Published in final edited form as:

Psychiatry Res. 2013 January 30; 205(1-2): 25–29. doi:10.1016/j.psychres.2012.08.041.

Social cognitive deficits in schizophrenia and their relationship to clinical and functional status

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Abstract

While research on social cognitive impairments in schizophrenia is quickly growing, relatively little is still known about the severity and correlates of these impairments. The few studies that have examined this issue suggest that social cognitive impairments may be positively related to psychiatric symptoms and negatively related to functioning. In the current analyses of 119 stable outpatients with schizophrenia spectrum diagnoses, we sought to further characterize the nature of social cognitive impairments in schizophrenia. Specifically, we examined 1) social cognitive impairments on four different social cognitive tasks including measures of emotional processing and Theory of Mind and 2) the demographic, symptom and functional correlates of these impairments. For three of the four social cognitive tasks examined, the majority of participants performed 1 or more SD worse than healthy controls, with variability in the degree of impairment across tasks. Contrary to expectation, correlations between social cognitive performance on each of the four tasks and clinical and functional features were few and weak, and for the most part did not replicate the previously reported relationship of social cognition to severity of symptoms or current functional status.

Keywords

social cognition; schizophrenia; severity; correlates; symptoms; functioning

1. Introduction

Social cognitive impairments in schizophrenia have recently been explored as potential mediators of the relationship between neurocognition and functioning (Brekke et al., 2005; Horton and Silverstein, 2008; Schmidt et al., 2011), and as a more proximal target for psychosocial rehabilitation. Existing research indicates that social cognition is often

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impaired in individuals with schizophrenia. Impairments have been documented in several domains including affect recognition (Edwards et al., 2002; Fiszdon and Bell, 2009; Hoekert et al., 2007; Pinkham et al., 2007), attributional bias and Theory of Mind (ToM; Bora et al., 2009; Brune, 2005; Garety and Freeman, 1999; Sprong et al., 2007). Impairments in these latter two domains, in particular, have been theorized to be related to the presence and severity of paranoid delusions (Garety and Freeman, 1999), and several researchers have examined this purported link (Bentall et al., 2009; Combs et al., 2009; Martin and Penn, 2002; Peer et al., 2004). Researchers have also examined the links between social cognition and negative and/or disorganized symptoms (Fett et al., in press; Ventura et al., in press), depression (Bentall et al., 2009), positive symptoms (Fett et al., in press; Ventura et al., in press) and remission status (Pousa et al., 2008). Two recent reports suggest that social cognitive impairments are present across different phases of illness, are correlated with negative symptoms, and are stable over a 12-month follow-up (Green et al., 2012; Horan et al., 2012). Others have suggested that some social cognitive impairments may be attenuated during symptomatic remission (Bora et al., 2008; Bora et al., 2009; Pousa et al., 2008), or that social cognitive impairments may be a reflection of more generalized neurocognitive deficits (Dickinson et al., 2008; Kerr and Neale, 1993). In sum, there is evidence that individuals with schizophrenia show impairments in social cognition, and that these impairments may be associated with clinical variables.

Several studies have also reviewed the relationship between social cognition and functioning in schizophrenia (Couture et al., 2006; Fett et al., 2011). Based on the approximately two dozen individual studies reviewed, it appears that the majority of research indicates significant positive associations between these constructs (e.g. correlations .22–.48 as reported in Fett et al, 2011). The degree of relationship between social cognition and functioning varies however, depending on the social cognitive domain and the type of functional outcome assessed. Moreover, while relationships between certain social cognitive and functional domains have been more thoroughly assessed (e.g. emotion perception and community functioning), there is relatively little information about the pattern of inter correlations for other social cognitive domains and other types of functional outcomes. Of interest, results of a recent large sample study of social cognition and quality of life (Maat, et al., 2012) suggested that theory of mind is negatively related to quality of life, which is in contrast to other studies that indicate positive correlations between social cognition and functioning. This is in contrast to other studies that indicate positive correlations between social cognition and functioning.

