

Metacognitive Capacity Is Related to Self-Reported Social Functioning and May Moderate the Effects of Symptoms on Interpersonal Behavior

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Abstract: Impairments in metacognition or the ability to form integrated senses of self and others have been linked to deficits in laboratory-based measures of social functioning in schizophrenia. This study examined whether self-reported social functioning was related to metacognition in 88 adults in a nonacute phase of schizophrenia. Concurrent assessments were made of metacognition with the Metacognition Assessment Scale–Abbreviated, social functioning with the Social Functioning Scale, symptoms with the Positive and Negative Syndrome Scale, and neurocognition with the Wisconsin Card Sorting Task. Univariate correlations revealed that self-reported social functioning was related to metacognition. Symptom severity was linked to interpersonal relationships, and overall metacognition was found to significantly moderate that relationship such that the effects of symptoms on function grew less as metacognitive capacity was stronger, independent of the effects of neurocognition. This may suggest the potential of metacognitive interventions to titrate the negative effects of symptoms on social function.

Key Words: Intersubjectivity, metacognition, psychotherapy, schizophrenia, social functioning

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Metacognition refers to the set of abilities that allow human beings to form ideas about and reflect on themselves and other people, as well as integrate past experiences to develop a more complex sense of self and others (Lysaker et al., 2018; Moritz et al., 2018; Semerari et al., 2003). In the integrated model of metacognition, metacognition reflects a spectrum of activities that spans from the recognition of discrete and specific mental experiences to the integration of those experiences into a larger complex sense of self and others. Recently, considerable interest has arisen on the presence and effects of metacognitive deficits in schizophrenia (Lysaker and Dimaggio, 2014; Lysaker et al., 2018). In particular, it has been suggested that metacognitive deficits may leave many persons with schizophrenia less able to form and maintain meaningful social relationships and a sense of belonging within one's community (Lysaker et al., 2011a, 2011b). Evidence supporting this includes findings that greater metacognitive deficits predict weaker social connections concurrently and at future assessment points independent of levels of psychopathology and other forms of cognition (Lysaker et al., 2010b).

Although this is promising, there have been several limitations to the literature. The first limitation is that studies linking metacognition to social functioning have exclusively relied on observer ratings or laboratory-based measures, rather than on self-report social functioning. Although observer ratings may capture important aspects of social function, there are other elements of social functioning that cannot be directly observed. For example, the level of intimacy and connection a person feels within a social interaction is inherently subjective. To understand the social experiences of people with schizophrenia, there is a need to include a self-report measure to compliment observational methods. Although self-report measures are sometimes criticized (Hamera et al., 1996; Selten et al., 2000), there is evidence that even those with poor insight are capable of accurately reporting social functioning (Bell et al., 2007). This is particularly important in persons with psychosis because they experience a persistent sense of lack of connection with others (Salvatore et al., 2007), something that a self-report measure may capture better than an observational method.

A second limitation is that studies examining metacognition and social functioning have not attempted to examine what type of social functioning is most affected by metacognitive deficits. For example, are metacognitive deficits more related to difficulties relating to others in general and/or to the presence and absence of specific social behaviors? One possibility is that those with metacognitive deficits find social exchanges confusing or even threatening and, therefore, fail to form bonds or attachments to others (Lysaker et al., 2005b). Therefore, rather than affecting the ability to engage in a specific set of behaviors, metacognitive deficits may affect social functioning by decreasing the capacity to feel connected to others. With difficulties forming a complex sense of oneself or others, persons may lack a fundamental basis for intersubjective experience (Ickes et al., 2004). Evidence suggests that those with schizophrenia have deficits in metacognition (Lysaker and Hasson-Ohayon, 2014; MacBeth et al., 2014; Vohs et al., 2014), as well as difficulty building a sense of intersubjectivity (Stanghellini et al., 2002). Therefore, regardless of what prosocial activities persons with schizophrenia engage in, this inability to feel they share their experience with others may reduce the capacity to form stable bonds with others. Understanding whether metacognition affects specific aspects of social functioning may help us conceptualize both treatment needs and ways to develop or refine interventions and seems important for improving social functioning as it remains an elusive treatment target (Roberts et al., 2012).

