



The relationship between theory of mind deficits and neurocognition in first episode-psychosis



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ARTICLE INFO

Keywords:

Theory of mind
Neurocognition
Social cognition
Psychosis
First-episode psychosis

ABSTRACT

Research suggests that theory of mind (ToM) deficits are related to chronic psychosis and to first-episode psychosis (FEP) independently of other neurocognition domains. The aim of this study was to measure the differences in ToM area in a Spanish population of FEP sample ($N = 32$) and in a healthy control group ($N = 32$). A further aim was to describe the relationship between different domains of neurocognition, psychotic symptoms and social functioning with ToM in this sample. ToM was assessed with the MASC task. Estimated IQ with a short version of the WAIS III, Rey-Osterrieth Complex figure, Trail Making Test, Stroop test and Wisconsin Carding Sorting test were used to assess neurocognition. Psychotic symptoms were assessed with Community Assessment of Psychic Experiences (CAPE) in both groups and with PANSS scale in FEP group. GAF and Cannon-Spoor scales were used to measure social functioning before and after onset of psychosis. FEP showed important deficits in ToM domain compared to controls. A worse executive functioning was associated with worse scores in ToM task. However, no relation was found between positive or negative psychotic symptoms and ToM or social functioning and ToM. In our sample neurocognition tests were strongly related to ToM domain independently of other variables.

1. Introduction

Theory of Mind (ToM) refers to the cognitive ability of inferring intentions, and beliefs that oneself and others hold (Premack, 1978). ToM deficits have been suggested as a key cognitive aspect of schizophrenia (Frith, 1992). Actually, a large body of research confirms that ToM is disrupted in patients with schizophrenia (Brune, 2005). Moreover, these deficits seem to be independent of other deficits in executive functioning or general neurocognitive impairments (van Hooren et al., 2008).

Recently, ToM has been described as a mediator between neurocognition and social competence (Couture et al., 2011). Social cognition has been found to be more strongly associated with social functioning than neurocognition, with the strongest association found with ToM compared with other social cognitive functions (Fett et al., 2011).

Relatively few studies have focused on ToM of first-episode psychosis (FEP) (Ayesa-Arriola et al., 2016; Bora and Pantelis, 2013;

Healey et al., 2016). It is known that ToM is not a dichotomous concept (present/absent), but rather a complex construct. Thus, ToM can be differentiated between “overmentalizing” – to excessively attribute intentions or self-referential meanings to others, and “undermentalizing” – to lack a functional concept of mental states (Frith, 2004). This classification is relevant because positive symptoms have been related to “overmentalizing” and negative ones to “undermentalizing” states (Montag et al., 2011). Besides, studies about the stability of ToM deficits in FEP individuals indicate that they are fairly stable across different phases of illness (Bora and Pantelis, 2013; Healey et al., 2016). Recently, Ludwig et al. (2017) have examined the properties of the Social Cognition Psychometric Evaluation battery in early psychosis. Only Hinting task demonstrated good properties to be administered in FEP. However, MASC task was not evaluated in this study; to the best of our knowledge, this paper is the first to use MASC task in FEP.

Neurocognitive deficits, such as deficits in attention, working memory and processing speed, have been extensively studied in

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schizophrenia patients and are well known factors in the limitation of psychosocial functioning. An important meta-analysis showed that neurocognitive deficits are still studied more frequently than social cognition in psychosis, although overall associations with psychosocial functioning appear to be stronger for social cognition domains (Frith, 2004).

The aim of this study was to measure ToM in a Spanish population of FEP sample and in a healthy control group. A further aim was to describe the relationship between different domains of neurocognition, psychotic symptoms and social functioning with ToM in this sample.

Firstly, it was hypothesized, that patients would perform worse than controls across all domains of ToM and neurocognition tasks. Secondly, the deficits in ToM would not be related to other neurocognition, demographic or clinical aspects. And thirdly, ToM would be associated to social functioning in FEP group.

2. Methods

2.1. Subjects

Data were obtained from a sample of FEP subjects ($N = 32$), admitted consecutively to the FEP program of Basurto University Hospital from September 2014 to December 2016. All participants were between 18 and 60 years old, provided written informed consent, and were tested by trained research psychologist/psychiatrists. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. The local ethics committee (Ethics Committee of Clinical Research of Basurto University Hospital) approved the study design. Participants in the FEP group had SCID confirmed DSM-IV diagnosis of psychosis (American Psychiatric Association, 1994).

FEP subjects had received less than one year of antipsychotic treatment and they were in a non-acute phase of the disorder. Controls ($N = 32$) were recruited from the general population in the same catchment area as the patients through public announcements, and did not have first – degree relatives with a psychotic disorder. Socio-demographic and clinical variables were collected in the sample.

