Social Cognition, Social Competence, Negative Symptoms and Social Outcomes: Inter-relationships in People with Schizophrenia

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Abstract

Social deficits are common in people with schizophrenia and the treatment of deficits in social competence has been a long-time treatment strategy. However, negative symptoms and social cognitive deficits also contribute to social dysfunction. In this study, we examined the correlations between everyday social outcomes, a performance based measure of social competence, and performance on 8 different social cognition tests in 179 patients with schizophrenia. Social cognition, social competence, and motivation-related negative symptoms accounted for 32% of the variance in real-world social outcomes. In addition, two different social cognition tests, along with expression-related negative symptoms accounted for 32% of the variance in performance-based

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assessments of social competence. These data suggest that negative symptoms exert an important influence on social outcomes and social competence, but not social cognition, and that social cognition and social competence exert separable influences on real-world social outcomes. Improving social outcomes seems to require a multi-faceted approach which considers social cognition, social competence, and negative symptoms.

Keywords

Schizophrenia; negative symptoms; social competence; social cognition; social functioning

Impairment in real-world social functioning is a central feature of schizophrenia (Bellack et al., 1990; Hooley, 2010). Social functioning deficits are seen in people before they develop schizophrenia, as well as in relatives of those with the disease (Couture et al., 2006). While current pharmacological treatments for schizophrenia reduce rehospitalizations, they have not significantly helped with poor functional outcomes, including social deficits (Harvey and Bowie, 2012; Priebe, 2007). Social skills training has been the mainstay psychosocial treatment for many years with the rationale that learning social competencies would be helpful in improving social functioning (Smith et al., 1996). While social skills training can improve deficits in social competence, negative symptoms, which include deficits in both motivation and emotional expression, correlate with poor everyday social outcomes and do not respond to current pharmacological interventions (Fervaha et al., 2013; Kirkpatrick, et al., 2006).

Recently, we (Robertson et al., 2014) examined a large sample of patients with schizophrenia (n=561) and found that clinical assessments of two particular negative symptoms, passive social withdrawal and active social avoidance, accounted for more variance in real world social outcomes than performance on an interactive assessment of social competence. Furthermore, those analyses showed that these two negative symptoms exerted their influence on social outcomes independently of the correlations between social competence and real world social outcomes. Thus, failures to engage in social activities were not correlated with performance-based measures of social competence and patients with both high and low levels of social competence were found to have essentially equivalent levels of social functioning.

Research also has shown a consistent relationship between social cognition and everyday social outcomes (Mancuso, et al., 2011; Penn, et al., 2008). Social cognition has been defined as the "mental operations that underlie social interactions, including perceiving, interpreting, and generating responses to the intentions, dispositions, and behaviors of others" (Green et al., 2008). Social cognition is typically broken down into four domains: emotion processing, social perception, attributional bias, and theory of mind (Green et al., 2010); Pinkham et al., 2014). Emotion processing is defined as the ability to understand the emotions that another is experiencing by observing facial expressions, vocal features, or both. Social perception is the ability to interpret social cues from behavior in a social context. Theory of mind is the ability to infer others' intentions, beliefs, and dispositions. Attributional style is the ability to develop ideas regarding the cause of both positive and

negative life events. There is mounting evidence to suggest that deficits in social cognition are a distinct contributing factor to poor social outcomes in schizophrenia and that deficits in social cognition may also correlate with deficits in social competence (Horan et al., 2008; Mancuso et al., 2011).

The past findings indicate that social skills, negative symptoms, and social cognition all have been found to predict real-world social outcomes, but not necessarily in the same study. For instance, a recent study looked at both social cognitive impairments and negative symptoms as predictors of functional outcomes (Bell et al., 2011). The researchers examined whether the correlation between negative symptoms and social cognition and functional outcomes were related or separate constructs. As expected, the data showed that high levels of social cognition and low levels of negative symptoms were correlated with more positive functional outcomes. The findings also indicated that these two domains—negative symptoms and social cognition—were separate, distinct factors contributing to poor outcomes, suggesting that efforts to improve treatments should focus on treatments for these two domains of impairment. However, this study did not include a performance-based assessment of social competence or social skills. Another study examined the effects of performance on a social cognition task (i.e., a Theory of Mind task), negative symptoms, and a performance-based assessment of social competence on real-world social outcomes (Couture et al., 2011). They found that theory of mind deficits acted as a mediator between social competence and social outcomes, and also that negative symptoms and social competence were directly correlated with functional outcomes. While informative, it is noteworthy that this study examined only one domain of social cognition. Given the mutlidimensional nature of social cognition noted above, an important next step is to understand the interrelationship among all known domains of social cognition, social competence, and negative symptoms and how they predict social outcomes. Developing a broader understanding of these factors has the potenital to guide the development of treatment strategies to most efficiently improve social functioning in patients with schizophrenia.