To address these issues, this study had two general aims. First, it explored the relationship of metacognition with the self-report of social functioning across three different domains: quality of social communication and interaction, levels of social activities, and level of social withdrawal. Based on the theory that metacognition allows for enhanced interpersonal interactions through the capacity to form an intersubjective context (Tomasello et al., 2005), we hypothesized that metacognition would be more closely related to the meaning and quality of interpersonal communication, than to social functioning measured by the behavioral outcomes of social activities and social withdrawal. We

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also sought to determine whether metacognitive capacities moderated the relationship of symptoms upon social functioning. Although our main question concerned general metacognitive capacity theoretically, relative failure on any element of the metacognitive system could be linked to poor self-assessed social function. Self-reflection gives persons a realistic sense of self and goals, allowing them to enter relationships with clear aims and reasonable expectations about how others see them, whereas the awareness of others as independent beings with separate lives is necessary for forming shared connections and negotiating when conflicts arise. Therefore, we additionally conducted exploratory analyses to determine whether specific aspects of metacognitive capacity are related to the abilities to form and sustain stable and fulfilling social connections. Finally, metacognition has been suggested to be a form of cognition, which is related to, but not synonymous with, neurocognition, which refers to broader abilities including memory, attention, and executive function (Lysaker et al., 2018). Given findings that domains of neurocognition including executive functioning are closely linked with social functioning over time in schizophrenia, we included a measure of executive functioning as a potential covariate (Green et al., 2000).

METHODS

Participants

Participants were 76 men and 12 women diagnosed with schizophrenia ($n = 50$) or schizoaffective disorder ($n = 38$) as confirmed by the Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition* (SCID). Mean age was 49.57 (SD = 8.40), and mean education was 12.80 years (SD = 1.76). Forty were Caucasian, 47 were African-American, and 1 was self-identified as Hispanic. All participants were actively involved in outpatient psychiatric treatment. Exclusion criteria included hospitalization or medication changes within the last 30 days or a chart diagnosis of active substance dependence.

Instruments

Metacognitive Assessment Scale—Abbreviated

Metacognitive capacity was measured using the Metacognitive Assessment Scale—Abbreviated (MAS-A) (Lysaker et al., 2005a; Semerari et al., 2003), with scores based on participant responses to the Indiana Psychiatric Illness Interview, a semistructured scale that asks open-ended questions about how the interviewee views their life and their mental health (Lysaker et al., 2002). The MAS-A measures the person's ability to form a sense of himself or herself and other people and to use that knowledge in ways that range from relatively more fragmented to more integrated. There are four subscales: self-reflectivity, the mind of the other-reflectivity, decentration, and mastery. Self-reflectivity measures the person's ability to form integrated ideas about himself or herself, whereas other-reflectivity measures the person's ability to form integrated ideas about other people. Decentration measures the ability to see the social world and one's place in it from multiple vantage points, and mastery represents the ability to implement effective strategies to cope with one's mental states based on metacognitive knowledge. The items of each scale are conceptualized as hierarchical, with each requiring a more complex level of integration than the items below it. Once a person is judged incapable of integrating information at the level specified by an item, it is assumed that no higher levels of integration can be performed. Ranges are presented in Table 1. Lower scores suggest that the experience of self and others exists as a group of smaller pieces of information or fragments of experiences that are relatively unrelated. Higher scores on all scales reflect greater metacognitive capacities or the ability to form a sense of self and others in which fragments of experience are integrated into relatively more complex and cohesive ideas within the flow of life. Scores on each of these subscales may be added together to yield a total score.

TABLE 1. Study Variables

	Mean (SD)	Scale Range
MAS		
Self-reflectivity	4.22 (1.40)	0–9
Other-reflectivity	3.02 (0.92)	0–7
Decentration	1.01 (0.85)	0–3
Mastery	3.60 (1.61)	0–9
Total	11.85 (1.20)	0–28
SFS		
Interpersonal relationships	113.65 (18.22)	
Social engagement/withdrawal	98.89 (10.59)	
Prosocial behavior	109.84 (15.75)	
PANSS		
Total score	75.99 (13.89)	
WCST		
Categories correct	3.09 (2.12)	
Perseverative errors	31.11 (20.56)	

The Social Functioning Scale

The Social Functioning Scale (SFS) (Birchwood et al., 1990) is a multidimensional measure of social functioning designed for use with people who have schizophrenia. The scale has been shown to have strong reliability and validity in studies using both clinical and nonclinical populations (Burns et al., 2007). We were particularly interested in three subscales of the SFS: interpersonal behavior (*e.g.*, number of close friends, quality of communication), social engagement/withdrawal (*e.g.*, time spent alone, initiation of conversation), and prosocial activities (*e.g.*, playing sports, going to concerts, visiting relatives). The interpersonal behavior subscale of the SFS represents subjective appraisal of interpersonal relationships and communication. An example item of the interpersonal behavior subscale is “How easy or difficult do you find talking to people at the moment?” In contrast, the social engagement/withdrawal subscale and the prosocial activities subscale are behavioral measures that measure frequency of engaging in activities. An example item of the social engagement/withdrawal subscale is “How often do you leave the house?” and an example item of the Prosocial subscale is “How often have you attended parties?”

