Original Article

Clinical symptoms predict concurrent social and global functioning in an early psychosis sample

Cristina Cacciotti-Saija,[1] Robyn Langdon,[2] Philip B. Ward,[3] Ian B. Hickie[1] and Adam J. Guastella[1]

[1]Brain and Mind Centre, The University of Sydney, [2]ARC Centre of Excellence in Cognition and Its Disorders (CCD), Macquarie University, and [3]Schizophrenia Research Unit, South Western Sydney Local Health District, University of New South Wales, Sydney, New South Wales, Australia

Corresponding author: Associate Professor Adam J. Guastella, Brain and Mind Centre, The University of Sydney, Building F, 94 Mallett Street Camperdown, NSW 2050, Australia. Email: adam.guastella@sydney.edu.au

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Abstract

Aim: Although well established in chronic schizophrenia, the key determinants of functioning remain unknown during the early phase of a psychotic disorder. The aim of this study was to comprehensively examine the social cognitive, basic neurocognitive and clinical predictors of concurrent social functioning and global functioning in an early psychosis sample.

Methods: This study examined the relationship between social cognition, basic neurocognition and clinical symptoms with concurrent functioning in 51 early psychosis individuals. Assessments included a range of self-report, observational and clinician-rated measures of cognitive, symptom severity and functioning domains.

Results: Results revealed a significant association between self-reported social function and lower levels of both social interaction anxiety and negative psychotic symptoms. A significant association was also observed between lower levels of negative psychotic symptoms and observed social functioning. Lastly, results demonstrated a significant association between reduced negative psychotic symptoms and clinician-rated global functioning.

Conclusions: Clinical domains such as negative symptoms and social interaction anxiety significantly contribute to an optimal model predicting outcome during the early phase of a psychotic disorder. These clinical features may also provide useful markers of an individual's capacity for social participation. Clinical implications include the need for early targeted intervention to address social anxiety and negative psychotic symptoms to facilitate optimum patient outcome.

Key words: clinical symptom, first-episode psychosis, schizophrenia, social cognition, social functioning.

INTRODUCTION

Impaired social functioning is a defining feature of schizophrenia involving difficulties in interpersonal relationships, maintaining employment and functioning in the community.[1] Cognitive dysfunction, especially impaired social cognition, is a primary characteristic of schizophrenia and a primary determinant of poor functional outcome in this disorder.[2] Social cognition has been broadly defined[3] as 'the mental operations that underlie social interactions, including perceiving, interpreting, and generating responses to the intentions, dispositions, and behaviours of others' (p. 1211). Impairments in four key social cognitive domains are predominantly investigated in schizophrenia research: emotional processing (primarily facial and vocal affect recognition), social perception/knowledge (including identifying social cues and interpreting nonverbal communication), theory of mind (ToM; inferring intentions, dispositions and beliefs of others) and attributional bias (stylistic interpretations about the causes of events such as the self, others or the environment).[2–5] Social cognition serves as a mediator between more basic neurocognition and real-world functioning, thereby suggesting it to be a more proximal determinant of daily functioning in schizophrenia than neurocognition.[6–8]

There is robust evidence for social cognitive impairments in early psychosis on tasks assessing facial affect perception, especially fear and sadness[6] as well as measures of ToM,[9,10] social perception/knowledge[10] and attribution bias.[11] Numerous studies have shown that social cognitive impairments remain relatively stable over the first several years of illness[12–16]; however, findings concerning the functional impact of these impairments are more mixed. For example, Horan *et al.*[17] assessed 55 first-episode schizophrenia patients on measures of emotional processing, ToM and social perception, as well as clinical ratings of symptoms and daily functioning. Higher baseline and 12-month follow-up social cognition scores were found to be significantly associated with better social functioning, work functioning and independent living at 12-month follow-up. In contrast, a recent study by Sullivan *et al.*[18] examined the longitudinal association between both ToM and psychotic symptoms as well as social functioning outcome in 54 people with first-episode psychosis. Results revealed that neither baseline ToM nor baseline symptoms (including both positive and negative psychotic symptoms) were associated with social functioning outcome at 6- and 12-month follow-up.

