$, $p < 0.05$) and timeline ($\beta = 0.22$, $p < 0.05$) emerged as the significant variables association with self-esteem.

Table 3 shows Spearman's ρ correlations between the dependent variables and the eight causal attribution items. None of the causal items were significantly related to levels of depression. Attributing one's illness to one's state of mind and to stress was significantly related to higher levels of anxiety and self-esteem respectively. However, caution should be exercised when interpreting these findings because of the possible influence of multiple comparison testing.

The relative contribution of insight, illness perceptions and depression to medication adherence

Given the hypothesized influence of emotional dysfunction upon adaptive coping in the model of Leventhal *et al.*, depression was tested alongside insight and illness perceptions to determine whether it related to medication adherence. Thus, depression, insight, identity, cure/control and consequences were entered into the equation. This model explained 16% of the variance in medication adherence ($F = 4.8$, df = 5, $p = 0.001$). Although depression and the perceived consequences of illness were the variables most strongly related to self-reported

Table 3. *Correlation table: IPQ attribution items and dependent variables*

	MARS	Anxiety	Depression	Self-esteem	Hereditary	Chance	Personality	Own behaviour	Other people	Poor medical care	State of mind
Anxiety	−0·25*										
Depression	−0·33**	0·58**									
Self-esteem	−0·26**	0·43**	0·77**								
Hereditary	0·07	0·05	−0·01	0·08							
Chance	−0·04	0·05	−0·01	0·04	−0·33**						
Personality	−0·14	0·13	0·19	0·13	0·11	−0·02					
Own behaviour	0·07	−0·09	0·01	0·07	0·10	0·11	0·43**				
Other people	−0·20*	0·08	0·08	−0·08	0·10	−0·12	0·27**	−0·12			
Poor medical care	−0·24*	0·04	0·02	0·10	0·17	−0·06	0·15	0·08	0·06		
State of mind	−0·09	0·27**	0·18	0·19	0·17	−0·09	0·43**	0·36**	0·08	0·09	
Stress	0·03	0·10	0·12	0·27**	0·38**	−0·11	0·07	−0·01	0·07	0·11	0·20

Inter-item causal attribution correlations and correlations between causal attribution items and dependent variables were calculated using Spearman ρ.
IPQ, Illness Perception Questionnaire; MARS, Medication Adherence Rating Scale.
* $p < 0.05$, ** $p < 0.01$.

medication adherence in the univariate analysis, only insight ($\beta = 0.22$, $p < 0.05$) emerged as significant in the multiple regression analysis. In a separate analysis, attributions that other people played a role in the cause of illness and attributing illness to poor medical care in the past were significantly and negatively related to self-reported medication adherence.

DISCUSSION

This study used a cross-sectional design. Such an approach does not, of course, permit interpretation of causality. However, the results of the present study suggest that the level of insight held by the sample was not related to emotional dysfunction. In accordance with our hypotheses, we also found that illness perception constructs of identity, cure/control, consequences and timeline were significantly related to depression, anxiety and self-esteem. Furthermore, specific causal attributions were related to emotional variables. In a series of multivariate analyses, increased levels of perceived consequences of the illness were related to increased depression. A greater level of anxiety was associated with heightened perception of symptoms. Lower self-esteem was related to a weaker perception of cure/control, a longer timeline and a greater perception of symptoms.

The results of our study are in many ways similar to the findings of Lobban *et al.* (2004) and Jolley & Garety (2004). Although Lobban *et al.* did not measure insight and used different measures of depression and anxiety (the Hospital Anxiety and Depression Scale; Zigmond & Snaith, 1983), they found similar strong relationships between illness perceptions (identity, timeline and consequences) and anxiety and depression. In the present study, a longer timeline perception was positively, and significantly, correlated with depression as in the pilot study of Jolley & Garety (2004).

Investigation of the relationship between observer-rated positive symptoms, as measured in the PANSS, and perceived symptoms revealed that, while observer-rated and perceived symptoms were correlated positively, it was the perceived (subjective) rather than the observer-rated (objective) symptom levels that were more strongly associated with anxiety, depression

and low self-esteem. This seems to confirm that it is the appraisal of symptoms rather than their occurrence that is distressing. The same may apply to other aspects of illness perception; that is, they too may not be accurate (as perceived by observers) representations of the patient's predicament.