The importance of learning more about social cognition in schizophrenia was highlighted by a recent NIMH-sponsored workshop report which identified social cognition as an important area of future schizophrenia research (Green et al., 2008). The workgroup specifically recommended that researchers further examine the relationship of social cognitive domains to functional outcomes, as well as examine the stability and correlates of social cognitive impairments. In line with these recommendations, we sought to further characterize the nature of social cognitive impairments in a sample of stable outpatients with schizophrenia spectrum disorders. Specifically, we examined 1) the rate of social cognitive impairments on four different social cognitive tasks, and 2) the demographic, symptom and functional correlates of these impairments. For our second aim, consistent with previous literature, we hypothesized that social cognitive performance, particularly on our measure of Theory of Mind, would be negatively correlated with severity of psychiatric symptoms, with correlations between ToM and the PANSS Delusions item expected to be particularly high. Additionally, we hypothesized that there would be a significant negative relationship between the social cognitive measures and the PANSS Negative factor. Finally, we hypothesized that social cognitive performance would be positively related to clinical measures of functioning.

2. Methods

2.1 Participants

Baseline data were obtained from 119 individuals who consented to participate in one of two ongoing IRB-approved trials. Data from this same sample has previously been analyzed to examine the overlap in social cognitive and neurocognitive impairments (Fanning et al., 2012). Participants were outpatients receiving treatment at either VA Connecticut Healthcare System or the Connecticut Mental Health Center. They were diagnosed with DSM-IV (American Psychiatric Association, 2000) schizophrenia (n=82) or schizoaffective disorder (n=37), based on the Structured Clinical Interview for DSM-IV (First, 1996). Participants were considered clinically stable at time of study entry, defined as having no psychiatric hospitalizations, no changes in psychiatric medications, no housing changes, and no substance abuse in past 30 days. In order to be eligible for study entry, individuals had to meet the following additional criteria: aged 18–65, proficient in English, no auditory/visual impairment that would interfere with study procedures, Global Assessment of Functioning (GAF) score above 30, and no known traumatic brain injury, neurological disease, or developmental disability.

Normative data for each of the social cognitive measures was obtained from the literature. In the case of the Hinting Task, this was based on the original report of this measure as administered to a sample of acute inpatients and a mixed sample of 44 psychiatric and non-psychiatric controls (Corcoran, Mercer & Frith, 1995). In the case of the Bell-Lysaker Emotion Recognition Task, previously published data from 56 healthy community controls was used in determining normative performance (Fiszdon & Bell, 2009). As described in their respective manuals, for the Mayer-Salovey-Caruso Emotional Intelligence Test, Managing Emotions subtest (MSCEIT-ME) (Mayer et al., 2002), a 300 person community standardization sample employed by the MATRICS Consensus Cognitive Battery was used. For the Egocentricity subscale of the Bell Object Relations and Reality Testing Inventory, normative data was based on a 934 person non-clinical sample.

2.2 Measures

At study entry, participants completed a comprehensive battery of demographic, psychosocial, functioning, symptom, neurocognitive and social cognitive measures. Assessments were conducted over several sessions. All diagnostic, symptom, and functioning assessments were performed by Masters or Doctoral-level staff trained to high rates of reliability (total score ICCs > .85).

The Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1987), a Likert-type (1–7) rating based on a semi-structured interview, was used to assess psychiatric symptoms. Scores range from 30–210, with higher scores indicating greater pathology. Both total score and a five-component solution (Bell et al., 1994) (positive, negative, cognitive, emotional discomfort, and hostility) were examined. Select individual PANSS items (P1 Delusions, P6 Suspiciousness and P7 Hostility) were also included in the analyses based on their theorized relationship to social cognition.

The Quality of Life Scale (QLS) (Heinrichs et al., 1984), a Likert-type (0–6) rating based on a semi-structured interview, was used to measure current overall functioning. Scores range from 0 to 126, with higher scores indicating better functioning. Both total score and scores on each of the four QLS domains (Interpersonal Relations, Intrapsychic Foundations, Instrumental Role Function, and Common Objects and Activities) were used in analyses.

2.3 Social cognitive measures

The Hinting Task (Corcoran et al., 1995; Greig et al., 2004) is a widely used measure of Theory of Mind. It consists of 10 short vignettes of social interactions, each ending with one of two characters giving a hint to the other character about what they would like that character to do. Total scores range from 0 to 20, with higher scores indicating better performance. Corcoran et al. (1995) reported that a sample of healthy adult subjects had an average score of 18.3 ($SD = 1.6$) on the task.

The Egocentricity subscale of the Bell Object Relations and Reality Testing Inventory (BORRTI; Bell, 1995) is a self-report measure of social schema. While it does not neatly fall into any of the agreed-upon domains of social cognition, it is probably most closely related to Theory of Mind and attributional bias. It contains questions related to one's interpretations of social relationships, and has been found to relate to other measures of social cognition (Bell et al., 2009). Sample items from the Egocentricity scale include "people are never honest with each other" (true) and "people frequently try to humiliate me" (true). Higher scores reflect higher Egocentricity, or the tendency to view others as objects to be used to achieve one's goals. Raw scores on the BORRTI are transformed into standard scores (mean = 50, standard deviation = 10). Scores above 60 are considered pathological.