The present study aimed to examine and quantify the cross-sectional contribution of several known predictors of real-world social outcomes, including negative symptoms, social competence (measured with a performance-based social skills task), and social cognition (measured with 8 different measures) in 179 patients with schizophrenia. This sample is entirely independent from the previous sample reported on by Robertson et al. (2014). The current study used items from the Positive and Negative Syndrome Scale (PANNS) to index negative symptoms while also using the PANSS positive symptom factor for comparison purposes. Social competence was measured with the Social Skills Performance Assessment (SSPA; Patterson et al., 2001). Real-world social outcomes were obtained from ratings generated with a structured rating system that generated rated on the basis of input from patients and from a variety of different informants. This study examined not only the relationships between social skills, negative symptoms, and social cognition with social outcomes, but also the predictive relationships between interactive measures of social competence, performance-based measures of social cognition, and clinical ratings of negative symptoms. Our primary hypothesis was that including social cognition in the predictive equation would increase the level of variance in real world social outcomes

accounted for, compared to the previous study which used only social competence and negative symptoms as predictors. We also expected that if there were an overlap between predictors, a comprehensive assessment of social cognition would reduce the predictive relationship between negative symptoms and real world social outcomes by accounting for variance that previously was attributed to negative symptoms. Our negative symptoms assessment included both motivation deficits and expression deficits to the extent that these concepts are captured by the PANSS.

Methods

2.1 Subjects

The data was collected in two different geographical locations. The study participants were patients (n=179) with schizophrenia or schizoaffective disorder, receiving treatment at outpatient locations in Miami and Dallas. Miami patients were recruited from the outpatient services at the University of Miami Miller School of Medicine. Patients in Dallas were recruited using Metrocare Services, a large non-profit provider of mental health services in Dallas County, as well as other outpatient services associated with the University of Texas Southwestern Medical (UTSW) Center. All research participants signed informed consent forms in accordance with the policies of their respective Institutional Review Boards. Patients were participants in the Social Cognition Psychometric Evaluation (SCOPE) study (Pinkham et al., 2014) from whom data were collected between October 2012 and May 2014.

All participants completed a structured diagnostic interview—the Mini International Neuropsychiatric Interview, 6th Edition (MINI) (Sheehan et al., 1998)—administered by a trained interviewer, followed by a consensus process at each site. Additionally during screening, all participants were administered the Wide Range Achievement Test, 3rd Edition (WRAT-III) Recognition Reading subtest (Wilkinson,1993). Grounds for exclusion from the study included a history of traumatic brain injury, brain disease such as seizure disorder or neurodegenerative condition, a reading score below the 6th grade reading level, or the presence of another DSM-IV diagnosis that would exclude the diagnosis of schizophrenia. In order for the data to reflect findings from an inclusive range of participants and their real-world conditions, comorbid substance use disorders were only an exclusion criterion if the patient had a diagnosis of substance abuse in the last month or substance dependence in the past 6 months. Any patients who arrived for their study visits appearing intoxicated were rescheduled. Patients who were currently receiving inpatient treatment were not recruited, but those living in many different kinds of residential facilities—supervised, unsupervised, supported, or unsupported—were all recruited.

2.2 Assessment Strategy

Upon completion of a successful screening, the collection of test assessments was completed in a counter-balanced order.

Real-World Functional Outcomes—Informants were identified by the participants and were high contact clinicians, family members, or close friends. We used the Specific Levels

of Functioning (SLOF; Schneider and Struening, 1983) as our functional outcomes rating scale. Ratings for each item were made on a 1–5 point scale with higher scores indicating better functioning. Interviewers who talked both to informants and to the patients generated the ratings on the basis of all available information, following the procedures that we had previously adopted in the Validation of Everyday Real World Outcomes (VALERO), phase I study (Harvey et al., 2011). In this report we focused our efforts only on identifying the correlates of the ratings of the interpersonal functioning subscale.