More recently, it has been argued that cognitive predictors including both social cognition and basic neurocognition should be weighed against other potential predictors of functional outcome to enhance predictive power. A recent study by Vesterager *et al.*[19] investigated the socio-demographic, clinical and cognitive predictors of functional capacity and real-world functioning in 117 individuals aged 18–34 years with first-episode schizophrenia spectrum disorders. Results revealed that at baseline, the combination of working memory, negative symptoms and social cognition accounted for 41% of the variance in functional capacity. Neurocognitive performance and negative symptoms alone were found to predict functional capacity at 10-month follow-up. These findings support similar studies that have demonstrated negative symptoms to be critical determinants of not only social functioning but also quality of life and recovery in early psychosis.[20–23] Recent attention has also been directed towards social anxiety as a potential contributing factor to poor social functioning in psychosis.[24,25] Social anxiety disorder is the most prevalent comorbid anxiety disorder in schizophrenia, occurring in 7–40% of psychotic individuals.[26–28] Studies have shown a strong association between social functioning, social anxiety and depressive symptoms[29] as well as reduced quality of life in individuals with first-episode psychosis.[30]

The extant literature has mostly involved chronic schizophrenia patients; however, these samples are likely to show less variability in outcome than those in the early stages of illness.[31,32] The impact of social dysfunction may be greater for individuals with early psychosis given the increased significance of social interactions during this developmental period.[33,34] The early phase of a psychotic disorder, namely, the 'critical period', is the most crucial for limiting and even preventing the development of severe long-term disability.[35] The current study therefore aimed to investigate how social cognition, neurocognition and clinical domains (positive and negative psychotic symptoms, social anxiety and depression variables) predict concurrent social functioning and global functioning in individuals diagnosed with early schizophrenia spectrum disorders. We employed a comprehensive and ecologically valid assessment approach including both self-report and distal (i.e. what one actually does in daily life) measures as well as more proximal, skills-based assessments (i.e. what one can do when given the opportunity and supports).[36–39]

METHOD

Participants

A total of 51 participants (15 females, 36 males; mean age ± standard deviation (SD), 21.75 ± 4.38) were recruited from specialized tertiary referral services for the assessment and early intervention of mental health problems in young people (Youth Mental Health Clinic, YMHC, at the Brain and Mind Research Institute, BMRI; and *headspace*, Campbelltown, Sydney, Australia; Inner West Area Health Service First Episode Psychosis Intervention Services).[40] Participants were an outpatient sample comprised of individuals with early psychosis meeting the following inclusion criteria: (i) aged between 16 and 35 years (ii) current or past diagnosis of schizophrenia (n = 19, 37.3%), schizophreniform disorder (n = 12, 23.5%), schizoaffective disorder (n = 15, 29.4%) or psychotic disorder not otherwise specified (n = 5, 9.8%) according to the Structured Clinical Interview for DSM-IV-TR Axis I Diagnosis – Patient version (SCID-P); and (iii) within the first 3 years of treatment for psychosis. Exclusion criteria included (i) current substance dependence on alcohol or drugs; (ii) insufficient English language skills; (iii) intellectual disability (IQ <70); and (iv) history of a significant neurological disorder. The average age of illness onset was 20.4 years (SD = 4.3). Ninety percent (n = 47) of participants were taking at least one or more psychotropic medications including combinations of antipsychotics (n = 44, 86.3%), antidepressants (n = 14, 27.5%), mood stabilizers (n = 5, 9.8%) and benzodiazepines (n = 18, 3.9%).

Measures

Clinical assessment

The SCID-P[41] was administered to confirm diagnosis. Psychiatric symptom severity was examined using the Scale for the Assessment of Negative Symptoms (SANS[42]) and the Scale for the Assessment of Positive Symptoms (SAPS[43]). To estimate full-scale IQ, the two subtest version of the Wechsler Abbreviated Scale of Intelligence was conducted (WASI[44]).

Basic neurocognition

The Repeatable Battery for the Assessment of Neuropsychological Status[45] is a brief test of basic neurocognitive function. It generates five indices for immediate memory, language, visuospatial/constructional, attention and delayed memory.

