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Does clinical or cognitive insight predict outcome in psychosis? Findings from a longitudinal first episode cohort

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ABSTRACT

The outcome of first episode psychosis (FEP) is highly variable and difficult to predict. We studied prospectively the impact of poor insight and neuropsychological deficits on outcomes in a longitudinal cohort of 127 FEP patients. Participants were assessed on 5 domains of cognitive function and 2 domains of insight (clinical and cognitive). At 12 months, patients were assessed again for symptom severity and psychosocial function. Regression analyses revealed that cognitive insight (a measure of self-reflectiveness and self-certainty) was the best baseline predictor of overall psychopathology at 12 months whereas executive function performance at admission to the study indicated later severity of negative symptoms. Other neuropsychological and insight measures were poor predictors of psychosocial function at 1 year. The results suggest that specific neuropsychological and insight factors have separate predictive capacities indicating that they are distinct psychological processes in psychosis. Cognitive insight proved to be a useful prognostic indicator, and should be considered for future studies and as a potential focus for treatment.

1. Introduction

Evidence suggests that rates of recovery from psychosis vary widely (Van Os et al., 1996) and efforts have been made to determine early predictors of outcome by tracking illness course in incident cases from the first episode of psychosis. Outcome itself is multifaceted and one useful way to differentiate types of outcome is by examining clinical (cessation of symptoms) and functional (social integration, and occupational well being) domains separately. Putative predictors of outcome after a first episode of psychosis (FEP) include duration of untreated illness (DUP), pre-morbid functioning, gender and diagnosis (Wiersma et al., 2000).

Cognitive impairment, which is apparent at the onset of psychosis and stable over time, has also proven to be a useful indicator of functional outcome in established schizophrenia(Rund, 1998) but conclusions from first episode psychosis spectrum samples are less certain (Mesholam-Gately et al., 2009; Allott et al., 2011; Bozikas and Andreou, 2011). In terms of symptom outcome in FEP, cross-sectional studies show strong associations between poor cognitive function and negative symptoms (Milev et al., 2005). However, the longitudinal nature of this relationship is not clear.

1.1. Insight as a predictor of outcome

A less explored question in outcome studies is whether insight into illness at first episode predicts later recovery. Poor 'clinical insight' – awareness the patient has of their illness – is common in schizophrenia samples and across the psychosis spectrum (David, 1990; Amador et al., 1994). There is growing evidence that good insight is associated with recovery (David, 2004; Lincoln et al., 2007) and measures of insight can predict outcome at one year (Segarra et al., 2010) and four year follow-ups (Van Os et al., 1996). However, few follow-up studies have made use of reliable insight assessment instruments, but rather have taken single insight items from generic psychopathology scales.

While many studies in psychosis have focused on illness related insight, Beck and colleagues distinguish another type of insight construct called 'cognitive insight' which reflects a more general cognitive style, namely a tendency toward flexible thinking and for one's reasoning to be subject to self-reflection(Beck et al., 2004). The Beck Cognitive Insight Scale (BCIS) is a self-report questionnaire developed to measure cognitive insight in both clinical and nonclinical populations (Beck et al., 2004). Several studies, but by no means all (Riggs et al., 2012) have found correlations between clinical and cognitive insight. Hence they appear to be tapping related but different concepts. The BCIS has shown good test retest reliability in schizophrenia suggesting it has trait like properties (Riggs et al., 2012) while clinical insight has both state and trait like properties (Wiffen et al., 2010).

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1.2. Is insight related to neuropsychological deficits?

Extensive research which has been subjected to systematic review (Morgan and David, 2004) and meta-analysis (Aleman et al., 2006) suggests that there is an association between poor clinical insight (as measured by the Schedule for Assessment of Insight—Expanded (SAI-E) Kemp and David, 1996) and neuropsychological deficits, especially in domains of executive function (Aleman et al., 2006). However, such an association is not always evident (Kemp and David, 1996) and much of the variance in insight cannot be explained by cognitive function. Cognitive insight has also been shown to be associated with various neuropsychological functions (Gilleen et al., 2011; Orfei et al., 2011). In fact one study investigated this in FEP patients and found that clinical insight was not associated with neuro-cognition but cognitive insight was (as measured on the BCIS) (Lepage et al., 2008). Understanding whether insight and neuropsychological mechanisms are distinct will help determine whether insight measures are useful for predicting outcome independently.

