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Schizotypal traits and cognitive performance in siblings of patients with psychosis

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ABSTRACT

Introduction: Schizotypy has been proposed to be the expression of genetic vulnerability to schizophrenia. The available literature shows cognitive similarities between schizotypy and schizophrenia, with mildly impaired performance being associated with schizotypy. This study aims to determine the relationship between schizotypy and cognitive performance in siblings of patients with psychosis.

Methods: Schizotypal features and cognitive performance on a neuropsychological battery were compared between 48 siblings of patients with psychosis and 44 healthy controls. The relationships between schizotypy and cognitive performance were analysed by controlling the condition of being a sibling.

Results: Siblings showed poorer performance on vigilance/sustained attention (M = 37.6; SD = 7.1) and selective attention/interference control/working memory (M = 23.28; SD = 2.7) tasks. The variance in vigilance/sustained attention performance was explained, at 30%, by the interpersonal factor of schizotypy on the suspiciousness dimension and the condition of being a sibling.

Conclusions: Interpersonal features of schizotypy in siblings of patients with psychosis are associated with deficits in vigilance/sustained attention performance.

1. Introduction

Schizotypy has been shown to have genetic continuity with schizophrenia and other psychotic disorders (Chen, 2013; Nelson et al., 2013; Tienari et al., 2000). Schizotypy has a multidimensional nature, such as schizophrenia. The three dimensional solution is the most accepted (Fonseca-Pedrero et al., 2011), with positive, negative and disorganised dimensions, like has schizophrenia though with more attenuated and non-psychotic symptoms (Kety et al., 1994).

Currently, different hypotheses regarding genetic vulnerability to schizophrenia exist, and the most consolidated of these are the polygenic models. They include the neurodevelopmental hypothesis, which suggests that an alteration of the early neurodevelopmental processes could lead to schizophrenia and its attendant cognitive and psychosocial deficits (Arnold et al., 2004; Franco et al., 2010; Keshavan, 1999; Keshavan and Hogarty, 1999; Mjellem and Kringlen, 2001; Nehra et al., 2016).

The literature shows that people at high genetic risk of developing schizophrenia may present neurobehavioral signs throughout their lives, such as schizotypal personality traits and cognitive dysfunction (Allen et al., 2009; Nehra et al., 2016), that are indicators of vulnerability to the illness (Hans et al., 1999; Prasad and Keshavan, 2008). Some authors consider these signs to be part of the schizophrenia diathesis (Bhojraj et al., 2010; Diwadkar et al., 2006). First-degree relatives of patients with psychosis have increased levels of schizotypy, predominantly in the negative dimension (Ettinger et al., 2014). Schizotypy has been implicated as a key expression of risk in the relationship between familial liability and schizophrenia (Lenzenweger, 2006).

There is evidence from both neuroimaging and neurological studies that supports the idea that some first-degree relatives of patients with schizophrenia have structural and functional brain changes that are similar to those of their affected relatives, although not to the same degree (Chan et al., 2010; Knöchel et al., 2016; Kong et al., 2012; Neelam et al., 2011; O'Donoghue et al., 2015; Prasad et al., 2015; Seidman et al., 2014; Yan et al., 2015; Zhang et al., 2016).

Relatives of patients with psychosis have shown intermediate performance between patients and controls with respect to memory, attention, and executive function (Bhojraj et al., 2010; Delawalla et al., 2008; Egan et al., 2001; Onwuameze et al., 2016; Şevik et al., 2011; Sitskoorn et al., 2004; Snitz et al., 2006; Szoke et al., 2005). There is

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also a specificity of these cognitive markers as risk signs for schizophrenia rather than bipolar and affective disorders (Cornblatt and Erlenmeyer-Kimling, 1985; Kremen et al., 1998; Wobrock et al., 2009). Moreover, according to the genetic hypothesis, families with multiple affected members will exhibit more deficits (Faraone et al., 2000).

Cognitive deficits shown by the patients with schizophrenia and their relatives have been observed in a similar way in patients with schizotypal personality disorder (Raine, 2006; Voglmaier et al., 1997) and in healthy people with schizotypal traits (Kim et al., 2011). Schizotypy has been associated with a poor performance on attention (Gooding et al., 2006; Lenzenweger, 2001), working memory (Park and McTigue, 1997), and executive functioning (Daneluzzo et al., 1998; Lenzenweger and Korfine, 1994) tasks. Genetic vulnerability has been more specifically studied by Johnson et al. (2003) in a sample of monozygotic and dizygotic siblings of patients with schizophrenia compared with healthy controls. They found a relationship between schizotypal traits and cognitive dysfunction only in siblings of patients.

A convergent research approach between these vulnerability markers may increase knowledge of psychosis diathesis, and it may help to better identify high-risk subjects (Diwadkar et al., 2006). Schizotypal traits may distinguish a more vulnerable sub-group among individuals genetically predisposed to psychosis with more neurodevelopmental alterations, such as cognitive deficits (Bhojraj et al., 2010).

In light of these results, we aimed to analyse and quantify the linear relationship between the schizotypal traits and the cognitive performance of the sample, taking into account the condition of being a sibling of a patient with psychosis. We hypothesised that the siblings of patients with psychosis will present poorer cognitive performance than healthy controls and that these differences will be associated with schizotypal traits.