Symptom severity

The SAPS[43] and the SANS[42] are widely used tools to measure positive and negative symptoms that characterize schizophrenia. SAPS and SANS total scores are generated by summing the four and five global ratings, respectively. The Depression, Anxiety and Stress Scales (DASS 21[46]) measure the tripartite negative emotional states of depression, anxiety and stress experienced over the last week. The Kessler Psychological Distress Scale (K 10[47]) measures levels of distress experienced over the past 4 weeks based on questions about anxiety and depressive symptoms. The Social Interaction Anxiety Scale (SIAS[48]) measures anxiety and distress associated with social interactions.

Social cognition

Emotion recognition measures. The Reading the Mind in the Eyes Test (RMET[49]) assesses one's ability to infer mental states from the eye regions of human faces. The Facial Expressions of Emotions: Stimuli and Tests[50] assesses identification of six basic emotions (happiness, sadness, anger, fear, surprise and disgust). The Movie Stills Task[51] requires identification of emotions (happy, surprised, afraid, angry, disgusted, sad or neutral) from a complex movie scene displayed both with and without the actors' facial expressions.

ToM measures. The False Belief Picture Sequencing Task[4] requires arrangement of picture cards into a logical sequence of events to reason that a story protagonist is acting on the basis of a false belief. The Faux Pas Recognition Task[52] was modified to include 10 items that require participants to identify when a faux pas is present with the hit rate and false alarm rate calculated.

Attribution measures. The Ambiguous Intentions Hostility Questionnaire (AIHQ[53]) contains five short, written, second-person vignettes describing negative interpersonal events with ambiguous causality. This study focuses on the hostility, blame and aggression bias scores.

Functional outcome

Self-reported distal measure of social functioning. The Interpersonal Competence Questionnaire (ICQ[54]) assesses five domains of interpersonal

competence (e.g. initiating relationships). The Social Functioning Scale (SFS[55]) measures the frequency of social activities and generates a total raw score by summing the frequency of self-reported social activities across seven subscales. The Sheehan Disability Scale (SDS[56]) measures the impact of symptomatology (here, social difficulties) on work, social and family functioning.

Proximal measure of social functioning. The Social Skills Performance Assessment (SSPA[57]) consists of two 3-min role play conversations assessing social skills. Ratings from two scenes are collapsed into an overall composite social skill scale, with higher scores signifying greater skill.

Clinician-rated distal measure of global functioning. The Clinical Global Impression – Severity scale (CGI-S[58]) is composed of a 7-point scale assessing overall symptom severity and functional impairment.

Procedure

The Structured Clinical Interview to confirm DSM-IV diagnosis was administered by an experienced clinical psychologist. Clinical assessments to evaluate psychiatric symptoms (SAPS and SANS) and estimate intellectual ability (WASI) were conducted on the same day by one of two research psychologists trained to a research reliable standard. Suitable participants were invited to attend a second assessment session involving tests of basic cognition, social cognition and symptom severity. Participants were enrolled to commence a 6-week social cognition training programme as part of a broader clinical research trial. Assessment sessions were conducted within a 2-week time frame prior to the commencement of group treatment.

Data analysis

Analyses were conducted in SPSS (version 20. Armonk, NY: IBM Corp.) with significance set at $P < 0.05$. Three functional outcome variables were of interest: a self-reported distal measure of social functioning (social functioning variable); a skills-based, proximal measure of social functioning (SSPA variable); and a clinician-rated distal measure of global functioning indexed by severity of illness (CGI-S variable).

Principal component analysis (PCA) was conducted to create the social functioning outcome variable utilizing three independent factors: SDS, ICQ and SFS total scores. PCA was chosen to determine which linear components exist within the data and how a particular variable might contribute to that component.[59] To reduce the number of DASS variables, a total composite-weighted score was created by standardizing each of the three DASS subscale scores. The *z*-scores were then averaged to create the DASS total (weighted) score, yielding a mean of 0 and SD of 1.