The aim of this study is to investigate whether insight factors (clinical and cognitive) at FEP contribute to prognosis, independent of neuropsychological function. As outcome measures often integrate multiple domains of recovery, it is helpful to specify the association that insight and cognitive factors have with later outcome. Therefore this study will examine relationships with three domains of outcome separately; function (social integration and occupational well being), overall psychopathology, and psychosis related symptoms. We hypothesise that neuropsychological deficits at onset will be associated with poorer functional outcome whereas insight measures will be associated with symptom related recovery. Specifically, we hypothesise that good insight at FEP will predict less severe psychopathology at follow-up. We also speculate that cognitive insight will be a better predictor of outcome than clinical insight since it is thought to reflect an enduring thinking style while clinical insight is shaped more by ongoing symptoms and socialization into a medical model (Beck et al., 2004).

2. Method

2.1. Sample

We recruited first episode psychosis patients as part of the National Institute of Health Research (NIHR) Biomedical Research Centre (BRC) Genetics and Psychosis study. We approached patients aged 18–65 years appearing to meet DSM-IV criteria for schizophrenia or related disorder, or affective disorder with psychotic features who presented to one of 3 south London boroughs' geographical catchment area-based adult mental health services. Eligibility was determined through examination of the clinical notes of new admissions and consultation with clinical teams. Inclusion criteria required that patients have 7 or more consecutive days of psychotic symptom(s) and were presenting to services for the first time with these symptoms. Patients were approached as soon as possible (up to 3 months after first contact). Exclusion criteria were developmental learning disability, poor English fluency, and a known organic cause for psychosis.

2.2. Procedures

Ethical approval was obtained from the local research ethics committee. All study participants gave full informed consent. Raters were experienced researchers who were extensively trained and demonstrated adequate inter-rater reliability on clinical and neuropsychological assessment (Hallgren, 2012). Participants completed all measures within 6 months of first presentation with services. At 12 months after initial assessments, some research measures were repeated via clinical notes or face to face interview when available.

2.3. Baseline assessments

2.3.1. Clinical, pre-treatment, and demographic measures

Information about employment/relationships/living status and medication, was collected through interview with the patient and searching clinical records. Diagnosis was made according to DSM-IV criteria using the Operational Criteria OPCRIT (McGuffin et al., 1991) based on the clinical notes for the month after first contact with psychiatric services for psychosis. All diagnoses were carried out by qualified psychiatrists and clinical researchers, subject to comprehensive training and inter-rater reliability testing. This was shown through consensus diagnoses meetings and a prerequisite screening of 10 diagnostic cases with 100% consistency with previous raters before autonomous ratings using OPCRIT occurred. Due to relatively small numbers in each diagnostic group, diagnoses were combined to form non-affective (schizophrenia, schizophreniform and psychosis NOS) and affective (bipolar, mania or depression with psychosis) groups. Demographic information about housing, relationship and employment status 1 year prior to FEP and 1 year after were recorded. DUP (period between first psychotic symptom and initiation of treatment) was calculated based on full clinical notes (with some informant interviews) of each patient.

The Global Assessment of Functioning—GAF, which is a single rating scale from 1 to 100 (a low score indicating poorer functioning) (American, Psychiatric Association, 1994) was used to rate both severity of symptoms and disability. We assigned two separate ratings on the GAF based on dimensions of psychiatric symptoms and psychological, social and occupational function. To rate specific psychotic symptoms, the Positive and Negative Syndrome Scale (PANSS) was used (Kay et al., 1987). The PANSS was scored on a clinical interview, and symptoms rated on a Likert scale (1–7); high scores indicate more severe psychotic symptoms.