Performance-Based Social Competence—The Social Skills Performance Assessment (SSPA) (Patterson et al., 2001) was used to measure social competence. As our group has described previously (e.g., Robertson et al., 2014), the SSPA is an abbreviated and adapted version of the role-play components of the Maryland Assessment of Social Competence (MASC) (Sayers et al., 1995) which aims to measure social skills for patients with schizophrenia. Two role-play scenarios are presented after a brief role practice (i.e., greeting a new neighbor and calling a landlord to request the repair of a leak that remains unrepaired despite a previous request); the participants are then expected to start and maintain a conversation for three minutes per role-play. Sessions were administered and audiotaped by raters trained in test administration but untrained in scoring, thus reducing potential biases in the administration of the test. All SSPAs were scored by a single expert scorer blind to participant identity, psychiatric ratings, and all other study related data. In order to generate a single score, the multiple rating domains for each scene were averaged and then the total scores for the two scenes were combined into a single score, consistent with the previous research using this measure.

Social Cognition—8 measures that had been previously selected for their potential validity were used to measure social cognition (Pinkham et al., 2014). The measures were: the Ambiguous Intentions and Hostility Questionnaire: Abbreviated version (AIHQ: three subscales) (Combs et al., 2007), the Bell Lysaker Emotion Recognition Test (BLERT) (Bryson et al., 1997), the Penn Emotion Recognition Test (ER-40) (Kohler et al., 2003), the Relationships Across Domains -- Abbreviated Version (RAD) (Sergi et al., 2009), the Reading the Mind through the Eyes task (Eyes; Baron-Cohen et al., 2001), The Awareness of Social Inferences Test, Part III (TASIT III) (McDonald et al., 2003), the Hinting task (Corcoran et al., 1995), and the Trustworthiness Task, Abbreviated version (Adolphs et al., 1998). See Table 1 for a description of these measures and the domains that they measure.

Clinical Symptom Ratings—The Positive and Negative Syndromes Scale (PANSS) - - a widely used assessment tool in schizophrenia research (Kay et al., 1987) - - was used to measure symptomology. This instrument consists of 30 items assessing the severity of positive symptoms, negative symptoms, and other general features of psychopathology. The PANSS was administered and scored by a trained rater other who was not an informant for the SLOF. The PANSS "Marder Factor" was used as a composite measure of negative symptoms (Marder et al., 1997). This factor includes the items of "blunted affect", "emotional withdrawal", "poor rapport", "passive social withdrawal", "lack of spontaneity", "motor retardation", and "active social avoidance". This factor has been tested against and compared to other frequently used measures of negative symptoms in schizophrenia, and has

proven to be a valid composite measure (Daniel, 2013). In our previous study of 561 patients (Robertson et al., 2014), no symptoms other than symptoms from this factor were significantly correlated with SLOF Interpersonal Functioning subscale scores. We performed a similar analysis in this study as well.

2.3 Statistical Approach

Multiple regression analyses were used to examine the relative importance of social competence, negative symptoms, and social cognition in their abilities to predict social outcomes. First, the relationships between social competence, negative symptoms and social cognition were examined. Stepwise regression analyses were run to examine the relative importance of the 8 social cognition measures and total, as well as individual negative symptoms, for the prediction of SSPA total scores. Then a similar analytic strategy was used to predict the SLOF interpersonal functioning scores. The 8 social cognition measures, SSPA total scores, and the PANSS negative symptoms were used to predict SLOF interpersonal functioning subscale scores.

Results

Table 2 presents demographic information on patient participants. Table 3 shows the means, standard deviations, and ranges for the real-world social functioning variables as well as the predictor variables, which include PANSS symptoms and social cognition measures. Table 4 shows the intercorrelations between these same variables. As seen in Table 4, many of the social cognition measures have significant correlations with one another. Additionally, overall scores on negative symptoms, as well as four of the social cognitive measures (BLERT, Hinting Task, RAD, and TASIT), and SSPA scores, were significantly correlated with SLOF interpersonal functioning scores. Negative symptoms were correlated with social competence and real-world social outcomes, but manifested smaller correlations with the measures of social cognition. Similarly to our previous study with a separate sample, the overall PANSS positive symptom factor did not correlate significantly with interpersonal functioning and only one of the positive symptoms, conceptual disorganization, was correlated significantly with interpersonal functioning, Pearson r=−.26, p<.001.

