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journal homepage: [www.elsevier.com/locate/psychres](http://www.elsevier.com/locate/psychres)

# A multidimensional assessment of social cognition in psychometrically defined schizotypy



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## ARTICLE INFO

## Article history:

Received 20 October 2012

Received in revised form

27 July 2013

Accepted 8 August 2013

## Keywords:

Schizophrenia-spectrum

Emotion recognition

Theory of mind

Managing emotions

## ABSTRACT

Individuals with schizophrenia exhibit impairments in multiple social cognitive domains. There is evidence that these impairments may be trait-related vulnerability markers for schizophrenia. However, the literature focusing on individuals vulnerable to developing schizophrenia-spectrum disorders, referred to as schizotypy, has produced inconsistent findings. This study's primary aim was to provide a more comprehensive understanding of social cognitive functioning within schizotypy than previous studies by employing a broad array of measures to assess multiple social cognitive domains, and examine how these domains relate to specific schizotypy traits (i.e., positive, negative, and disorganized) and Quality of Life (QOL). Facial emotion recognition, Theory of Mind (ToM), and aspects of emotional intelligence related to regulating one's own emotions (emotion management) and other's emotions (social management) were measured. Individuals with psychometrically defined schizotypy ( $n=36$ ) and controls ( $n=26$ ) were examined. The schizotypy group performed significantly worse than controls on facial emotion recognition, ToM, and emotion management, but not social management. Generally speaking, poorer social cognition performance was not a function of specific schizotypy traits. However, negative traits were associated with poorer facial emotion recognition, and disorganized traits were associated with better social management. Facial emotion recognition was associated with QOL in the schizotypy group.

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## 1. Introduction

The mental processes used to observe, interpret, and respond to other people's emotions are encompassed in the term "social cognition." Previous studies have found that individuals with schizophrenia exhibit impairments in multiple domains of social cognition including emotion recognition (Penn et al., 2008), social-based emotion regulation/management (Kee et al., 2009), and theory of mind (Sprong et al., 2007; Bora et al., 2009)—the ability to attribute mental states to oneself and others. Social cognition plays a key role in one's ability to function in society, and impairments in several social cognitive domains have been linked to poor functional outcome in individuals with schizophrenia (Couture et al., 2006). The pervasive nature of facial emotion recognition and Theory of Mind (ToM) impairments, which persist even when other schizophrenia symptoms improve over time (Sprong et al., 2007; Penn et al., 2008; Bora et al., 2009), and evidence of a possible genetic component underlying emotion management functioning (Lo et al., 2010), suggest these impairments may be trait-related

vulnerability markers for schizophrenia (Kee et al., 2004; Aguirre et al., 2008). The present study adds to our knowledge of social cognition and schizophrenia liability by examining a broad set of social cognitive abilities in individuals with psychometrically defined schizotypy—defined as the personality organization associated with an elevated risk for developing schizophrenia-spectrum disorders (Meehl, 1962). The present study is informed by the logic and assumptions set forth by Meehl's model of schizophrenia-spectrum disorders, a diathesis-stress model that conceptualizes schizophrenia-spectrum disorders as existing on a continuum. Meehl posits that there are healthy, non-clinical individuals that possess a genetic predisposition for developing schizophrenia-spectrum disorders, and these individuals exhibit traits similar to what is seen in schizophrenia, albeit less severe (Meehl, 1962, 1990; Lenzenweger, 2006). There is a substantial body of research supporting a continuum model of schizophrenia-spectrum disorders that incorporates this concept of schizotypy—i.e., otherwise healthy individuals showing "schizophrenia-like" traits (e.g., Lenzenweger, 2010; Cochrane et al., 2012).

There are several fundamental limitations with respect to the literature on social cognition in schizotypy that the present study addresses. First, most schizotypy studies focus on a very narrow set of social cognitive domains, often times examining only one domain. This is problematic because social cognition is a

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multifaceted construct. The present study addressed this by employing a conceptually broad array of measures to assess multiple social cognitive domains: ToM, facial emotion recognition, and the ability to manage emotions. This allowed us to examine whether at-risk populations are prone to impairments in specific social cognitive domains, or if these individuals exhibit broader impairments impacting multiple aspects of social cognition. Additionally, our methodology enabled us to explore how these domains are related to one another.

Second, there is considerable inconsistency in findings across studies. For example, while several studies have found ToM impairments in individuals with schizotypy (Langdon and Coltheart, 1999; Langdon and Coltheart, 2001; Gibson et al., 2010), many other studies have failed to find such impairments (Jahshan and Sergi, 2007; Fyfe et al., 2008). Similar uncertainty exists regarding whether ToM relates to specific schizotypy traits—as schizotypy, much like schizophrenia, is a heterogeneous construct characterized by positive, negative and disorganized traits (Kerns, 2006). With respect to ToM, several studies have found a significant relationship between ToM impairments and positive schizotypy traits (Pickup, 2006; Barragan et al., 2011; Gooding and Pflum, 2011; Pflum et al., 2013) whereas other studies have failed to find this relationship (Fernyhough et al., 2008; Gooding et al., 2010). With regards to facial emotion recognition, there is stronger evidence of facial emotion recognition impairments in at-risk populations compared to controls (e.g., Williams et al., 2007; Brown and Cohen, 2010; Germine and Hooker, 2011). However, there are inconsistencies in the literature regarding whether facial emotion recognition relates to specific schizotypy traits. Although some studies have found a relationship between negative schizotypy traits and emotion recognition impairments (Williams et al., 2007; Surguladze et al., 2012), other studies have found no such relationship (Brown and Cohen, 2010; Germine and Hooker, 2011). The present study addressed this concern by employing a schizotypy sample with a diverse set of positive, negative, and disorganized traits.

