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## Psychiatry Research

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

## Superior mentalizing abilities of female patients with schizophrenia

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## ARTICLE INFO

## Article history:

Received 12 April 2013

Received in revised form

30 August 2013

Accepted 11 September 2013

## Keywords:

Gender

Mentalizing

Metacognition

Sex differences

Schizophrenia

Social cognition

Theory of mind

## ABSTRACT

Mentalizing abilities are severely disrupted in patients with schizophrenia, but gender-related differences in this domain are virtually unexplored. Given the importance of these abilities in understanding psychopathology, social functioning and outcome, this study aimed to examine the mentalizing abilities of male and female patients with schizophrenia. The cognitive and affective mentalizing abilities of self and other of clinically stable male and female patients with schizophrenia were analyzed using the abbreviated version of the Metacognitive Assessment Scale (MAS-A). Compared to their male counterparts, the female patients demonstrated superior overall mentalizing abilities. This advantage was also evident when mentalizing about the Self or the Other. When examining cognitive versus affective mentalizing, women were significantly better in their ability to attribute and understand the affective mental states of others. These differences were unrelated to intelligence or psychopathology. The superior mentalizing abilities of female patients extend gender-related differences in schizophrenia to include social cognition. This suggests that our current knowledge of socio-cognitive abilities in schizophrenia is generalizable to male but not to female patients. The findings also provide important insights to understanding how etiological differences affect social cognition. Awareness to such differences has important implications for diagnosis and clinical treatment.

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## 1. Introduction

Research confirms that mentalizing abilities are severely disrupted in patients with schizophrenia, and underscores the importance of these abilities in understanding psychopathology, social functioning and outcome (Frith, 2004; Billeke and Aboitiz, 2013). However, despite the high-priority for socio-cognitive research in schizophrenia (Green and Leitman, 2008), gender differences in mentalizing abilities are virtually unexplored. In fact, a recurrent limitation mentioned in this body of research is that generalizations are often limited by the underrepresentation of women in research samples (e.g., Lysaker et al., 2010a, 2010b). In light of gender-related vulnerability in developing schizophrenia (Tandon et al., 2008) and differences in course of illness (Canuso and Pandina, 2007), examining gender differences in mentalizing abilities in this population is important to understanding how etiological differences affect social cognition, and the relevance it may have for treatment approaches and efficacy.

Mentalizing (also referred to as ‘Theory of Mind’) refers to one’s ability to attribute mental states to oneself and others, and

comprises both cognitive (i.e. reasoning about knowledge and beliefs) and affective components (i.e. reasoning about emotions) (Abu-Akel and Shamay-Tsoory, 2011). This capacity is essential for social and behavioral functioning in that it allows people to understand and predict behavior in terms of the state of their knowledge, intentions, beliefs and desires, and is a necessary aspect of our ability to empathize (Shamay-Tsoory et al., 2010). Accordingly, difficulties with mental state reasoning and attribution interfere with the recognition of important information inherent in human interactions (Brüne et al., 2009), and could undermine one’s ability to cope with distress and solve interpersonal issues (Kean, 2009).

In the absence of research specifically examining gender-related differences in mentalizing in schizophrenia, clues from other domains of socio-cognitive research suggest that male and female patients process social information differently. Most of the evidence comes from research concerned with emotion perception and processing. For example, research shows that schizophrenic males are more impaired in auditory emotion processing (Vaskinn et al., 2007), in recognizing sad facial expressions (Kohler et al., 2003), and more prone to perceive neutral faces as angry ones (Weiss et al., 2007). In addition, there is evidence for a female advantage in general cognitive domains such as language abilities, memory and executive functioning (Goldstein et al., 1998; Longenecker et al., 2010; Han et al., 2012). It is important to note

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that these abilities are often recruited in the service of mental state processing (Apperly, 2012), and even considered by some as precursors or protoforms of mental state processing (Stone and Gerrans, 2006). Moreover, it has been shown that peripheral oxytocin correlates with emotion perception in healthy women and women with schizophrenia but not in healthy men or men with schizophrenia (Rubin et al., 2011). With evidence showing a positive influence for oxytocin on theory of mind abilities in schizophrenia (Pedersen et al., 2011), gender-related differences in baseline oxytocin in schizophrenia would predict better mentalizing abilities among the female patients.

