Psychiatry Research 220 (2014) 118–124

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Performance in multiple domains of social cognition in parents of patients with schizophrenia

Marie-Audrey Lavoie [a,b,c], India Plana [b,d], Philip L. Jackson [a,b,c], Florence Godmaire-Duhaime [a], Jacinthe Bédard Lacroix [a], Amélie M. Achim [b,d,*]

[a] École de psychologie, Université Laval, Quebec city, Québec, Canada
[b] Centre de recherche de l'Institut universitaire en santé mentale de Québec, Quebec city, Québec, Canada
[c] Centre interdisciplinaire de recherche en réadaptation et réintégration sociale, Quebec city, Québec, Canada
[d] Faculté de médecine, Université Laval, Quebec city, Québec, Canada

ARTICLE INFO

Article history:
Received 11 December 2013
Received in revised form
10 June 2014
Accepted 24 July 2014
Available online 1 August 2014

Keywords:
Social cognition
Schizophrenia
First-degree relatives
Mentalizing
Social knowledge
Emotion recognition
Empathy

ABSTRACT

Social cognition refers to a set of cognitive abilities that allow us to perceive and interpret social stimuli. Social cognition is affected in schizophrenia and impairments have also been documented in unaffected relatives, suggesting that social cognition may be related to a genetic vulnerability to the disease. This study aims to investigate potential impairments in four domains of social cognition (mentalizing, emotion recognition, social knowledge and empathy) in the same group of relatives in order to gather a more complete picture of social cognition difficulties in this population. The *Batterie Intégrée de Cognition Sociale* (BICS) (mentalizing, emotion recognition, and social knowledge) and the *Interpersonal Reactivity Index* (IRI) (empathy) were administered to 31 parents of patients with a psychotic disorder and 38 healthy controls. Parents of patients performed significantly worse than controls on the mentalizing test but significantly better on the social knowledge test. No significant between-group differences were observed for emotion recognition and empathy. This study is the first to evaluate four social cognition domains in this population. The results precise which social cognition processes may be impaired or preserved in unaffected relatives of patients and lead us to propose an hypothesis about a mechanism that could underlie the mentalizing difficulties observed in this population.

1. Introduction

Schizophrenia is a multi-determined psychotic illness characterized by symptoms that can fluctuate widely over time (e.g., hallucinations, delusions, disorganization; APA, 2013), as well as more stable characteristics including cognitive deficits and alterations in brain structure (Nopoulos et al., 1994; Shenton et al., 2001). These more stable features have been the focus of many recent studies about psychosis as they may be trait-related and thus linked to a genetic vulnerability to develop schizophrenia (Braff et al., 2007). Gottesman and Gould (2003) described these trait-related characteristics, or endophenotypes, as measurable intermediate characteristics between the full phenotype and the genotype. These characteristics (e.g., cognitive, neuroanatomical, neurophysiological, or biochemical abnormalities) are thought to be more directly related to the specific genes implicated in schizophrenia than the syndrome itself (Gottesman and Gould, 2003) and represent major targets for prevention and the early treatment of the illness.

Among these stable schizophrenia-related deficits, social cognition difficulties could be an important characteristic to examine. Social cognition refers to a large range of skills that allow people to perceive and interpret social stimuli and that guide daily social interactions (Frith and Frith, 2007; Green et al., 2008; Achim et al., 2012b). Many constructs have been associated with social cognition, though certain inter-related domains have emerged as more central in schizophrenia such as mentalizing, social perception/knowledge, emotion recognition, attributional bias and likely higher order aspects of emotion processing such as empathy (Green et al., 2008; Lee et al., 2011; Savla et al., 2013; Pinkham et al., 2014). *Mentalizing* (also known as Theory of Mind) refers to the capacity to infer the mental states (e.g., beliefs, intentions, desires, and emotions) of others typically based on the integration of complementary information about the person and the context in which the person evolves (Frith and Frith, 2006; Achim et al., 2013). *Social perception/knowledge* can be defined as the body of knowledge one holds in memory about theoretical social situations (e.g., the knowledge of social contexts, social rules, social goals or of what is expected in different social