In addition to ToM and facial emotion recognition, we also examined the social and emotional knowledge involved in managing emotions. Compared to emotion recognition and ToM functioning, which both involve accurately interpreting other people's behaviors, the social cognitive skill of managing emotions involves an individual's ability to act in a way that effectively influences emotions. To the authors' knowledge only one published study has examined this domain in relation to schizotypy. Aguirre et al. (2008) compared psychometrically defined high schizotypy and low schizotypy groups, and found that individuals in the high schizotypy group performed significantly worse on the managing emotions branch of the Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT; Mayer et al., 2002a), which was calculated by averaging the scores of two subtests that assess how well individuals can manage their own emotions and the emotions of others (see Section 2 for a more detailed description of these tasks). The present study builds upon these findings, and sheds light on this relatively unexplored domain, by examining performance on both managing emotions subtests, separately.

A final limitation of the current body of research concerns the lack of research examining the degree to which social cognitive impairments relate to “real-world” variables, such as quality of life (QOL) in individuals with schizotypy. We addressed this limitation by evaluating the relationship between QOL and social cognition in individuals with schizotypy.

The social cognitive domains examined in this study were selected based on previous findings suggesting that impairments in these domains may serve as vulnerability markers for schizophrenia-spectrum disorders (e.g., Kee et al., 2004; Aguirre et al., 2008; Lo et al., 2010), and the notion that, collectively, these

domains represent the basic social cognitive skills needed to successfully function in real world social interactions. Beginning with the ability to correctly identify other people's emotional expressions (facial emotion recognition), then understanding other people's emotions and actions (ToM), and ending with the ability to respond to these emotions in an adaptive way (emotion management and social management), these social cognitive domains cover a broad range of skills that people use on a regular basis.

We hypothesized that the schizotypy group would show impaired functioning relative to controls in the three social cognitive domains assessed in this study. Additionally, we expected that within the schizotypy group we would observe a significant positive correlation between ToM impairments and positive schizotypy traits similar to Pickup's (2006) findings, and a significant positive correlation between facial emotion recognition and negative schizotypy traits similar to what was observed by Williams et al. (2007). We also expected to find significant positive correlations between all four social cognition tasks. Finally, we hypothesized QOL would positively correlate with all four social cognition measures within the schizotypy group.

## 2. Methods

### 2.1. Participants

Undergraduates ( $n=7951$ ) from a university campus were invited via e-mail to participate in an online survey for a chance to win monetary prizes. Of the 2145 respondents, roughly 22% were excluded due to incomplete ( $n=467$ ) or invalid ( $n=13$ ) surveys. Surveys were deemed “invalid” if they endorsed atypical response choices to at least three of four questions from the Infrequency Scale (Chapman and Chapman, 1983). The survey included a consent form and basic demographic questions. The university's Human Subjects Review Board approved this study and written informed consent was obtained prior to participation.

Schizotypal subjects were identified based on scoring at or above the 95th percentile on at least one of the three schizotypy scales of the Schizotypal Personality Questionnaire-Brief Revised (SPQ-BR; Cohen et al., 2010). Subjects were excluded from the schizotypy group if they had only an elevation on the SPQ-BR negative subscale that was accompanied by a score on the Brief Symptom Inventory depression subscale that was below the gender-determined mean score in order to decrease the likelihood of depressive symptoms giving a “false positive” on the negative schizotypy subscale. The control group was defined based on SPQ-BR scores below the mean on all three schizotypy scales. From the 1665 participants with valid surveys, we randomly selected individuals that met criteria for either the schizotypy or the control group, and invited them to participate in the laboratory phase. Additional data was successfully obtained from 36 schizotypy and 26 control participants that completed the laboratory phase of the study. During the laboratory phase, participants completed the social cognition and QOL tasks. The entire session lasted roughly two hours. Participants received monetary compensation (\$20) for their participation in the laboratory phase of the study. See Cohen et al. (2012) for more information on recruitment and methods.

The schizotypy sample was relatively diverse with regard to the variety of schizotypy traits being represented by our participants. That is, the number of individuals exhibiting elevated scores (above the 95th percentile) on the specific trait scales of the SPQ-BR was distributed relatively proportionally with similar numbers of participants exhibiting elevations on the positive scale ( $n=10$ ), negative scale ( $n=7$ ), disorganized scale ( $n=10$ ), and elevations on two or more of these scales ( $n=9$ ).

### 2.2. Assessments

#### 2.2.1. Schizotypy dimensions

The Schizotypal Personality Questionnaire-Brief Revised (SPQ-BR; Cohen et al., 2010) is a 32-item self-report questionnaire used to identify schizotypal individuals. The SPQ-BR was created by identifying critical items from the Schizotypal Personality Questionnaire (Raine, 1991) and adding those items to the Schizotypal Personality Questionnaire-Brief (Raine and Benishay, 1995) in order to strengthen the latter's psychometric properties. Items are answered using a five-point Likert scale ranging from “strongly disagree” to “neutral” to “strongly agree.” In addition to a total score, the SPQ-BR yields three separate factors: positive, negative, and disorganized schizotypy traits. Higher scores reflect higher levels of symptomatology. Compared to the full SPQ, the SPQ-BR takes less time to administer and has been shown to result in fewer incomplete responses (Cohen et al., 2010). The SPQ has

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