3.1 Prediction of social competence

First, a stepwise regression was completed analyzing the relationship between the various measures of social cognition (AIHQ, BLERT, ER-40, Eyes task, Hinting Task, TASIT, RAD, and Trust task) and the SSPA total score. In this analysis, the Hinting test entered the equation first, $t(176)=5.98$, $p<.001$, $R^2=.16$. The Eyes task entered the equation next, contributing another 3 percent of the variance, $t(175)=4.66$, $p<.001$, $R^2=.19$. No other social cognition tests predicted SSPA performance in this stepwise model.

We then repeated the regression analysis adding total scores on negative symptoms into the equation. The Hinting task entered first, $t(176)=5.96$, $R^2=.16$, followed by negative symptoms, $t(175)=5.08$, $p<.001$, $R^2=.25$, and the ER-40 entered last, accounting for 2% of the variance (total $R^2=.27$). Thus, negative symptoms add to the prediction of social competence, but do not reduce the impact of social cognition on social competence. The

aspects of social cognition that predict social competence were altered by the addition of the negative symptoms as a predictor, however.

We repeated the analysis for a final time, entering the six individual negative symptoms (blunted affect, emotional withdrawal, passive social withdrawal, lack of spontaneity, flow of conversation, motor retardation, and active social avoidance) into the equations, as well as the eight social cognitive tests to predict SSPA scores. The largest predictor of SSPA scores were ratings of the PANSS item lack of spontaneity and flow of the conversation, $t(176)=6.30$, $p<.001$, $R^2=.17$, followed by scores on the Hinting Task, $t(175)=5.06$, $p<.001$, $R^2=.27$, followed by ratings of blunted affect, $t=2.80$, $p=.006$, $R^2=.30$, followed by scores on the BLERT, $t(174)=2.13$, $p=.034$, $R^2=.32$. Thus, considering the impact of individual negative symptoms adds to the prediction of social competence from negative symptoms and performance-based social cognition measures when they are measured concurrently. It also alters the specific emotion perception test that predicts social competence, but does not eliminate the influence of the emotion perception construct on social competence.

3.2 Predicting Interpersonal Functioning

The next stepwise regression examined the impact of the total negative symptoms score, social competence, and the 8 social cognition variables on the SLOF interpersonal functioning subscale. Negative symptoms entered first, accounting for 18% of the variance in scores on the subscale, $t(176)=6.03$, $p<.001$, $R^2=.18$. Entering the equation next was the SSPA, $t(175)=4.58$, $p<.001$, $R^2=.24$. The BLERT entered the equation next, contributing another 5 percent of the variance in SLOF interpersonal functioning, $t(175)=4.12$, $p<.001$, $R^2=.29$.

The next analysis performed via stepwise regression aimed to examine the relative impact of the six individual negative symptoms, social cognition, and social competence on interpersonal functioning. Active social avoidance entered the equation first, $t(176)=5.35$, $p<.001$, $R^2=.13$. Entering the equation next was the SSPA, $t(175)=4.58$, $p<.001$, $R^2=.22$. The BLERT entered the equation third, $t(,174)=3.63$, $p<.001$, $R^2=.28$. Passive apathetic social withdrawal was the final variable to enter into the equation, $t(173)=2.83$, $p<.01$, $R^2=.32$.

Discussion

Previous studies have examined the predictive relationships between negative symptoms, social competence, and social cognition and everyday social outcomes, but this is the first study to our knowledge that concurrently examined the interaction between social competence, a comprehensive assessment of social cognition, negative symptoms, and social functioning. Negative symptoms reflecting reduced motivation for social engagement appear to be the best predictors of everyday social outcomes in people with schizophrenia. Most of the variance in accounted for in real-world social outcomes was related to negative symptoms, including active social avoidance and passive-apathetic social withdrawal. This is identical to the finding in our previous study of 561 patients where social cognition was not assessed. However, the present results indicate that both social cognition and social competence were inter-related to a considerable degree and that both predicted everyday

social outcomes beyond the influence of negative symptoms. Finally, different negative symptoms were related to social competence in a different way compared to those that were directly correlated with social outcomes. The negative symptoms that related to social competence were deficits in expression, both emotional and verbal, in contrast to the deficits in motivation to engage in social acts that correlated directly with reduced social functioning.