Cognitive behavioural therapy (CBT) for psychosis is a relatively new intervention that aims to reduce the distress associated with positive symptoms of psychosis (Pilling *et al.* 2002). The findings of this study would, if replicated, provide some pointers for the development of CBT in psychosis. Lengthy timeline perceptions associated with psychosis were related to a greater level of depression. Therapeutic approaches should emphasize that having a psychotic disorder does not necessarily equate to a lifetime of illness, and that steps can be taken to reduce the likelihood of relapse and the chronicity of disability. Indeed, challenging negative beliefs about the controllability of the illness and developing individualized 'recovery action plans' have been shown to promote improved outcome in non-psychiatric conditions (Petrie *et al.* 2002).

Estimates have suggested that 55% of patients presenting with chronic psychotic illnesses (e.g. schizophrenia) have significant difficulties adhering to their medication regimen (Fenton *et al.* 1997). Similar rates of non-adherence have been documented among individuals presenting with a first episode of psychosis (Coldham *et al.* 2002). Although much research has sought factors predictive of adherence-related behaviour (Pan & Tantam, 1989; Kampmann & Lehtinen, 1999; Lacro *et al.* 2002), and compliance therapy has been effective in improving medication adherence (Kemp *et al.* 1998), the need to identify specific targets for intervention to enhance our understanding of the cognitive factors that underpin behavioural change has been highlighted (Adams & Scott, 2000; Scott & Pope, 2002). Contrary to our second hypothesis, our results suggest that reduced insight was associated significantly with poorer medication adherence. This finding may, in part, be explained by the fact that one facet of the SUMD assessment of insight (Amador *et al.* 1993) measures perceptions of awareness of the achieved effects of medication. However, the finding that illness perceptions *per se* did not directly explain a substantial proportion of the variance in adherence is consistent with recent illness perception research. For example, Horne and Weinman (2002) have shown that specific beliefs about treatment (rather than the illness) are the key influences on adherence, and that illness perceptions are related to these treatment beliefs in a logical way, particularly to patients' beliefs about their need for treatment.

Enhancing perceptions of controllability and working with beliefs about the impact of perceived consequences of psychosis are likely to be useful intervention targets, and a longitudinal test could determine whether such a focus also results in improved adherence. As noted earlier, using personalized action plans to tackle perceived barriers to treatment adherence should be considered. Gibson *et al.* (2000) in a systematic review found that asthma patients in receipt of a personalized action plan were more adherent to medication, were less likely to be hospitalized, and demonstrated improved outcome in comparison to those with no action plan.

Recognizing that our model only accounted for a modest amount of the variance in medication adherence, future research should highlight the importance of beliefs about treatment, particularly beliefs about the negative consequences of medication (Horne & Weinman, 1999). Moreover, as found by DiMatteo *et al.* (2000), our results partially suggest that participants with higher levels of depression seem less likely to adhere to their medication regimen.

Our study has a number of limitations. First, because of its cross-sectional design, we cannot infer the direction of causality; a longitudinal study is needed for this, particularly as illness perceptions may improve as symptoms improve. Indeed, the importance of measuring cognitions and outcomes over time is highlighted in recent research by Drake *et al.* (2004). This prospective study found a positive relationship between insight and depression, but only at onset. Subsequently, they found that paranoia predicted depression as the illness progressed. A second limitation is that the study participants had consented to take part in an intervention trial. The sample we examined may not therefore be representative of the general population of people with psychosis. It may, however, be

reasonably representative of a group willing to participate in psychological interventions, including adherence therapy. The findings of Lobban *et al.* (2004) in a different sample were similar, indicating that these results may be generalizable. Finally, although the MARS holds considerable concurrent and construct validity and has satisfied internal and test–retest reliability measures, an additional objective measure of medication adherence would have been desirable.

In conclusion, an awareness of appraisals such as illness perceptions and their interactions with emotional responses may generate improvements in interventions for people with psychosis.

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DECLARATION OF INTEREST

None.

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