Pearson correlation coefficients (two-tailed) were used to determine associations between all variables examined. Significant correlations ($P < 0.05$) were then subjected to univariate regression analysis in order to narrow down and determine the cognitive (IQ, basic neurocognition), social cognitive (emotion recognition, ToM, attributions) and symptomatic predictors (positive and negative symptoms, anxiety, depression and stress) that would be entered into further regression analyses. Neither IQ nor basic neurocognitive performance was found to significantly predict functioning (all *P*-values >0.05). Therefore, regression analysis primarily investigated the social cognitive and symptomatic predictors of functional outcome.

A stepwise forward regression, simple regression and standard multiple regression analysis was conducted on the variables that significantly correlated with social functioning, SSPA and CSI performance, respectively. Analyses were conducted to ensure the assumptions of normality, linearity, multicollinearity and homoscedasticity were not violated.

RESULTS

Psychometric properties for participant performance on all measures are presented in Table 1. Pearson correlations revealed significant associations between emotion recognition and ToM measures indicating instruments were tapping the same construct of interest and so were reliably comparable, all *P*-values <0.05.

The ICQ, SDS and SFS total scores were subject to PCA to create a social functioning outcome variable. Prior to performing the PCA, the suitability of data for factor analysis was assessed. Assessment of the correlation matrix revealed many coefficients of 0.3 and above. The Kaiser–Meyer–Oklin value was 0.65, exceeding the recommended value of 0.6[60,61] and the Bartlett's Test of Sphericity[62] reached statistical significance, supporting the factorability of the correlation matrix. PCA revealed the presence of one component with eigenvalues exceeding 1, explaining 59.75% of the variance. An investigation of the scree plot revealed a clear break after the first component. Using Cattell[63] scree test, it was decided to

TABLE 1. Psychometric properties for participant performance on all measures

Measure	*n*	M	SD	95% CI
WASI	50	17.43	17.43	(96.53, 106.19)
RBANS	51	78.86	15.94	(74.49, 83.23)
SAPS	51	5.00	3.98	(3.91, 6.09)
SANS	51	10.00	4.15	(8.86, 11.14)
DASS 21_Weighted	51	0.00	1	(−0.25, 0.25)
K10	51	24.57	8.75	(22.17, 26.97)
SIAS	50	36.80	21.22	(30.98, 42.62)
RMET	51	24.40	5.63	(22.86, 25.94)
FEEST	50	44.98	7.3	(42.96, 47)
Movie Still_F	51	10.94	2.07	(10.37, 11.51)
Movie Still_NF	51	9.49	2.11	(8.91, 10.07)
FBPST_FB	51	19.78	3.98	(18.69, 20.87)
FBPST_SS	51	22.63	2.37	(21.98, 23.28)
FBPST_M	51	22.22	4.55	(21.29, 23.15)
FBPST_C	51	16.76	4.55	(15.51, 18.01)
FP_Hit Rate	51	0.88	0.19	(0.83, 0.93)
NFP_False Alarm	51	0.14	0.26	(0.07, 0.21)
FP_Sensitivity	51	5.88	2.94	(5.07, 6.69)
AIHQ_BS	51	41.82	13.5	(38.12, 45.52)
AIHQ_HB	51	23.92	8.08	(21.7, 26.14)
AIHQ_AB	51	22.57	5.96	(20.93, 24.21)
ICQ	51	230.41	77.66	(209.1, 251.73)
SFS	51	115.84	28.04	(108.14, 123.54)
SDS	50	16.24	7.79	(14.08, 18.4)
SSPA	51	66.71	12.93	(63.16, 70.26)
CGI-S	51	3.43	3	(3.19, 3.67)