2.3.2. Insight measures

Clinical insight was measured with the SAI-E (Kemp and David, 1996). This scale measures three linked but separable dimensions of insight: awareness of illness; need for treatment; and the relabeling of symptoms as abnormal. It is an observer rated, semi-structured interview. Researchers were highly trained by the scale author before using the scale with participants, and were familiar with the clinical presentation of the patient. Inter-rater reliability following this training has been shown to be excellent (Morgan et al., 2010); high scores represent better insight.

Cognitive insight, a type of metacognitive measure (David et al., 2012) was quantified using the BCIS (Beck et al., 2004). This is a 15 item self-report scale, with items rated from 'do not agree at all' to 'agree completely'. There are two subscales: 'self-reflectiveness', which assesses willingness to accept fallibility and external feedback, as well as recognising dysfunctional reasoning style (e.g. 'my unusual experiences may be due to my being extremely upset or stressed') (9 items), and 'self-certainty', which assesses overconfidence (e.g. 'I can trust my judgment at all times') (6 items). High self-reflectiveness and low self-certainty are thought to indicate 'good' cognitive insight. Participants rated agreement on a 7-point Likert scale. This aimed to increase the sensitivity of the original measure, which used a 4-point scale.

2.3.3. Neuropsychological measures

All participants were assessed in the following five domains: General cognitive function: Full-scale IQ was derived from the Wechsler Adult Intelligence Scale—Third Edition (WAIS III) from the Information, Digit Span, Block Design, Matrix Reasoning and Digit Symbol Coding subtests. Verbal Memory: The Wechsler Memory Scale—Third Edition (WMS-III) logical memory test at a delayed (30-min delay) time point was used. Nonverbal Memory: as for Verbal Memory but using visual reproduction. Executive function and working memory: Trails B; the Spatial

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Working Memory (SWM) from the Cambridge Neuropsychological Test Automated Battery (CANTAB); and a verbal semantic fluency test. Processing speed: The Trails A. Individual test scores were converted into age standardised scores (WAIS and WMS III and SWM) or raw score (Trails, Semantic Fluency) and transformed if distributions were not normal (reference list for the above tests available from the authors on request).

2.4. Follow-up assessments

GAF ratings were scored again 12 months after patients were initially assessed. Researchers used clinical notes to assess both symptom and function aspects of the GAF (108 participants) or when available, the assessment was supplemented by a face to face interview (19 participants). The reduced figure for interview was due to strict time frame criteria for GAF (2 week window either side of baseline assessment +1 year) so in the majority of cases, records only were used. Researchers involved in rating GAF via notes completed intensive reliability checks (Cronbach alpha ~0.9). PANSS scores via interview were also collected at or just beyond the 12 month follow-up point (average 14.9 months). The number of participants with PANSS scores at 12 months dropped to 72 because it required clients to have a face to face interview. PANSS scores were collected at or just beyond the 12 month follow-up point (average 14.9 months). The same raters were involved in the GAF and PANSS interviews and record based GAF assessment to assist reliability.

2.5. Data analysis

Pearson's correlations were conducted to evaluate the relationship between baseline measures (symptoms, functioning, and neuropsychological and insight scores) with functional and symptomatic outcome at 12 month FU. No correction for multiple testing was applied as these correlations were exploratory and served to select variables for regression analysis. Correlated factors ($r > .25$) were entered into hierarchical multiple regressions in order to estimate a useful predictor model. Insight measures taken at entry into the study were the independent variables and symptom and functional outcome at 12 month follow-up were the dependent variables. Other factors which correlated highly to the outcome measures were entered into the model as covariates.

3. Results

3.1. Description of sample

Of the 152 patients enrolled in the BRC study with completed neuropsychological assessments, 127 were assessed at 1 year follow-up either by face to face interview or via clinical records giving a completion rate of 83.6%. The reasons for drop out included leaving the country ($n = 9$) disengagement from clinical team and/or refusal to take part in study interview ($n = 11$), clinical notes not attainable and/or refusal to take part in study interview ($n = 3$) and suicide ($n = 2$). There were no significant differences between those who completed the study from those that dropped out in terms of gender, age, ethnicity, education or baseline symptoms (all $t = -1.206$ to .447, $P = .2$ to .8). The DSM IV diagnoses for the sample were schizophrenia (23.6%), schizophreniform disorder (30%), schizoaffective-depressed (4.7%), schizoaffective-bipolar (6.3%), major depression with psychosis (10.2%), manic episode with psychosis (12.5%) and psychosis NOS (12.6%).