The Bell Lysaker Emotion Recognition Task (BLERT; Bell et al., 1997) is a measure of emotion processing. Examinees view 21 short video vignettes of an actor reciting neutral scripts while portraying one of seven different emotions. They are then asked to choose which emotion best describes the actor's affect. Fiszdon and Bell (2009) reported that healthy adult subjects achieved a mean score of 17.32 ($SD = 2.70$) on the BLERT.

The Mayer-Salovey-Caruso Emotional Intelligence Test, Managing Emotions (MSCEIT-ME) (Mayer et al., 2002) subtest is a component of the MATRICS Consensus Cognitive Battery (MCCB; Nuechterlein and Green, 2006) which measures the ability to appropriately manage emotions in social situations. In this measure of emotional processing, examinees are presented with short vignettes and asked how effective select actions would be in attaining specific goals (e.g. how effective in improving one's mood would it be to call friends and make plans). Normed T-scores for the scale have a mean of 50 and standard deviation of 10. Lower scores reflect greater impairment in awareness of emotion management skills.

2.4 Statistical Analysis

Non-normally distributed variables were transformed using a log(10) transformation where indicated. In order to ascertain the rates of social cognitive impairment, we calculated the number of participants scoring within, above or below normative estimates for community control sample on each of the four social cognitive tasks. Specifically, we calculated the number of participants within each standard deviation range, from more than 2 standard deviations below the healthy control (HC) mean to more than 2 standard deviations above the HC mean. Next, we calculated the percentage of patients who scored at least 1 SD worse than HC norms on one, two, three, or all four social cognitive tasks. Finally, we computed correlations to assess the relations between domains of social cognitive ability and demographic, symptom, and functioning characteristics. To control for Type I error associated with multiple comparisons within the demographic, symptom and functioning analyses, alpha was set to .01 for significance testing.

3. Results

On average, the sample was 44.95 years old ($SD = 11.04$), and had 12.89 ($SD = 2.32$) years of education. Sixty-five percent of the sample was male, 77% had never been married, and

37% were Caucasian. Average age at illness onset was 22.74 ($SD = 9.43$), with 9.62 ($SD = 13.09$) lifetime hospitalizations, and GAF of 43.60 ($SD = 8.94$) at the time of assessment.

3.1 Rates of social cognitive impairment

Impaired social cognition was prevalent in this sample and evident on all four social cognition measures (see Table 1). On three of the four social cognitive tasks (BLERT, BORRTI Egocentricity, MSCEIT-ME) over 50% of participants performed at least 1 SD below HC norms. On the Hinting Task, the majority of participants scored within 1SD of healthy control norms. Only 11 of 118 participants (9.32%) scored within (1 SD) or above healthy control norms on all four tasks; 107 (90.68%) scored at least 1 SD worse than HC on one or more tasks; 83 (70.34%) scored worse than HC on two or more tasks; 51 (43.22%) scored worse than HC on at least 3 tasks, and 14 (11.86%) scored worse on all four tasks.

3.2 Relationship of social cognitive impairment to demographic, symptom and functional variables

Among bivariate correlations between social cognition measures and demographics, the only significant relationship was between higher (pathological) Egocentricity (BORRTI) and higher age ($r = .27, p = .003$). There were only two, trend-level ($p < .05$) correlations between social cognitive measures and symptoms. Hinting task was negatively correlated with PANSS Negative Factor, and Egocentricity was positively correlated with PANSS Suspiciousness item. Correlations between social cognition and functioning were significant for two social cognitive measures, where in better performance on the BLERT and BORRTI Egocentricity scales were associated with higher ratings on the QLS Common Objects and Activities subscale ($r = .27, p = .003$ and $r = -.27, p = .003$, respectively). The MSCEIT-ME correlated positively with QLS Common Objects and Activities and GAF ratings, and negatively with QLS Instrumental Role Function, but these associations were observed only at trend-level.