Positive and Negative Syndrome Scale

The Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1987) is a 30-item rating scale completed by clinically trained research staff at the conclusion of chart review and a semistructured interview that can be summed to provide an overall measure of psychopathology. This measure has been shown to have excellent reliability and validity (Bell et al., 1992). The PANSS is known to covary with social functioning (Phalen et al., 2017).

Wisconsin Card Sorting Task (WCST)

The Wisconsin Card Sorting Task (WCST) (Heaton et al., 1993) is a neuropsychological test sensitive to impairments in executive function. It asks participants to sort cards that vary according to an unarticulated matching principle that changes after a certain number of correct responses. The current study used two scores: number of categories correct and number of perseverative errors.

Procedures

After written informed consent, the SCID was administered by a clinical psychologist to determine diagnosis and demographic variables

were collected. The SFS and the PANSS interviews were administered by research assistants with at least a bachelor's degree in a psychological field. The PANSS ratings were made blind to performance on all testing.

Data Analysis

Analyses were performed in three phases. First, we correlated the SFS interpersonal behavior, social engagement/withdrawal, and pro-social activities scores using Pearson correlations with age and education, and *t*-tests comparing the SFS scores of men and women to rule out the need to control for these variables in the next analysis. Second, we correlated select SFS subscales and the MAS-A total, PANSS total, and WCST variables. Given the number of correlations performed, we conducted two-tailed tests despite having made unidirectional hypotheses and increased the significance threshold to $p < 0.01$. During this phase, we also correlated the individual MAS-A subscales with the SFS scales for exploratory purposes. Third, in instances in which both metacognition and symptom variables were related to an SFS subscale, we planned to conduct moderation analyses using the PROCESS macro (Hayes, 2018) to determine whether metacognitive function moderated the effects of symptoms on social function.

RESULTS

Means and standard deviations of all key measures are presented in Table 1. Neither age nor education was correlated with the SFS scores, and SFS scores did not differ between gender.

Correlations between subscales of the SFS and of the MAS-A, PANSS total, and WCST scores are presented in Table 2. As revealed there, greater general symptom levels were linked with poorer functioning on the SFS interpersonal behavior, social engagement/withdrawal, and prosocial activities scales. Higher MAS-A total score and the decentration subscale were linked with better SFS interpersonal behavior scores at the $p < 0.01$ level, whereas having more categories correct on the WCST was related to better SFS interpersonal behavior and social engagement/withdrawal scores at the $p < 0.05$ level.

Given the MAS-A total and PANSS total scores were linked with the SFS interpersonal behavior scores at the $p < 0.01$ level, a moderation analysis was conducted to see if the MAS-A total moderated the effects of overall symptoms on the SFS interpersonal behavior. There was a significant interaction between PANSS total and MAS-A total as predictors of SFS interpersonal behavior (unstandardized coefficient = -0.071 , SE = 0.03 , $p = 0.019$). The negative association between PANSS total and SFS interpersonal behavior was significantly weakened when MAS-A scores were higher. A Johnson-Neyman regions-of-significance analysis was performed to identify whether there were points for the moderator (metacognitive capacity) at which the conditional effects of symptoms (PANSS total) on interpersonal behavior transition from significant to non-significant. Results show that lower symptom ratings were significantly

associated with greater interpersonal behavior scores only when metacognitive capacity was above 6.13. When these analyses were repeated, including the WCST category correct score as a covariate, the evidence of moderation remained significant.

DISCUSSION

In this study, we sought to confirm the literature associating metacognition with social functioning by using a self-report measure of social functioning for the first time. In addition, we sought to determine whether metacognition was more closely associated with quality and quantity of interpersonal connections rather than more behavioral indices and engagement or withdrawal. Consistent with our hypotheses, we found that the quality of interpersonal behavior was significantly associated with metacognition, including overall metacognition and the ability to understand one's place in the larger community, and trending toward significance in the metacognitive domains related to self-reflectivity, ability to understand others, and ability to use that information to respond to psychosocial challenges. The same measures of metacognition were generally not significantly related by contrast to amount of either prosocial behavior or social withdrawal.

We additionally examined whether the effects of symptom on self-reported social function might be moderated by metacognitive capacity. As also predicted, we found that overall metacognition significantly moderated that relationship such that the effects of symptoms on interpersonal behavior grew less as metacognitive capacity was stronger. Evidence of moderation persisted even after controlling for the effects of one domain of neurocognition, namely, executive function (Lysaker et al., 2010).