* Correspondence to: F-4500, 2601, de la Canardière, Québec (Québec), Canada G1J 2G3. Tel.: +1 418 663 5741.
E-mail address: amelie.achim@fmed.ulaval.ca (A.M. Achim).

http://dx.doi.org/10.1016/j.psychres.2014.07.055
0165-1781/

situations). *Emotion recognition* refers to the ability to identify affective states from social cues such as facial expressions or prosody. *Empathy* involves the ability to share and respond to others' emotional states (Decety and Jackson, 2004). *Attributional bias* refers to the way in which people explain the cause of social events (Pinkham et al., 2014). The inter-dependent nature of these processes implies that deficits in lower-level aspects of social cognition (emotion recognition and social perception/knowledge) can impact a person's ability to mentalize or to empathize with others (Frith and Frith, 2006; Achim et al., 2012b).

Social cognition impairments have been consistently observed in schizophrenia, both in chronic and recent-onset patients (Edwards et al., 2002; Sprong et al., 2007; Achim et al., 2012b). These impairments are associated with poor social functioning (Fett et al., 2011) and have been shown to mediate the relationship between non-social cognitive deficits and functioning (Brekke et al., 2005). In addition, impairments in social cognition were also observed in remitted patients, suggesting that these impairments are stable during the course of the illness (Bora et al., 2009a; Kohler et al., 2010). The only aspect of social cognition that has not revealed consistent deficits across groups of patients is attributional bias (Savla et al., 2013) and this type of bias seems linked with specific symptoms of the illness rather than the illness itself (Langdon et al., 2013).

Social cognition has also been studied in unaffected first-degree relatives of schizophrenia patients (Irani et al., 2006; Janssen et al., 2003; de Achával et al., 2010; Montag et al., 2012). In order to correspond to an endophenotype of the illness, deficits observed in patients also have to be observed in relatives, though in a milder form (Gottesman and Gould, 2003), as patients' relatives share part of the genes of the patients even if they are not affected by the illness. Some studies looking for social cognition endophenotypes have observed lower performance in unaffected relatives, compared to control participants, in mentalizing (Mazza et al., 2008; Anselmetti et al., 2009; Riveros et al., 2010; Huepe et al., 2012) and in emotion perception (Bediou et al., 2007; Alfimova et al., 2009; Erol et al., 2010), while others found no significant social cognition impairments in this population (Kelemen et al., 2004; Rasetti et al., 2009; Meijer et al., 2012).

We reviewed and summarized the literature on social cognition abilities of unaffected relatives in a recent meta-analysis. This work revealed mean impairments of moderate effect sizes for both mentalizing ($d=-0.48$) and emotion recognition ($d=-0.41$; Lavoie et al., 2013). Only two studies have targeted social perception/knowledge in relatives of schizophrenia patients. One showed a significant group difference for a task requiring to assess expressions and link them with a social context (Toomey et al., 1999) while the other observed no significant group difference for a task requiring to make trustworthiness judgments (Baas et al., 2007). Only one study has investigated self-reported empathy in this population and no significant difference between unaffected relatives and controls was observed (Montag et al., 2012). In accordance with a previous review (Bora et al., 2009b), the results from our meta-analysis suggested that deficits in at least some domains of social cognition may represent a trait of the illness and may potentially be related to a genetic vulnerability to develop the pathology (Lavoie et al., 2013).

The Consortium on the Genetics of Schizopohrenia (COGS), a major initiative addressing neurocognitive endophenotype of schizophrenia, has already considered social cognition among other cognitive measures of interest but have so far focused only on emotion recognition (Gur et al., 2007; Greenwood et al., 2012). Other aspects of social cognition could also represent valuable endophenotypes of schizophrenia, but have received less attention until recently. Studies with healthy relatives of schizophrenia patients have limited their assessments to one or two domains of social cognition (see Lavoie et al. (2013) for a review), often including emotion recognition and more recently mentalizing. Other aspects of social cognition have received much less attention, making it hard to see a global portrait of social cognitive deficits in this population. Identifying the full range of social cognition processes that are specifically impaired and preserved in healthy relatives of schizophrenia patients represents an important step towards advancing the knowledge of the pathogenesis of schizophrenia.