4. Discussion

In the current paper, we examined the extent of social cognitive impairments on four different social cognitive tasks, as well as the relationship between social cognitive performance and demographic, symptom and functional measures. Consistent with earlier literature, social cognitive impairments were common in our sample, with the majority of individuals performing more than 1 SD below control norms on many of the tasks. The exception to this was a Theory of Mind task, on which only about 1/3 of the sample performed 1 or more SD below the average range, and approximately 1/2 of the sample scored within 1 SD of the control average. While these results highlight the common occurrence of social cognitive impairments in stable outpatients and the associated need for treatment, they also suggest that important differences may exist between social cognitive domains, with a pattern of more common and severe impairments in some domains than in others. These results may simply be due to variations in the samples from which norms were derived for each task (that is, they were not standardized using a single large representative sample) or variations in the difficulty of individual tasks, and highlight the need for large-scale standardization studies of these and other social cognitive measures; however, it is also possible that they represent true variability in the frequency and degree of impairment across different social cognitive domains. While somewhat counterintuitive, our results suggest that severe impairment in a 'higher-order' social cognitive domain such as ToM may be less common than severe impairment in 'basic' domains such as affect recognition. One possibility is that affect recognition represents a more elemental process of social cognition, whereas ToM relies on a variety of processes and may allow the individual to compensate

for specific deficits using other social information provided by task stimuli. Additional studies are needed to fully evaluate this question.

The hypothesized relationships between social cognitive measures and measures of symptoms and functioning were only weakly and inconsistently supported. Findings related to psychiatric symptoms are congruent with those of other investigators (Fett et al., in press; Ventura et al., in press) who have reported consistent, though small-to-moderately sized relationships between social cognition and negative symptoms. It should be noted that in our study this relationship was only present for the ToM task. On the other hand, our findings stand in contrast to theoretical models that speculate a link between paranoid symptomatology (e.g. delusions, suspiciousness) and impairments in ToM, though the handful of studies evaluating this purported relationship have been equivocal (Garety and Freeman, 1999; Greig et al., 2004; Martin and Penn, 2002; Peer et al., 2004). While it is possible that the lack of significant associations between ToM and paranoid symptoms may be due to the specific characteristics of our sample (stable outpatients) and these relationships would be more apparent in an acute, highly symptomatic sample, support for such an interpretation is mixed, with several studies indicating that while the severity of social cognitive impairments is related to severity of symptoms, significant social cognitive impairments are nevertheless found in stable or remitted samples (Bora et al., 2008; Bora et al., 2009).

There were several small to moderate correlations between functioning and social cognition. The most consistent relationship was between social cognition and the Common Objects and Activities subscale of the QLS, which is a measure of community integration, and assesses participation in common activities such as shopping, eating out, or reading the newspaper, as well as the possession of common items such as a driver's license, watch, or postage stamps. Contrary to most other studies, there was also a negative correlation between MSCEIT-ME and QLS Instrumental Role Function subscale, a measure of engagement, accomplishment, and satisfaction with one's role as a worker, student, or caretaker. This negative relationship is, however, consistent with the results of Maat et al. (2012), who suggested that particularly in the presence of psychiatric symptoms, a negative correlation between social cognition and functioning may be a reflection of the individual's awareness of the effects their illness has on their social interactions. In this particular case, such heightened awareness may lead people to withdraw from common societal roles. If this were the case, however, one would also expect a negative correlation between social cognition and the QLS Interpersonal Relations subscale, a measure of the quality and extent of social interactions.

In sum, we found weak and inconsistent relationships between symptoms and functioning on the one hand, and different measures of social cognition on the other. As pertains to social cognition and functioning, it is important to note that several studies including a recent meta-analysis (Fett et al., 2011) report considerably higher associations between social cognition and functional outcome measures than the present data would suggest. Although it is encouraging that laboratory-based measures of social cognition have come to be known as valuable predictors of community function, correlations explaining approximately 20% of the variance (Fett et al., 2011) in this relationship clearly indicate that other, unaccounted for, factors are even more explanatory. The current study sample consisted of relatively older (mean age = 45), stable, VA and community mental health center patients, the majority of whom receive disability compensation and are actively involved in both clinical service and research activity in this community. Despite clear deficits on our laboratory measures, community social functioning in these adults may depend less on their own capacities and initiatives than on the structure and supports provided to them. In considering the various mediators that could influence this relationship, it is remarkable that significant (albeit small effect size) correlations have been detected elsewhere in the literature. We suggest that

future large-scale investigations are designed to test mediational relationships pertaining to differences in the capacity for, and access to, social opportunities in community dwelling individuals with schizophrenia.”

As suggested by others (Schmidt et al., 2011), the variability in patterns of interrelationships between social cognitive tasks and symptom and functional measures highlights the continued need to closely examine multiple domains of social cognition and their association to other variables of interest. Additional studies in this area may help identify important subgroups of patients with relatively spared social cognitive function and a better illness course, and perhaps shed light on the pathology of this complex disorder.