2. Methods

2.1. Participants

This is a cross-sectional analytical study with two comparative groups formed by siblings of patients with psychosis (assessment based on the DSM-IV-TR) and a healthy control group. The study sample was made up of 92 subjects: 48 siblings and 44 controls. All of them were recruited as part of a broader family study of psychosis investigating phenotypes and genotypes of functional psychosis. We included only siblings as relatives because they are at a greater genetic risk and because we desired to avoid cultural and educational biases that could be present to a comparatively greater degree among other relatives. The relative group comprised siblings of patients with psychosis at the University Hospital Institut Pere Mata in Reus, Spain. Healthy controls were recruited mainly from the university and some of them form the general population.

All participants were more than 18 years old and Caucasian. None had a prior diagnosis of any psychotic disorder, mental retardation, pervasive developmental disorder, delirium, dementia, amnestic or other cognitive disorders based on the DSM-IV-TR. All were evaluated with The Schedule for Clinical Assessment in Neuropsychiatry questionnaire (SCAN; Vázquez-Barquero, 1993). They consented to participate in the study and signed the informed consent form, had sufficient knowledge of the Spanish language and understood the informed consent and all the evaluation instructions. Siblings were only those who shared two parents, were not adopted, and whose psychotic sibling had previously consented to their participation in the study.

2.2. Measures

2.2.1. Schizotypal Personality Questionnaire (SPQ Raine, 1991)

The schizotypal traits were assessed using the SPQ in its Spanish version, which was translated and validated by Grasa et al. (2004). The SPQ is a self-assessment scale containing 74 items with a yes/no answer format and a scoring range of 0–74. These items formed nine dimensions grouped in three factors: cognitive-perceptual factor (ideas of reference, odd beliefs/magical thinking, unusual perceptual experiences and suspiciousness/paranoid ideation), interpersonal factor (social anxiety, no close friends, constricted affect and paranoid ideation), and disorganised factor (eccentric/odd behaviour and appearance, odd speech). The Spanish version of the scale (Grasa et al., 2004) has shown a high internal reliability ($\alpha = .90$), which is equal to Raine's original version. The criterion validity is high and correlates significantly with the SCID-II measurements ($r = .694$, $p < .01$), as well as the convergent validity on the O-LIFE scale ($r = .696$, $p < .01$) (Mason et al., 1995). In general, the good psychometric properties of the original version of the SPQ are maintained. This questionnaire has been used previously in a Spanish sample of siblings of patients with psychosis (Albéniz, 2004). The items of the lie scale (L) of the Spanish version of the Eysenck Personality Questionnaire-Revised (EPQ-R; Eysenck and Eysenck, 1997) were introduced between SPQ items to control the possible bias of social desirability, especially in siblings' responses. We used this strategy previously to assess schizotypal traits in siblings (Moreno Samaniego et al., 2011).

We used the SPQ because of its multidimensional nature, which makes it a more comprehensive measure of the construct and its components.

2.2.2. Neuropsychological battery

Cognitive performance was evaluated using a neuropsychological battery composed of different tests that were factorized using the maximum likelihood method with an oblique rotation, oblimin. We used a sample of 300 subjects of the broader family study to which this study belongs. It included psychotic (54%) and pathological personality (8%) patients, their first degree relatives (18%), and healthy controls (20%). Psychotic patients suffered from: paranoid schizophrenia (34.1%), residual schizophrenia (24.4%), nonspecified psychotic disorder (14.6%), delusional (12.2%), non-differentiated schizophrenia (9.8%), and schizoaffective disorder (4.9%). We obtained four factors: 1) Vigilance/sustained attention, made up of hit reaction time standard error, variability of standard error, hit reaction time, omissions, and response style (β) on the Continuous Performance Test II (CPT-II) (Conners, 2000). 2) Cognitive flexibility, made up of perseverative responses, perseverative errors, conceptual level responses and non-perseverative errors on the Wisconsin Card Sorting Test (Heaton et al., 1993; Heaton, 1999). 3) Signal detection, made up of commissions and detectability (d′) on the CPT-II. 4) Selective attention/interference control/working memory, made up of conceptual level responses and non-perseverative errors on the WCST, the Trail Making Test (TMT, Reitan and Wolfson, 1985) A and B, and color-word interference on the Stroop Color and Word test (Golden, 1994), and digit span and letter-number sequencing on the Wechsler Adult Intelligence Scale-III (WAIS-III, Wechsler, 1997). The Cronbach's α for each factor were: .812, .905, .904 and .801 respectively.

2.3. Study procedure

All procedures are in accordance with the Declaration of Helsinki. Ethical approval was obtained from the local Ethics Committee (CEIC HUSJR: 06-03-30/3proj4). All the participants consented to take part in the study voluntarily, without receiving any reward. All signed an informed consent form. First, the patients were asked for permission to seek the inclusion of their siblings, who were later contacted to explain to them the nature of the study and to obtain their signed informed consent form. Then, they received instructions for completing the self-administered questionnaires, and they were given the SPQ to fill in at home. The neuropsychological battery was administered at hospital.