AIHQ_BS, The Ambiguous Intentions Hostility Questionnaire_Blame Score; AIHQ_HB, The Ambiguous Intentions Hostility Questionnaire_Hostility Bias; CI, Confidence Interval; CGI-S, The Clinical Global Impressions – Severity Scale; DASS 21_Weighted, Depression, Anxiety and Stress Scales, reflecting a total composite weighted score; FBPST_C, False Belief Picture Sequencing Task_Capture; FBPST_FB, False Belief Picture Sequencing Task_False Belief; FBPST_SS, False Belief Picture Sequencing Task_Social Script; FBPST_M, False Belief Picture Sequencing Task_Mechanical; FEEST, The Facial Expressions of Emotions: Stimuli and Tests; FP_False Alarm, Faux Pas Recognition Task_False Alarm Rate; FP_Hit Rate, Faux Pas Recognition Task_Hit Rate; FP_Sensitivity, Faux Pas Recognition Task_Sensitivity; ICQ, The Interpersonal Competence Questionnaire; K10, Kessler Psychological Distress Scale; Movie Still_F, The Movie Still Task_Faces; Movie Still_NF, The Movie Still Task_No Faces; NFP_ False Alarm, Non Faux Pas_ False Alarm Rate, reflecting proportion of NFP trials where the participant incorrectly said a FP was present; RBANS, The Repeatable Battery for the Assessment of Neuropsychological Status; RMET, The Reading the Mind in the Eyes Task; SANS, The Scale for the Assessment of Negative Symptoms; SAPS, The Scale for the Assessment of Positive Symptoms; SD, standard deviation; SDS, Sheehan Disability Scale; SFS, The Social Functioning Scale; SIAS, Social Interaction Anxiety Scale; SSPA, Social Skills Performance Assessment; WASI, Weschsler Abbreviated Scale of Intelligence – two subtest version.

retain one component. Given there was only one component in the solution, rotation could not be performed and the rotated component matrix not computed. The pattern of loadings was instead based on the component matrix as shown in Table 2. Items strongly clustering on one component suggest that component one represents good social function.

TABLE 2. Pattern/structure for coefficients

Component coefficient matrix of one-factor solution for social functioning variable	
	Component 1
Item	Social functioning
SDS	−0.4
ICQ	0.45
SFS	0.44
% of variance explained	59.75%

ICQ, The Interpersonal Competence Questionnaire; SDS, Sheehan Disability Scale; SFS, The Social Functioning Scale.

TABLE 3. Stepwise forward regression analysis predicting social functioning from symptomatic variables

	Predictor	Social functioning				Model
		r	B	SE-B	β	ΔR^2
1	Constant		1.19	0.21		
	SIAS	−0.69***	−0.03	0.01	−0.69***	
2	Constant		1.85	0.25		0.47***
	SIAS	−0.69***	−0.03	0.01	−0.56***	
	SANS	−0.57***	0.09	0.02	−0.37**	
						0.58***

Note. *$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.
SANS, The Scale for the Assessment of Negative Symptoms; SE-B, Standard error-Beta; SIAS, Social Interaction Anxiety Scale.

A stepwise multiple regression using the forward method was conducted to determine the best predictive model for self-reported social function (see Table 3). A forward regression was chosen due to the many predictor variables including, K10, DASS, SIAS, SAPS and SANS, FP false alarm, AIHQ; HB, BS, AB. The prediction model contained two of the nine predictors and was reached in two steps with no variables removed. The model was statistically significant, $F(2, 47) = 34.960$, $P < 0.001$, and accounted for 59.8% of the variance of social function ($R^2 = 0.665$, adjusted $R^2 = 0.660$). Self-reported social function was primarily predicted by symptomatic variables including lower levels of social interaction anxiety and, to a slightly lesser extent, by lower levels of negative psychotic symptoms. The raw and standardized regression coefficients of the predictors together with their correlations with social function are shown in Table 3. Social interaction anxiety received the strongest weight in the model followed by negative psychotic symptoms. With the sizeable correlations between the predictors, the unique variance explained by each of the variables indexed by the squared semipartial

TABLE 4. Multiple regression analysis predicting clinician-rated global functioning from symptomatic and social cognitive variables

	Predictor	Severity of illness				Model
		r	B	SE-B	β	ΔR^2
1	Constant		2.89	0.54		
	SAPS	0.32*	0.03	0.03	0.14	
	SANS	0.59***	0.11	0.03	0.51***	
	RMET	−0.32*	−0.29	0.02	−0.19	
	NFP_False Alarm	0.31	0.27	0.40	0.08	
						0.39***

Note. *$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.
NFP_ False Alarm, Non Faux Pas_ False Alarm Rate, reflecting proportion of NFP trials where the participant incorrectly said a FP was present. RMET, The Reading the Mind in the Eyes Test; SANS, The Scale for the Assessment of Negative Symptoms; SAPS, The Scale for the assessment of Positive Symptoms; SE-B, Standard error-Beta.

correlations was relatively low: social interaction anxiety and negative psychotic symptoms accounted for approximately 3% and 1% of the variance of social function.