There are several implications of these analyses. Different negative symptoms were correlated with social competence and real-world social outcomes. Expression-related symptoms predicted social competence while symptoms reflecting social amotivation were directly correlated with everyday social outcomes. Thus, negative symptoms had both direct and indirect effects on social outcomes.

The social cognitive variables that had a direct impact on social outcomes were related to emotion recognition, while the social cognitive variable that had the largest impact on social competence was an interactive test that measures the ability to understand social cues as well as emotion recognition.

Another area of critical importance is self-assessment, including assessment of social cognitive competence. Examination of social metacognition is an important topic for future research, as it is likely that the ability to evaluate one's social cognitive (and social competence) performance may have functional importance. For instance, as shown by Lysaker et al. (2013) metacognitive abilities have a complex relationship with standard metacognitive measures and both relate to functional outcomes. We also showed recently (Gould et al., in press) that mis-estimation of abilities may be as important as the abilities themselves when predicting functional outcomes.

There are limitations of these results. The definition of interpersonal functioning on the SLOF is similar to the definitions of the social motivation oriented negative symptoms. Different raters collected these data and they were unaware of the other scores. At the same time, this overlap in definitions is likely to increase the correlation between negative symptoms and social outcomes. However, this potential confound cannot explain the correlations between performance-based measures of social competence and social cognition, the correlations between the performance based assessments of social cognition and social competence and social outcomes, and the correlations between expression-related negative symptoms and social competence. Further, this is a demanding research study and not all patients with schizophrenia are likely to be able to participate in it.

There are several potential implications for later research that might inform treatment interventions. In a recent review, psychosocial interventions were found to be effective at reducing negative symptoms (Elis et al., 2013). Specifically, cognitive behavioral therapy (CBT) and social skills training (SST) showed the most evidence for decreasing negative symptoms acutely and even after 6 months of treatment. Since our data demonstrated that passive-apathetic social withdrawal and active social avoidance accounted for the most direct variance of social functioning, future studies should be designed to specifically target these negative symptoms. In addition, cognitive remediation therapy improves cognition

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(Eack et al., 2013; McGurk et al., 2007; Wykes et al., 2011), improves the extent to which patients benefit from social-cognition training interventions (Lindenmayer et al., 2013), and also recently has shown to be effective in improving certain negative symptoms, specifically social withdrawal, affective flattening and motor retardation (Eack et al., 2013). As social withdrawal and affective flattening were seen to predict social outcomes in this study, these domains of therapies could be investigated, possibly in combined trials, to target multiple different determinants of impaired social outcomes in schizophrenia.

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References

Adolphs R, Tranel D, Damasio AR. 1998 The human amygdala in social judgment. Nature. 1998; 393:470–4. [PubMed: 9624002]

Baron-Cohen S, Wheelwright S, Hill J, Raste Y, Plumb I. The 'Reading the mind in the eyes' Test revised version: A study with normal adults, and adults with Asperger syndrome or high-functioning autism. J Child Psychol Psychiatry. 2001; 42:241–51. [PubMed: 11280420]

Bell MD, Corbera S, Johannesen JK, Fizdon JM, Wexler BE. Social cognitive impairments and negative symptoms in schizophrenia: are there subtypes with distinct functional correlates? Schizophr Bull. 2011:186–96. [PubMed: 21976710]

Bellack AS, Morrison RL, Wixted JT, Mueser KT. An analysis of social competence in schizophrenia. Br J Psychiatry. 1990; 156:809–18. [PubMed: 2207511]

Bryson G, Bell M, Lysaker P. Affect recognition in schizophrenia: a function of global impairment or a specific cognitive deficit. Psychiatry Res. 1997; 71:105–13. [PubMed: 9255855]

Combs DR, Penn DL, Wicher M, Waldheter E. 2007 The Ambiguous Intentions Hostility Questionnaire (AIHQ): a new measure for evaluating hostile social-cognitive biases in paranoia. Cognitive Neuropsychiatry. 2007; 12:128–43. [PubMed: 17453895]

Corcoran R, Mercer G, Frith CD. Schizophrenia, symptomatology and social inference: investigating "theory of mind" in people with schizophrenia. Schizophr Res. 1995; 17:5–13. [PubMed: 8541250]

Couture SM, Penn DL, Roberts DL. The functional significance of social cognition in schizophrenia: a review. Schizophr Bull. 2006; 32:S44–S63. [PubMed: 16916889]