At inclusion, 86% of patients were prescribed antipsychotic medication, and this decreased to 76% at 12 month follow-up. Time spent in psychiatric hospital varied widely with an average inpatient stay of 71 days. From 12 months prior to illness onset to 12 months after FEP, rates of unemployment in the cohort almost doubled to 68%. Around 60% of patients were single and almost a third, living alone with minimal changes at follow-up. Further description of the cohort is given in Table 1.

3.2. Correlation analysis

Significant inter-correlations from Time 1 (first contact with services) and at Time 2 (12 month FU) are described below. Collinearity of predictor variables was low (tolerance of 0.75 and above).

3.2.1. Insight and neuropsychology

Our clinical insight factor (SAI-E scores) did not correlate with IQ scores, but showed moderate associations with Verbal Memory scores ($r = .42$) and Digit Symbol Coding ($r = .31$). Clinical insight also showed weak associations with Verbal Fluency (.292), Matrix Reasoning ($r = .21$), Trails A ($r = -.27$) and Trails B ($r = -.25$). Cognitive insight (BCIS) associated most strongly with executive function tasks, (Verbal Fluency $r = .40$ Trails B $r = -.34$ SWM strategy score, $r = -.31$) and Verbal Memory ($r = .245$).

3.2.2. Neuropsychological associations with outcome

Baseline neuropsychological variables were shown to be correlated, albeit weakly with negative symptoms at 12 months: verbal tasks including WAIS composite IQ $r = -.25$, Information $r = -.24$, Verbal Memory $r = -.27$, Verbal Fluency $r = -.26$ and executive function tasks (SWM strategy score $r = -.31$; Trails B, $r = .28$). Digit Symbol Coding and Verbal Fluency were associated with 12 month functional function ($r = .195$, $r = .21$ respectively).

3.2.3. Insight and outcome

Clinical insight was associated with both symptom and function GAF domains at 12 months (both $r = .26$). Cognitive insight also correlated with GAF 12 month symptom severity ($r = .32$) and psychosocial function ($r = .23$). Insight factors were not associated specifically with positive or negative symptoms at follow-up. No variables of interest associated with positive symptoms at 12 month follow-up.

3.3. Regression analysis

On the bases of correlation findings, a series of hierarchical multiple regressions was carried out to compare the variance in outcome that can be explained by insight and neuropsychological factors after controlling for possible confounders. Regression models were created to analyse predictors of different aspects of outcome. These are function (social integration and occupational well-being), overall psychopathology, and psychosis-related symptoms.

3.3.1. Prediction of general psychopathology

Gender, diagnoses, DUP and ethnicity were entered into the model first, followed by baseline negative symptoms, then cognitive and clinical insight measures. Neuropsychological factors were not entered into the regression as they did not correlate with the GAF symptom scale. In this model cognitive insight independently contributed to the model, and together with negative symptoms explained 21% of variance in outcome $F(2, 57) = 8.602$, $P < .01$. Specifically each scale increase on the BCIS scale corresponds to half a unit improvement on the GAF symptom scale at 12 months. See Table 2a for details. Self-reflectiveness and self-certainty provided equivalent though opposite contributions to the model ($t = -1.719$ and 1.723 respectively). The composite score correlated better with the GAF symptom outcome than did the scales individually.

3.3.2. Prediction of psychosis-related symptoms

Insight measures were not well correlated with negative symptoms at 12 months, but neuropsychological factors were (verbal and

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Table 1
Description of sample over time.