Although the cross-sectional nature of these data precludes our ability to draw causal conclusions, it may be that deficits in metacognitive capacity reduce the quality of interpersonal connections by interfering with intersubjectivity. Intersubjectivity as briefly referred to above refers to the human capacity to share the experience of another person (Stern, 1985). If one is unable to recognize that self and others have distinct emotional and mental worlds that render different perspectives (e.g., the capacity for decentration), it becomes difficult to make connections with others, to show interest or curiosity in the unique lives of other people, or to overcome frustration when others' plans do not meet our expectations. In addition, without the ability to perceive others and their intentions, it may become less possible to understand what is occurring in the interaction. Moreover, with poor capacity to understand the mental states of others, persons may tend to ascribe intentions based on primitive systems, such as defense, so they are more keen to detect signs of threat and instead be less sensitive to signs of benevolence and interest from others (Dimaggio et al., 2015). In parallel, it may be that metacognition moderates the effects of symptoms on quality of social connection, because when functioning at higher levels,

TABLE 2. Correlations of Social Function With Metacognitive Mastery, Symptoms, and Neurocognition

	Social Engagement/Withdrawal	Interpersonal Relationships	Prosocial Activities
MAS-A self-reflectivity	0.06	0.27	0.14
MAS-A other	0.14	0.23	0.18
MAS-A decentration	0.05	0.31*	0.22
MAS-A mastery	0.05	0.26	0.20
MAS-A total	0.16	0.31*	0.23
PANSS total	-0.34*	-0.56**	-0.37*
WCST—categories correct	0.24	0.24	0.20
WCST—perseverative errors	-0.15	-0.20	-0.08

* $p < 0.01$. ** $p < 0.001$.

metacognition enables persons with schizophrenia to work around their symptoms and forge meaningful connections.

The finding that total metacognitive ability was weakly related to levels of prosocial activities, whereas most individual aspects of metacognition were not, may suggest specific metacognitive abilities may be less important for increased prosocial activity, which may depend on external factors (e.g., access to transportation, advice from loved ones, or goal setting during therapy), and more important for the capacity to engage in meaningful and satisfying interpersonal interactions. In parallel, the lack of association between metacognition and social withdrawal may also suggest that metacognition interferes with the formation of but not necessarily access to contact with others. In addition, the fact that these findings persisted after executive functioning was controlled is consistent with previous studies that have suggested that metacognition, as a domain of cognition, provides explanatory power above and beyond the effects of other domains of cognitions, including neurocognition (Lysaker et al., 2010a).

There are, however, alternative explanations and rival hypotheses that cannot be ruled out. For example, it may be that with reduced quality of social connection, metacognition atrophies and persons become less able to form complex and integrated sense of self and others. In addition, it is possible other things have both damaged metacognition and capacity for interpersonal social connections such as trauma or stigma (Lysaker et al., 2008, 2015). These results also suggest hypotheses for future study. For example, it may be that the metacognitive deficits are associated with decreased social functioning and interpersonal meaning within individuals in early stages of illness or even before illness onset. Future studies should use a longitudinal or experimental design to examine the possibility that metacognition and social functioning mutually affect one another over time.

There were some interesting exploratory findings. When we examined the links of metacognition with interpersonal behavior, although the correlations of decentration and overall metacognitive capacity were marginally stronger, all were generally of a similar magnitude despite not reaching clinical significance. This may suggest that social functioning can be affected by multiple metacognitive domains or that more than one or all may interact in a larger integrative and holistic manner to affect function. However, because three of the five metacognitive domains were trending toward significance, and as with all unexpected findings, replication is needed in future research, and all interpretations should be taken as speculative at best.

There were also limitations to this study. First, our sample size was modest and was composed of mostly men in later stages of their illness who were enrolled in treatment. Future studies should use larger samples, with more diverse populations, including women, persons in early phases of illness, and those who refuse treatment. In addition, we included one measure of metacognition, and the narratives were elicited through interaction in a specific context. Future research is needed with broader assessments of metacognition and other forms of neurocognition. Finally, there may be other variables not assessed here, which might affect the observed relationships including social anxiety and attachment style.

With replication, there may be clinical implications. Because current interventions targeting social deficits do not have clear gains in functional outcomes (Roberts et al., 2012), it may be that efforts to improve social functioning must move beyond skill-based approaches. Instead, to enhance social functioning in meaningful ways, efforts should be made to enhance the basic capacities that support interpersonal connections. Interventions aimed at highlighting disturbances of intersubjectivity and enhancing metacognition rather than focusing on behavioral outcomes, such as metacognitive reflection and insight therapy (Buck et al., 2009; Dimaggio et al., 2010; Lysaker and Klion, 2007; Lysaker et al., 2007), may provide a more effective treatment for social dysfunction in persons with schizophrenia. In parallel, interventions like metacognition-oriented social skills

training (Inchausti et al., 2018; Ottavi et al., 2014), which aim at promoting social problem solving, but only after having increased metacognition in a well-regulated intersubjective session atmosphere, have the potential to increase capacities for social interactions.

DISCLOSURE

The authors declare no conflict of interest.

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