Couture SM, Granholm EL, Fish SC. A path model investigation of neurocognition, theory of mind, social competence, negative symptoms and real-world functioning in schizophrenia. Schizophr Res. 2011; 125:152–60. [PubMed: 20965699]

Daniel DG. Issues in selection of instruments to measure negative symptoms. Schizophr Res. 2013; 150:343–5. [PubMed: 23899996]

Eack SM, Mesholam-Gately RI, Greenwald DP, Hogarty SS, Keshavan MS. Negative symptom improvement during cognitive rehabilitation: results from a two-year trial of cognitive enhancement therapy. Psychiatry Res. 2013; 209:21–26. [PubMed: 23623449]

Elis O, Caponigro JM, Kring AM. Psychosocial treatments for negative symptoms in schizophrenia: current practices and future directions. Clin Psychol Rev. 2013; 33:914–28. [PubMed: 23988452]

Fervaha G, Foussias G, Agid O, Remington G. Amotivation and functional outcomes in early schizophrenia. Psychiatry Res. 2013; 210:665–8. [PubMed: 23911005]

Gould F, McGuire LS, Durand D, Sabbag S, Larrauri C, Patterson TL. Self-Assessment in Schizophrenia: Accuracy of Evaluation of Cognition and Everyday Functioning. Neuropsychology. in press.

Green MF, Penn DL, Bentall R, Carpenter WT, Gaebel W, Gur RB, et al. Social cognition in schizophrenia: an NIMH workshop on definitions, assessment, and research opportunities. Schizophr Bull. 2008; 34:1211–20. [PubMed: 18184635]

Green MF, Horan WP. Social cognition in schizophrenia. Curr Direct Psychol Sci. 2010; 19:243–8.

Harvey PD, Raykov T, Twamley EW, Vella L, Heaton RK, Patterson TL. Validating the measurement of real-world functional outcomes: phase I results of the VALERO study. Am J Psychiatry. 2011; 168:1195–1201. [PubMed: 21572166]

Harvey PD, Bowie CR. Cognitive enhancement in schizophrenia: Pharmacological and Cognitive Remediation Approaches. Psychiatric Clin North Am. 2012; 35:683–698.

Hooley JM. Social factors in schizophrenia. Curr Direct Psychol Sci. 2010; 19:238–42.

Horan WP, Kern RS, Green MF, Penn DL. Social cognition training for individuals with schizophrenia: emerging evidence. Am J Psychiatric Rehab. 2008; 11:205–52.

Kay SR, Fiszbein A, Opfer LA. The positive and negative symptom scale PANSS for schizophrenia. Schizophr Bull. 1987; 132:261. [PubMed: 3616518]

Kirkpatrick B, Fenton WS, Carpenter WT, Marder ST. The NIMH-MATRICS consensus statement on negative symptoms. Schizophr Bull. 2006; 32:214–19. [PubMed: 16481659]

Kohler CG, Turner TH, Bilker WB, Brensinger CM, Siegel SJ, Kanes SJ, et al. Facial emotion recognition in schizophrenia: intensity effects and error pattern. Am J Psychiatry. 2003; 160:1768–74. [PubMed: 14514489]

Lindenmayer J, McGurk SR, Khan A, Kaushik S, Thanji A, Hoffman L, Valdez G, et al. Improving social cognition in schizophrenia: a pilot intervention combining computerized social cognition training with cognitive remediation. Schizophr Bull. 2013; 39:505–17.

Lysaker PH, Gumley A, Luedtke B, Buck KD, Ringer JM, Olesek K, et al. Social cognition and metacognition in schizophrenia: Evidence of their independence and linkage with outcomes. Acta Psychiatrica Scan. 2013; 127:239–247.

Mancuso F, Horan WP, Kern RS, Green MF. Social cognition in psychosis: multidimensional structure, clinical correlates, and relationship with functional outcome. Schizophr Res. 2011; 1252–3:143–51.

Marder SR, Davis JM, Chouinard G. The effects of risperidone on the five dimensions of schizophrenia derived by factor analysis: combined results of the North American trials. J Clin Psychiatry. 1997; 58:538–46. [PubMed: 9448657]

McDonald S, Flanagan S, Rollins J, Kinch J. TASIT: A new clinical tool for assessing social perception after traumatic brain injury. J Head Trauma Rehab. 2003; 18:219–38.