The aim of this study is thus to investigate the social cognition abilities known to be impaired in schizophrenia in a group of unaffected parents of patients with schizophrenia, including performance on mentalizing, emotion recognition, social perception/knowledge and empathy. In order to enlarge the body of evidence regarding how the different social cognition domains can be related to a genetic vulnerability associated with the illness, this study aimed to specify which of these social cognition processes are impaired or preserved in first-degree relatives of patients with schizophrenia and to establish relations between these aspects within the same population.

2. Method

2.1. Participants

Thirty-one (31) unaffected parents (mean age of 56.10 ± 7.27 years, nine men) of patients with a non-affective psychotic disorder were recruited through the *Clinique Notre-Dame des Victoires*, a clinic specialized in recent-onset psychosis in Québec City, Canada. Only parents of patients were selected among other first-degree relatives in order to have a more homogeneous group in terms of age. Parents were either related to patients with a diagnostic of schizophrenia ($n=20$), schizoaffective disorder ($n=4$), psychotic disorder not otherwise specified, ($n=3$) or delusional disorder ($n=4$).

Thirty-eight (38) healthy controls (mean age of 54.55 ± 6.81 years, 11 men) were also recruited through advertisements in local media and public places. Healthy controls were excluded if they had 1) a psychiatric illness, 2) a family member with a psychotic disorder (e.g., schizophrenia, schizoaffective disorder or bipolar disorder), or 3) were taking a psychoactive medication. Socio-economic status was assessed using the Hollingshead two-factor index of social position (Miller, 1991).

Participants were excluded if presenting a neurological disorder or an IQ under 70. IQ was estimated from two subscales of the Wechsler Adult Intelligence Scale III (WAIS-III) (Bloc design and Vocabulary; Ringe et al., 2002). All participants gave informed consent after study procedures were explained.

2.2. Tasks

2.2.1. Social cognition assessment

Social cognition was evaluated with the *Batterie Intégrée de Cognition Sociale* (BICS) (Achim et al., 2012b) and with a French version of the self-reported empathy questionnaire, the Interpersonal Reactivity Index (IRI; Davis, 1983). The BICS is composed of three main measures of social cognition evaluating respectively mentalizing (the *Combined Stories test),* social perception/knowledge (the *Social Knowledge test*) and emotion recognition (the *Emotion Recognition test*).

1) The *Combined Stories test.* This task is a verbal mentalizing task in which the participants had to read aloud short stories and then answer one or two questions about the mental states of the story characters (e.g., emotions, beliefs, and intentions). Twenty mentalizing stories were presented and each subsequent question was scored 0, 1, or 2 points using a correction grid that takes into account the accuracy and complexity of the answer (e.g., 1 point is given for an answer that is too concrete; 0 point for a incorrect answer). Six of the stories were followed by two questions, for a total of 52 points for the mentalizing stories. The *Combined Stories test* also includes six non-social reasoning stories, constructed similarly to the mentalizing stories but that require non-social reasoning rather than mental states attributions. Questions were also scored 0, 1 or 2 points for a total of 12 points. Each story (mentalizing and non-social reasoning) had a reading control question, scored 0 or 1, in order to confirm that the participant understood the story.
2) The *Social Knowledge test*. This task, developed by Achim et al. (2012b), involves presenting a series of situations in which people can find themselves (e.g., "Someone who is chased by a huge dog"). For each of these contexts, the participants were instructed to state the feeling or reaction that would be most common in such situations. No specific character is presented and no action or verbalization is being produced, unlike mentalizing tasks in which mental states are inferred based on what a character is expressing or doing in