In the non-pathological literature, preadolescent (Bosacki and Astington, 1999) and adult (Carroll and Yung, 2006; Xia et al., 2012) females often proclaimed the better mentalizers. Moreover, research within the framework of Baron-Cohen's (2003) empathizing–systemizing theory of psychological sex differences demonstrates that females, as compared to males, have more empathizing-driven cognitive style (Focquaert et al., 2007), which utilizes the capacity to detect others' mental states in order to predict their behavior and respond with an appropriate emotion (Baron-Cohen et al., 2005). This dovetails with research demonstrating that females possess superior emotional intelligence whereby they are better at perceiving emotions in others and in using these emotions to guide their thoughts and behavior (Brackett et al., 2004). Supporting evidence for these differences is provided by imaging studies which suggest that gender-related differences in mentalizing (Krach et al., 2009) and empathizing (Schulte-Ruther et al., 2008) might be associated with gender-specific neural mechanisms. More recently, gender-related differences in neural activations were also observed when making social appraisals of oneself or of others, as well as when reflecting on self-appraisals (Veroude et al., 2013). Accordingly, one would predict that such gender-related mentalizing differences within the general population would also be present among patients with schizophrenia. However, it should be noted that individuals differences in neural structures associated with discrepant empathizing–systemizing cognitive styles were also discerned, independent of gender, in an all-male adult sample (Lai et al., 2012).

To examine the extent to which schizophrenia impinges on this seeming female advantage, we evaluated the mentalizing abilities of male and female patients with schizophrenia based on video recorded clinical interviews using the abbreviated version of the Metacognitive Assessment Scale (MAS-A) (Lysaker et al., 2005). In this context, it is important to note that while we acknowledge that 'metacognition' and 'mentalizing' are two concepts that have distinct theoretical and developmental origins, they generally refer to the ability to comprehend actions and behaviors in terms of one's own and other mental states (Dimaggio et al., 2011). In this regard, a recent study found that the MAS was correlated with the Social Cognition and Object Relations Scale (SCORS) which assesses aspects closely related to Theory of Mind functioning (Lysaker et al., 2010a). Moreover, these concepts have been used in many studies as similar, and there is a broad consensus indicating that these terms refer to almost the same psychological function (Bateman and Fonagy, 2011). Crucially, this instrument allows us not only to evaluate the patients' general mentalizing abilities, but also to evaluate four important aspects of the mentalizing capacity which include self versus other as well as cognitive versus affective mentalizing. Given the great variability in mentalizing abilities among patients with schizophrenia (Abu-Akel and Shamay-Tsoory, 2013), these distinctions are important in that they allow us to inspect, in finer detail, gender-related differences. Based on evidence from schizophrenia research showing a female advantage in emotion processing and other cognitive domains, and a possible neurochemical profile associated with enhanced social cognition, we hypothesized that the female patients would demonstrate superior overall mentalizing abilities, particularly within the affective domain.

## 2. Method

### 2.1. Participants

The data of 42 (21 males and 21 females) patients meeting the International Classifications of Diseases-10th Revision (ICD-10) diagnostic criteria for schizophrenia were analyzed for the purposes of this study. These patients, recruited from psychiatric facilities around Denmark, were selected from a larger cohort of 108 patients (21 female) who volunteered to participate in a study on metacognitive abilities in schizophrenia. All patients were stabilized on fixed doses of anti-psychotic medications. None of the patients had an organic disorder. At the time of assessment, none of the patients were under the influence of alcohol or drugs, and did not display psychotic symptoms. All patients were informed about the nature of the study, and were given a written summary of the purposes and procedures of the study. The study was approved by the Danish Ethical Committee and complies with the requirements of the Declaration of Helsinki.