McGurk SR, Twamley EW, Sitzer DI, McHugo GJ, Mueser KT. A meta-analysis of cognitive remediation in schizophrenia. Am J Psychiatry. 2007; 164:1791–02. [PubMed: 18056233]

Patterson TL, Moscona S, McKibbin CL, Davidson K, Jeste DV. Social skills performance assessment among older patients with schizophrenia. Schizophr Res. 2001; 48:351–60. [PubMed: 11295387]

Penn DL, Sanna LJ, Roberts DL. Social cognition in schizophrenia: an overview. Schizophr Bull. 2008; 34:408–11. [PubMed: 18375928]

Pinkham AE, Penn DL, Green MF, Buck B, Healey K, Harvey PD. The social cognition psychometric (SCOPE) study: results of the expert study and RAND panel. Schizophr Bull. 2014; 4:813–23. [PubMed: 23728248]

Priebe S. Social outcomes in schizophrenia. Br J Psychiatry Suppl. 2007; 50:s15–20. [PubMed: 18019039]

Robertson BR, Prestia D, Twamley EW, Patterson TL, Bowie CR, Harvey PD. Social competence versus negative symptoms as predictors of real world social functioning in schizophrenia. Schizophr Res. 2014; 160:136–41. [PubMed: 25468184]

Sayers MD, Bellack AS, Wade JH, Bennet ME, Fong P. An empirical method for assessing social problem solving in schizophrenia. Behav Modif. 1995; 3:267–89. [PubMed: 7625993]

Schneider LC, Struening EL. SLOF: a behavioral rating scale for assessing the mentally ill. Soc Work Res Abstr. 1983; 19:9–21. [PubMed: 10264257]

Sergi MJ, Fiske AP, Horan WP, Kern RS, Kee KS, Subotnik KL, et al. Development of a measure of relationship perception in schizophrenia. Psychiatry Res. 2009; 1661:54–62. [PubMed: 19193447]

Sheehan DV, Lecrubier Y, Sheehan KH, Amorim P, Janavas J, Weiller E, et al. The mini-international neuropsychiatric interview (M.I.NI,): the development and validation of a structured diagnostic interview for DSM-IV and ICD-10. J Clin Psychiatry. 1998; 59 (Suppl 20):22–33. [PubMed: 9881538]

Smith TE, Bellack AS, Liberman RP. Social skills training for schizophrenia: review and future directions. Clin Psychol Rev. 1996; 16:599–17.

Wilkinson, GS. WRAT-3: wide range achievement test administration manual. 3. Wilmington: Wide Range Inc; 1993.

Wykes T, Huddy V, Cellard C, McGurk SR, Czobor P. A meta-analysis of cognitive remediation for schizophrenia: methodology and effect sizes. Am J Psychiatry. 2011; 168:472–85. [PubMed: 21406461]

Highlights

We examined social functioning in a large sample of people with schizophrenia.

The role of social cognition and negative symptoms in prediction of social competence was examined.

The role of social competence, social cognition, and negative symptoms for the prediction of everyday social outcomes was examined.

The best predictor of social outcomes was negative symptom severity.

Social competence and social cognition also predicted social outcomes.

Different negative symptoms were related to social competence and social outcomes.

Table 1

Description of Social Cognition Measures

Task	Format	Description
Ambiguous Intentions and Hostility Questionnaire, abbreviated version (AIHQ)	Paper and pencil	This task is designed to evaluate hostile social cognition biases. Participants are asked to read 5 hypothetical, negative situations with ambiguous causes (ie, intentional or accidental) and imagine that the situation is happening to them.
Bell Lysaker Emotion Recognition Task (BLERT)	Stimuli presented via computer, responses recorded by experimenter	The BLERT measures the ability of the participants to correctly identify 7 different emotional states: happiness, sadness, fear, disgust, surprise, anger, or no emotion. The participants view 21 video segments—each ten seconds long.
Penn Emotion Recognition Test (ER-40)	Stimuli presented via computer, responses recorded by experimenter	The ER-40 measures facial affect recognition ability. Participants are shown 40 color photographs of static faces expressing 4 basic emotions (ie, happiness, sadness, anger, or fear) and no emotion. T
Reading the Mind in the Eyes Test	Stimuli presented via computer, responses recorded by experimenter	The Eyes tasks measures ability to determine the mental state of others based on expression in the eye region of the face. Participants view 36 photos of pairs of eyes along with four possible options of descriptor words for the thought/feeling being portrayed.
The Awareness of Social Inferences Test, Part III (TASIT)	Stimuli presented via computer, responses recorded by experimenter	The TASIT consists of video clips of everyday social interactions, and Part III, the Social Inference-Enriched test, assesses participants' ability to detect lies and sarcasm.
Hinting Task	Paper and pencil	The Hinting Task measures the ability of individuals to deduce the true meaning behind indirect speech. The participant is read 10 short passages involving an interaction between two people. Each passage ends with one of the characters hinting at something.
Trust Test	Paper and Pencil	This task assesses participants' ability to make complex social judgments of trustworthiness. Participants rated 42 faces for trustworthiness on a scale from −3 to 3. Faces were presented in grayscale and represented ethnically diverse males and females.
Relationships Across Domains (RAD)	Paper and Pencil	The RAD measures competence in the perception of four relational models: communal sharing, authority ranking, equality matching, and market pricing. The abbreviated version is comprised of 15 vignettes involving different male-female dyads that represent one of the relational models. Participants read each vignette and answered 3 yes/no questions about whether a future behavior was likely to happen given the described relationship.