Inclusion criteria were the following (for both groups): age between 18 and 60 years, adequate ability to speak and understand the Spanish language, $IQ > 70$; for FEP sample: treatment with antipsychotic medication < 1 year and the psychotic episode fulfilled DSM-IV-TR criteria for affective or non-affective psychotic disorder. Exclusion criteria for the two groups were: current or past comorbid diagnosis of any neurological disorder which could prevent neuropsychological task performance, currently suffering severe medical conditions, any current drug dependence and unwillingness to participate.

2.2. Procedures

2.2.1. ToM task

The MASC task (Lahera et al., 2014) was used to assess ToM. MASC task is an approximately 15 min film where a group of people have a dinner party. Subjects must answer 46 multiple-choice questions in order to try to understand what the characters are feeling and thinking. Only one answer out of four is correct. The movie scenes display social situations, which contain irony, sarcasm, implicit social rules, faux pas and insinuations, and ambiguous non-verbal communication. The four choices of each answer include, (1) correct attribution of ToM to the characters of the film, (2) overmentalizing errors (a mental state that is attributed when there is no reason to), (3) undermentalizing errors (a present mental state that is not attributed) and (4) total absence of mental inference (a physical causality attribution instead of a mental state). The MASC yields a summed score for all questions, indicating general ToM performance.

2.2.2. Neuropsychological measures

The Rey-Osterrieth Complex figure test (Rey, 1994) permits the evaluation of visuospatial constructional abilities, memory, and planning. The patient is presented with a figure that must be copied. After a short period, the subject should reproduce the figure presented from memory. The figure can be split into 18 items and scores may vary from 0 to 36 depending on the number of items drawn, their correct location and accuracy. The measures studied include a copy score, the time required to copy the figure and immediate or 3-min recall score.

The Trail Making Test (TMT) (Sánchez-Cubillo et al., 2009) measures attention, speed and mental flexibility. Participants were administered parts A and B of the TMT according to the guidelines presented by Strauss et al. (2006). Total time in seconds for parts A and B was recorded, representing the TMT-A and TMT-B direct scores.

The Spanish adaptation of the Stroop Test (Golden, 1994) was used to assess the ability to maintain a goal in mind and to inhibit a habitual response in favor of a less familiar one (inhibitory/interference control). Four indexes were obtained: the first two, the word reading score (PTP) and the colour-naming score (PTC) measure processing speed; the colour-word score (PTPC) reflects the ability to inhibit automatic response; and the interference score reflects the difference between performance in colour-word part (PTC) and expected performance taking into account reading speed (PTP) and colour naming speed (PTC). For the three basic scores, higher T scores reflect better performance. For the interference score, lower scores (a T score of 40 or less) are generally indicative of problems.

The Wisconsin Card Sorting test (WCST) (Heaton, 1981) is considered a measure of executive function. It consists of four key cards and 128 response cards with geometric figures that vary according to three perceptual dimensions (colour, form, or number). The subject is instructed to sort each response card under one of the stimulus cards, whichever the subject thinks is correct. Many authors normally rely on no more than two or three scores as an index of subject's performance, including: number of categories completed, number of perseverative errors, and number of non perseverative errors (Barceló and Knight, 2002).

The short form of the Wechsler Adult Intelligence Scale (WAIS)–III (Blyler et al., 2000) was administered for an indication of intellectual functioning (IQ), and included the following tests: 'Block Design' (odd items), 'Digit Symbol', 'Arithmetic' (odd items) and 'Information'.

2.3. Clinical measures

2.3.1. Psychotic dimension

The Community Assessment of Psychic Experiences (CAPE) (Ros-Morente et al., 2011): consists of 42 items that tap into the psychotic phenotype. This scale was used to determine positive, negative and depressive symptoms along a frequency scale (1 = never to 4 = nearly always) and a distress scale (1 = not distressed to 4 = very distressed) in both groups.

Positive and Negative Syndrome Scale (PANSS) (Peralta and Cuesta, 1994): was used to assess symptoms in patients. This scale contains one positive symptom subscale, one negative symptom subscale and one subscale of general psychopathology. Each item can be rated from 1 (absent) to 7 (extreme). van der Gaag et al. (2006) developed a more fine-grained model of symptoms. This model also captures disorganized symptoms. The positive, negative, and disorganized symptom factors of the Van der Gaag model were used in our analyses.

2.4. Social functioning

A short form of the Cannon-Spoor premorbid adjustment scale (PAS) (Barajas et al., 2013) was used (childhood subscale (up to age 11) and early adolescence subscale (12–15 years)). The scale examines 4 areas of development: sociability and withdrawal, peer relationships, ability

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