Demographic/symptom data		Baseline sample
Age, years		M = 29.75 (8.95)
Gender		69% male
Years of education		M = 13.28 years
Level of education obtained		Postgraduate: 3% Degree: 17% A levels:22% NVQ/vocational: 22% GCSE'S: 20% No qualifications: 16%
Ethnicity		Black African/Caribbean: 40% White British: 27% White other: 11% Asian: 6% Other: 16%
IQ		N: 152 FSIQ: 89.65 (16.15) PIQ: 86.93 (15.80) VIQ: 94.05 (16.08)
Progress	**Baseline**	**12 month FU**
PANSS ratings	n = 138 Positive M = 14.65 (6.0) Negative: M = 14.90 (6.3)	n = 72 Positive M = 11.50 (4.9) Negative: M = 14.11 (5.9)
GAF scores	n = 130 Symptoms: 48.78 (20.23) Function: 57.03 (17.5)	n = 127 Symptoms: 57.73 (20.4) Function: 59.23 (19.5)
Medication	n = 145 Antipsychotics: 53.3% – Oral 98.5% – Depot 1.5% Antipsychotics/ antidepressant: 18% Anti-psychotic/ tranquilisers: 19% Anti-depressants 2% Lithium: 0% Other combinations: 2.9% None: 4.8%	n = 123 Antipsychotics: 49% – Oral 89% – Depot 9% Antipsychotics/ antidepressant: 21% Anti-psychotic/ tranquilisers: 6% Anti-depressants 5% Lithium: 2% Other combinations: 9% None: 8%
Psychiatric hospital admission days during 1 year follow-up		71.09 days (79.15) Range = 0 to 365
Social circumstances	**Year prior to onset**	**12 month follow-up**
Relationship status	n = 147 Single 60% Married/living with someone 20% In a steady relationship 20%	n = 126 Single 71% Married/living with someone 20% In a steady relationship 9%
Employment status	n = 150 Unemployed 38% Student 11% Employed full time 35% Employed part time 16%	n = 127 Unemployed 68% Student 11% Employed full time 8% Employed part time 13%
Living status	n = 149 Alone 30% Alone with children 6% With partner 8% With partner & children 12% Parents 26% Other family 5% Friends 9% Other 4%	n = 126 Alone 20% Alone with children 5% With partner 5% With partner & children 15% Parents 20% Other family 4% Friends 5% Other 28% Psychiatric hospital 50% Supported Accommodation: 33% Prison: 3% Other: 14%

executive function tasks). These were entered stepwise into a model along with gender, diagnoses, DUP and ethnicity and baseline negative symptoms. In this case, Trails B alongside negative symptoms was predictive of negative symptoms at 12 months; F (1, 34) = 11.33, P < .002, accounting for 23% of outcome variance. Specifically, a difference in speed of 10 s on the trails task predicted a corresponding shift of nearly 4 points on the PANSS negative symptoms scale. Faster performance on the Trails B was associated with fewer negative symptoms at 12 months. See Table 2b for details.

Table 2a
Regression showing the ability of insight factors to predict symptom severity.

	Std beta	t	P
Final model			
Cognitive insight	0.340	2.861	0.006
Baseline negative symptoms	−0.305	−2.563	0.013
Excluded variables			
Gender	0.164	1.370	0.176
Diagnoses[a]	0.193	1.558	0.125
DUP	0.109	0.886	0.380
Ethnicity[b]	−0.115	−.943	0.380
Clinical insight	0.091	0.673	0.504

[a] Non-affective vs affective.
[b] White vs Black.

3.3.3. Prediction of functional outcome

The usefulness of both insight measures to predict functional outcome was assessed in a regression model after controlling for possible confounders (gender, diagnoses, DUP, ethnicity, baseline function and baseline negative symptoms) and highly correlated neuropsychological variables (Digit Symbol Coding and Verbal Fluency). Baseline negative symptoms, ethnicity and gender accounted for 39% of variance in function at 12 months F (3, 44) = 10.47, P < 0001. Insight and neuropsychological measures were excluded from the final model as they did not account for variance to a significant level. Negative symptoms alone accounted for 22% of the variance, with a decreased unit PANSS score corresponding to an increase in 12 month function of 1.6 GAF points. Ethnicity added another 10% of variance into the model, with white patients showing 14 points better function on the GAF compared to black and minority ethnic groups at follow-up. Finally being female led to improvements in functional outcome by 12 points on the GAF scale. See Table 3 for details.