Based on earlier significant correlations, a simple regression was performed to assess the ability of SANS performance to predict social functioning indexed by skill-based performance on the SSPA. SANS scores significantly predicted SSPA performance, B = –1.14, SE-B = 0.41, β = –0.37, $t^{48} = -2.76$, $P = 0.008$. SANS scores also explained a significant proportion of variance in SSPA performance, $R^2 = 0.13$, $F(1,49) = 7.61$, $P = 0.008$.

SAPS and SANS, RMET and FP False Alarm performance were used in a standard regression analysis to predict global functioning indexed by clinician-rated severity of illness (see Table 4). The prediction model was statistically significant, $F(4,46) = 8.886$, $P < 0.001$, and accounted for approximately 43.6% of the variance of illness severity ($R^2 = 0.436$, adjusted $R^2 = 0.387$). Severity of illness was predicted by higher levels of negative psychotic symptoms. The raw and standardized regression coefficients of the predictors together with their correlations with severity of illness are shown in Table 4. Negative psychotic symptoms received the strongest weight in the model and accounted for approximately 2% of the variance of illness severity.

DISCUSSION

This study found that self-reported social functioning is strongly predicted by lower levels of social interaction anxiety and negative psychotic symptoms in individuals with early psychosis. Lower levels of negative psychotic symptoms were also found to predict observed social functioning, whereas greater levels of negative symptoms predicted poorer global functioning rated by clinicians. These findings support research indicating that negative symptoms[20–23] and social anxiety[26,29,30] are critical determinants of functioning during the early phase of a psychotic illness. Findings also suggest that social interaction anxiety and negative psychotic symptoms may provide useful markers of an individual's capacity for social engagement and social participation. In terms of an explanatory model, it may be that reduced social reward associated with negative symptoms contributes to reduced participation and motivation to engage in social activities.[64] Individuals may consequently feel less able to connect with peers, which in turn may heighten social evaluation concerns resulting in ongoing social withdrawal and disability.

Although some social cognitive skills including attribution style and mental state inference were significantly associated with self-reported and clinician-rated functioning, respectively, social cognition was not found to significantly contribute to an optimal model predicting outcome. Similar findings were observed for neurocognitive performance, which was not associated with any measure of functional outcome. The current findings oppose previous studies that have revealed positive associations between cognitive performance and outcome; however, these have predominantly occurred in chronic schizophrenia samples and so results may be influenced by the effects of long-term illness or treatment, or be biased towards individuals with poorer outcomes.[65] Methodological differences between studies including the measurement of cognition and functional outcome as well as diagnostic inclusion criteria and length of follow-up may have also contributed to inconsistencies between studies.[65] Lastly, specific cognitive measures and/or

outcome measures (based on a composite of three self-report scales, possibly measuring somewhat different aspects of functioning) may not have been sensitive enough to capture any significant effects, compared with clinical interviews for example.

Limitations of the current study include the absence of individuals with affective psychosis. Evidence suggests that affective symptoms have greater impact on social functioning outcomes compared with psychotic symptoms.[29] Moreover, the lack of a healthy control group means that conclusions cannot be made concerning the specificity of findings for the clinical group. It is clear that future studies involving increased rigor, homogeneity, multimodal assessments and healthy control groups are warranted to further examine functional prognostic markers in early psychosis.

In summary, the present study indicates that social functioning is predicted by clinical symptoms during the early stages of a psychotic illness. Although significant associations were observed between social cognitive performance and some outcome measures, social cognition did not contribute to an optimal model predicting outcome. Clinical implications include the need for early targeted intervention to address social anxiety and negative psychotic symptoms in early psychosis in order to prevent disability and maximize functional outcome.

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