The current study is one of only a few to examine the relationship of symptoms and functioning to several different measures of social cognition, and as such represents a much needed contribution to the budding literature in this area. Replications of these results are needed, particularly given the limitations of the current study methods, which include a large number of analyses, the lack of a single normative control group, and the use of norms derived from several different studies. Future work in this area would also benefit from the development of a comprehensive social cognitive assessment battery. Such a battery would permit examination of 1) interrelationships between different social cognitive domains, 2) profiles of social cognitive impairment in schizophrenia versus other samples, and 3) the relative impact of individual domains in predicting functional outcomes.

Acknowledgments

This work was supported by NIMH (2R01 MH061493 to MDB) and VA RR&D (D4752R to MDB; D4628W to JMF). The funding sources had no role in study design, data analysis, or manuscript preparation.

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Table 1
Performance of participants relative to healthy controls on four measures of social cognition

	BLERT	Hinting Task ^a	BORRTI ^b	MCSEIT-ME
Health control <i>M</i>	17.31 (2.70)	18.3 (1.6)	50 (10.0)	50 (10.0)
<i>(SD)</i>				
<i>N</i> (%)				
> 2 SD above HC	0 (0%)	0 (0%)	29 (24.4%)	0 (0%)
mean				
1–2 SD above HC	0 (0%)	13 (10.9%)	39 (32.8%)	3 (2.5%)
mean				
0–1 SD above HC	18 (15.1%)	14 (11.8%)	34 (28.6%)	17 (14.3%)
mean				
0–1 SD below HC	27 (22.7%)	49 (41.2%)	11 (9.2%)	25 (21.0%)
mean				
1–2 SD below HC	32 (26.9%)	11 (9.2%)	5 (4.2%)	27 (22.7%)
mean				
> 2 SD below HC	42 (35.3%)	31 (26.1%)	1 (0.8%)	47 (39.5%)
mean				

N = 119,

^a *N* = 118;

^b Higher scores reflect greater pathology.

BLERT = Bell Lysaker Emotion Recognition Task; BORRTI = Bell Object Relations and Reality Testing Inventory; Egocentricity scale; MCSEIT-ME = Mayer Salovey Caruso Emotion Intelligence Test, Managing Emotions subscale.

Table 2

Bivariate correlations between social cognition measures and demographic, clinical and functional characteristics

	BLERT	Hinting Task ^a	BORRTI ^b	MCSEIT-ME
Demographics				
Age	– 0.12	0.13	0.27 *	– 0.14
Years Education	0.17	– 0.05	– 0.11	0.11
Lifetime Hosp. ^c	0.01	– 0.03	0.16	– 0.05
Age of Onset	– 0.02	0.12	– 0.02	– 0.09
Symptoms				
PANSS Total	0.12	– 0.14	0.07	– 0.06
Positive factor	0.17	– 0.03	0.14	0.00
Negative factor	0.12	– 0.22 †	– 0.11	– 0.01
Cognitive factor	– 0.13	– 0.17	0.06	– 0.14
Hostility factor	0.05	0.06	0.12	– 0.08
Emotional Discomfort factor	0.12	0.03	0.02	– 0.01
PANSS Delusions item	0.12	0.04	0.15	– 0.02
PANSS Suspiciousness item	0.00	0.01	0.19 †	– 0.08
PANSS Hostility item	0.03	– 0.02	0.20	– 0.01
Functioning				
QLS Total	0.04	0.11	– 0.09	0.09
QLS Interpersonal	0.01	0.04	– 0.09	0.15
QLS Instrumental	– 0.02	0.09	0.05	– 0.19 †
QLS Intrapsychic	0.02	0.12	– 0.05	0.10
QLS Common Objects	0.27 *	0.11	– 0.27 *	0.19 † 0.20 †
GAF	0.15	0.15	– 0.09	

N = 119;

† *p* < .05,

* *p* < .01;

^a*N* = 118;

^b Higher scores reflect greater pathology;

^c log-transformed;

BLERT = Bell Lysaker Emotion Recognition Task; BORRTI = Bell Object Relations and Reality Testing Inventory, Egocentricity scale; MSCEIT-ME = Mayer Salovey Caruso Emotion Intelligence Test, Managing Emotions subscale; QLS = Quality of Life Scale; PANSS = Positive and Negative Syndrome Scale.