4. Discussion

In line with our hypotheses, our data suggest that the cognitive processes underlying neuropsychological performance and level of insight account for separate variance in recovery from FEP. Poor cognitive insight was associated with more severe psychopathology at 12 months, which supports our prediction that cognitive insight is better associated with outcome than clinical insight. We hypothesised that neuropsychological deficits at onset would be associated with poorer functional

Table 2b
Regression showing the ability of neuropsychological factors to predict negative symptoms.

	Std beta	t	P
Final model			
Trails B	0.336	2.652	0.011
Baseline negative symptoms	0.358	2.639	0.012
Excluded variables			
DUP	0.203	1.498	0.142
Gender	−0.257	−2.041	0.048
Diagnoses[a]	−0.066	−0.491	0.626
Ethnicity[b]	0.175	1.345	0.186
Verbal Fluency	0.021	0.145	0.885
WAIS information	0.107	0.164	0.449
Verbal Memory	−0.102	−0.664	0.551

[a] Non-affective vs affective.
[b] White vs Black.

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Table 3
Regression showing the ability of demographic, clinical and cognitive factors to predict functional outcome.

	Std beta	t	P
Final model			
Baseline negative symptoms	−0.474	−4.012	0.001
Ethnicity[a]	−.316	−2.681	0.011
Gender	0.278	2.349	0.024
Excluded variables			
Diagnoses[b]	.228	1.818	0.077
DUP	−0.219	−1.881	0.067
Baseline function	.163	1.297	0.202
Verbal Fluency	0.085	0.637	0.528
Digit Symbol Coding	0.030	.191	0.850
Clinical insight	0.100	.699	0.489
Cognitive insight	0.144	1.159	0.253

[a] White vs Black.
[b] Non-affective vs affective.

outcome however, functional outcome was predicted by neither insight nor neuropsychological factors. Rather, only negative symptoms, as rated by PANSS scores were associated with baseline neuropsychology performance, predicted mainly by executive function.

4.1. Cognitive insight and outcome

Cognitive insight did predict later psychopathology based on outcome scores of the GAF. While previous studies have shown that BCIS is associated with positive symptoms (Pedrelli et al., 2004; Bora et al., 2007) our results did not indicate a direct association with negative or positive symptoms. This perhaps was due to reduced numbers on the PANSS assessment (96) compared to GAF (117). Another plausible explanation for this finding may have to do with the fact that the PANSS focusses on 'positive and negative psychotic symptoms' rather than generalised psychopathology. Indeed past research suggests that the association with cognitive insight differs between specific positive symptoms, such that poor cognitive insight is associated with delusional thinking not hallucinations (Engh et al., 2010) Other studies have also failed to find a relationship between cognitive insight and PANSS positive symptoms (Favrod et al., 2008; Tranulis et al., 2008; Uchida et al., 2009). The GAF is a measure of generalised psychopathology and so other factors such as mood may be an important factor influencing the positive association between cognitive insight and outcome. For example, research has found positive correlations between cognitive insight and anxiety (Colis et al., 2006).

In a review, Riggs et al. (2012) emphasise that research exploring associations between BCIS and symptoms has produced mixed results and that this is a relatively new field of research, precluding firm conclusions (Riggs et al., 2012). In spite of these considerations, our results indicate that cognitive insight is worthy of further examination as a potentially useful factor for prognoses and treatment. We did not examine change in BCIS over time but it would be interesting to see if particular elements of cognitive insight may be tackled therapeutically to improve symptom outcome. For example, using cognitive behavioural therapy (CBT) to challenge rigid thinking styles and encourage self reflection could be measured as improvements on the BCIS (Granholm et al., 2006; Perivoliotis et al., 2010).

4.2. Clinical insight and outcome

Clinical insight as measured by the SAI-E was not a predictor of outcome over time in this study (cf: R J. Drake et al., 2007; Startup et al., 2010). This finding aligns with a review of the literature which found that there is good evidence that insight predicts relapse and readmission in FEP, but less for links between insight and later symptoms or function (Drake, 2008) The lack of association across time indicates that clinical insight may be too fluid a construct to be a useful prognostic indicator in prospective studies especially in the early phase of the illness, presumably because the patient, and indeed their careers are struggling to make sense of their experiences in terms of a pathological process (McGorry and McConville, 1999; Lappin et al., 2007). Furthermore, in order to maximise statistical power, we only evaluated the SAI-E composite score while findings from a study from Taiwan showed that insight into need for treatment was predictive of 1 year outcome, but insight into psychotic experience was not (Yen et al., 2002). To further complicate matters, insight into illness appears to manifest differently across diagnostic categories (Drake, 2008).