### 2.2. Clinical measures

The male and female groups were matched in terms of their age, age of illness onset, duration of illness, socioeconomic background, verbal IQ, level of psychopathology and social functioning. The clinical and demographic data were collected using translated and validated Danish measures and included a demographics questionnaire, the vocabulary subtest of the Wechsler Adult Intelligence Scale – Third Edition (WAIS-III) (Wechsler, 1997), the Global Assessment of Functioning Scale (GAF), as well as the abbreviated version of the Positive and Negative Symptom Scale (PANSS) (Kay et al., 1989). The second author conducted and scored all the assessments and interviews. For inter-rater reliability purposes, a subsample (25%) was rated by a trained clinical psychologist, blind to the study. According to the Fleiss-Guidelines (Fleiss et al., 2003), the inter-rater reliability for all instruments were excellent (ICC, all  $r_s \geq 0.80$ , all  $p_s < 0.001$ ).

### 2.3. Mentalizing assessment

The patients' mentalizing abilities were assessed using the *Metacognitive Assessment Scale-Abbreviated Version* (MAS-A) (Lysaker et al., 2005), which was specifically developed to measure metacognitive/mentalizing abilities in patients with serious mental diseases such as schizophrenia. This scale is an adaptation of the MAS by Semerari et al. (2003) which was originally designed to detect changes in the metacognitive abilities of patients with personality disorders undergoing psychotherapy. Typically, the MAS is applied to interview transcripts of the Indiana Psychiatric Illness Interview (IPII) (Lysaker et al., 2002). For the purposes of this study, a scoring manual was developed in close collaboration with Paul Lysaker (Manual can be requested from the second author) based on video-recordings of PCL-R interviews (The Hare Psychopathy Checklist-Revised) (Hare, 2003). This semi-structured interview, lasting from 90 to 120 min, is divided into 12 sections exploring various topics. For the purposes of the metacognition scoring, the following six topics were selected: school and education, employment history, career goals, upbringing and family history, friends and intimate relations and antisocial behavior. During these interviews, participants, for example, recounted in an interactive way with the interviewer their school history, whether they liked their school period, how their teachers would have described them, and how they interpreted their own role in the peer group. Such a conversational paradigm provides a more naturalistic method to evaluate mentalizing abilities as opposed to scripted paradigms in which mentalizing abilities are cued. Another important advantage of this procedure is that it allows the rater to take into account valuable information conveyed through gesture and facial expressions when coding mentalizing abilities particularly those pertaining to intentionality and affective states. Here, the rater must, for example, determine if the participant can communicate the different emotions they feel and recognize that their understanding of life events is subjective. The full presence of a function is awarded a score of '1', and '0.5' if it is only partially present. A total score (or MAS-Total), ranging from 0 to 28, is generated by summing the scores of its four subscales of *Self Reflectivity*, *Understanding the others' mind*, *Decentration* and *Mastery*. For the purposes of the current study, we are interested, in addition to the total score, in the scores received on the *Self Reflectivity* and *Understanding the others' mind* subscales, referred to hereafter as the MAS-Self and MAS-Other. Scores received on these subscales range from 0 to 9 for MAS-Self and from 0 to 7 for MAS-Other. Each point on these scales constitutes a step. With each step the participant demonstrates the ability to think about oneself and other's knowledge, intentions and emotions in an increasingly complex and integrated manner (for details see Lysaker et al., 2010a).

Scores above 4 for MAS-Self and above 3 for MAS-Other generally indicate that the participant is aware of their emotions as well as the emotion of others and are able to mentalize both cognitively and affectively. Using this as a guideline, we produced a categorical measure of affective and cognitive mentalizing by evaluating steps 4 and 5 for MAS-Self and steps 3 and 4 for MAS-Other. Each step received a score of '0' or '1'. This scheme produced 4 categories that denote the various combinations of the presence or absence of cognitive and affective mentalizing for

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