Note. See article text for references

Table 2

Participant demographic and clinical characteristics

Characteristic	(n=179)	
	n	
Male**	117	65%
Race		
Caucasian	76	42%
African American	94	53%
Native American	1	1%
Asian	4	2%
Other	4	2%
Ethnicity		
Hispanic	37	21%
Non-Hispanic	142	79%
Diagnosis		
Schizophrenia	96	54%
Schizoaffective	83	46%
Medication type [a]		
Typical	26	15%
Atypical	125	70%
Combination	3	2%
	Mean	SD
Age (years)	42.11	12.32
Education (years)	12.70	2.14
Maternal Education (years)	12.61	3.22
WRAT-3	93.68	15.84

[a] Nineteen individuals were not taking antipsychotic medications, and medication information was missing for 6 individuals.

Table 3

Scores on PANSS, Social Functioning, Social Competence, and Social Cognition.

Variables	M	SD	Range
PANSS Negative Symptoms	13.72	5.29	6–38
PANSS Positive Symptoms	15.14	5.79	8–36
PANSS Total	60.69	14.86	36–102
Specific Levels of Functioning (SLOF): interpersonal functioning	3.29	0.89	1–5
Ambiguous Intentions Hostility Questionnaire (AIHQ) Hostility	2.38	0.61	1–5
AIHQ Aggression	1.88	0.39	1–5
AIHQ Blame	8.76	2.85	1–5
Bell-Lysaker Emotion Recognition Test (BLERT)	13.24	3.82	0–21
Penn Emotion Recognition Test (ER-40)	29.69	5.37	0–40
Eyes Task	20.22	5.52	0–36
Hinting Task	13.65	3.80	0–20
The Awareness of Social Inferences Test (TASIT)	44.55	7.55	0–64
Trust Task	− 0.12	1.13	−3–3
Relationships Across Domains (RAD)	24.79	5.79	0–45
Social Skills Performance Assessment (SSPA)	4.14	0.53	1–5

Table 4

Intercorrelations of variables

Pearson correlations	1	2	3	4	5	6	7	8	9	10	11	12	13
1. SLOF Interpersonal	-	-.398**	-.049	-.011	-.104	.271**	.100	.109	.165*	.228**	.069	.202**	.311**
2. Negative Symptoms		-	-.080	-.065	-.022	-.053	-.058	-.137*	-.104	-.225**	.075	-.206**	-.349**
3. AIHQ Hostility			-	-.128	.614**	-.151*	-.203**	-.234**	.020	-.228*	-.087	-.129	.037
4. AIHQ Aggression				-	.259**	-.044	-.006	-.117	.037	-.224*	-.009	-.092	.064
5. AIHQ Blame					-	-.142*	-.073	-.189**	-.007	-.095	-.010	-.104	.083
6. BLERT						-	.576**	.526**	.437**	.539**	-.056	.272**	.275**
7. ER-40							-	.527**	.323**	.517**	-.114	.480**	.259**
8. Eyes								-	.485**	.566**	.011	.585**	.315**
9. Hinting									-	.475**	.008	.382**	.404**
10. TASIT										-	-.042	.622**	-.018
11. Trust											-	.028	.018
12. RAD												-	.267**
13. SSPA													-

*
Correlation is significant at the 0.05 level.

**
Correlation is significant at the 0.01 level.