As noted above, considering that clinical insight is closely attuned with symptoms at the acute phase of psychosis, it may be useful to measure the prospective value of insight at a time where psychotic symptoms are more stable. For example, Wiffen and colleagues showed that insight improves over a 1 year period, and that there was a corresponding change in symptom severity in a sample of 670 stable patients with schizophrenia or schizoaffective disorder enrolled in a clinical trial (Wiffen et al., 2010) Other research has also shown a correlation between change in insight and global improvement of symptoms in 614 patients with schizophrenia(Gharabawi et al., 2006) similarly, early change in symptoms and insight predicted outcome 1 year later in FEP in Vellore, South India (Saravanan et al., 2010) Finally, the CATIE study revealed that improvement in insight was also associated with decreased severity of symptoms, having adjusted for baseline after 18 months (Mohamed et al., 2009).

4.3. Neuropsychology and outcome

This study identified an association between the Trails B task and negative symptoms at 12 months consistent with prior research indicating that negative symptoms and cognition overlap, even in FEP (Malla et al., 2002; Milev et al., 2005). Factors that tend to cluster with prominent negative symptoms such as insidious onset and a schizophrenia diagnosis also did not take away the association shown between poor Trails B performance and enduring negative symptoms. We found no association between negative symptoms and Trails A. Our results suggest that the negative dimension of psychopathology is specifically associated with working memory and executive functions (both of which Trails B can index) rather than mere processing speed, and supports previous follow-up studies (Green et al., 2000; Fujii and Wylie, 2003).

4.4. Functional outcome

Negative symptoms at baseline were the best predictor of outcome in the psychosocial domain. Being female and of white ethnicity were also associated with better psychosocial functioning. After accounting for these factors, insight and neuropsychological performance were not associated with function at 12 months. Perhaps the impact of cognition on outcome does not manifest strongly until later in illness course. Indeed for all patients, disability is liable to endure long after cessation of symptoms and perhaps outcome trajectories are not differentiated enough at one year to identify reliable cognitive predictors.

4.5. Limitations

Our inability to identify links between neuropsychological or insight factors with functional outcome may in part be due to the use of only one global functional outcome measure and the study could have benefited from analysing specific real life outcome indicators (but see Allott et al., 2011). In light of an association between cognitive insight and general psychopathology rather than psychotic symptoms, it would have been informative to have evaluated mood and other non-psychotic symptoms at follow-up since low mood tends to link with increased self evaluation (Crumlish et al., 2005; David et al., 2012) Also, our neuropsychological battery was brief, so

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as to be applicable to a symptomatic patient group but a larger battery, particularly one which had a wider range of executive function tasks, may have been more sensitive. Finally, while statistical power concerns prohibited us from including more variables in the analysis, important factors such as pre-morbid adjustment, substance abuse and medication could be important confounders in this study.

4.6. Conclusions

We have shown an association between aspects of outcome following an episode of psychosis and a relatively novel measure of self appraisal style known as cognitive insight. The positive relationship over time between cognitive insight and psychopathology suggests a causal role for meta-cognition on later recovery from psychosis. Intervention studies to explore the effect of change to cognitive insight might help clarify the relationship as well as providing a novel focus for treatment studies.

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Contributors

The Genes and Psychosis (GAP) study is overseen by RM, AD MD and SB. JO and BW designed the present study using data from the GAP, and selected the measures. JO collected, scored and input data, analysed and interpreted the findings and wrote the manuscript. AD, BW and CJ assisted in the interpretation of the findings and commented on the manuscript. Authors BW, LF, CJ, AK and BW recruited participants, and collected and scored data.

Conflict of interest

All authors declare that they have no conflicts of interest.

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