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'Theory of Mind', psychotic-like experiences and psychometric schizotypy in adolescents from the general population

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ABSTRACT

This study examined 'Theory of Mind' (ToM) functioning, its association with psychometric schizotypy and with self-reported psychotic-like experiences (PLEs) and depressive symptoms, in a community sample of adolescents. Seventy-two adolescents (mean age 14.51 years) from Barcelona, Spain, completed questionnaires assessing PLEs, depressive symptoms, and schizotypy. A verbal ToM task and a vocabulary test were administered. The effect of symptomatology, vocabulary ability, age, and gender on task performance was explored. Neither total score on schizotypy nor PLEs were associated with ToM performance. A significant effect of vocabulary on adolescent's performance of both ToM and control stories was found. ToM showed significant negative associations with positive schizotypy, and with one cluster of positive PLEs: first-rank experiences. Positive significant associations between ToM and persecutory delusions and the impulsive aspects of schizotypy were found. Depressive symptoms did not affect ToM performance. Positive schizotypal traits and first-rank symptoms are associated with ToM deficits in adolescents. Results support the trait-(versus state-) dependent notion of ToM impairments in schizophrenia. ToM may be a developmental impairment associated with positive schizotypy and PLEs.

1. Introduction

Theory of Mind (ToM), 'mindreading' or 'mentalising' constitutes the ability to infer mental states of other people in order to understand and predict their behaviour (Premack and Woodruff, 1978). ToM is an aspect of social cognition underlying the ability to deceive, cooperate or empathize (Gallagher and Frith, 2003), is associated with social-interaction and general vocabulary skills (Bosacki and Astington, 1999), and is acquired by around the age of four years (Baron-Cohen et al., 1999). ToM deficits have been reported in adults with schizophrenia (Corcoran et al., 1995; Brüne and Bodenstein, 2005; Marjoram et al., 2005; Bömmer and Brüne, 2006; Marjoram et al., 2006; Kettle et al., 2008), in children and adolescents with autism (Baron-Cohen et al., 1985; Perner et al., 1989; Happé, 1994; Baron-Cohen, 1995), and in adults with depression (Lee et al., 2005; Wang et al., 2008). Controversy remains concerning the possibility that ToM impairments constitute specific state-dependent deficits restricted to the symptomatic phase of schizophrenia, as proposed by Frith (1992), or an underlying trait identifiable before the onset of the disease. Intact ToM in patients with remitted schizophrenia (Pousa et al., 2008), and in unaffected adult relatives (mean age 48 years) of patients with schizophrenia (Kelemen et al., 2004), constitutes evidence supporting the state notion. Support for the trait account is provided by contrasting evidence from two meta-analyses indicating ToM deficits in remitted patients (Sprong et al., 2007; Bora et al., 2009). Moreover, Janssen et al. (2003) observed poorer ToM performance in non-psychotic adult relatives (mean age 38 years old) of patients with psychosis compared to controls, and Anselmetti et al. (2009) found impaired ToM functioning in non-psychotic parents of patients with schizophrenia.

Clinical factors, such as severity of illness or antipsychotic medication, constitute possible confounders in determining the aetiology of ToM impairments in schizophrenia (Pickup, 2006). To overcome these inherent difficulties in studying ToM in patients, mentalising abilities among healthy individuals with schizotypal traits have been investigated. Schizotypy constitutes a non-clinical manifestation of the same biological factors operating in schizophrenia and psychotic spectrum disorders (Claridge, 1994). ToM impairments are present in adults with schizotypy (Langdon and Coltheart, 1999), particularly those experiencing positive symptoms (Langdon and Coltheart, 2004). Pickup (2006) reported poorer ToM in adults presenting higher scores on the unusual experiences subscale of the Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE)

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questionnaire, a self-report measure of schizotypal characteristics in healthy individuals (Mason et al., 1995). However, lack of association between mentalising abilities and psychometric schizotypy has also been reported (Jahshan and Sergi, 2007; Fernyhough et al., 2008).

Individuals with schizotypy also present psychotic-like experiences (PLEs; Kwapil et al., 1997; Dickey et al., 2005). PLEs in children and adolescents constitute a putative antecedent for the development of psychotic disorders (Poulton et al., 2000; Cannon et al., 2002; Laurens et al., 2007, 2008; Welham et al., 2009). There is a paucity of studies of the association between PLEs and mentalising abilities in non-clinical samples and in adolescents. Marjoram et al. (2006) suggested that ToM deficits may be present throughout the life-span of schizotypal individuals, and become more pronounced when experiencing PLEs. Another study indicated impaired ToM in young adults at ultra-high-risk for psychosis who reported attenuated positive psychotic symptoms (Chung et al., 2008). Yet, other evidence indicates a lack of association between persecutory ideation and ToM (Fernyhough et al., 2008). Although mixed results on the association between ToM, schizotypy, and PLEs have been reported, evidence suggests that impaired mentalising is not exclusive to symptomatic patients (Pickup, 2006; Bora et al., 2009), and further understanding of the nature of ToM dysfunction in schizophrenia might be achieved via examining ToM from the early phases, and even before the onset, of the illness. As psychotic symptoms are distributed on a continuum within the general population (van Os et al., 2000; Verdoux and van Os, 2002), examining the relationship between ToM and PLEs and schizotypy in a community sample of adolescents, prior to the emergence of psychotic disorders, may provide important information regarding the aetiology of ToM deficits in schizophrenia.

Accordingly, the aim of this study was to examine ToM functioning, its association with psychometric schizotypy and with self-reported PLEs and depressive symptoms, in a group of adolescents. As far as we know, this is the first study examining ToM functioning and its relations with schizotypal traits and PLEs in adolescents. Given evidence that ToM deficits are associated with the positive features of schizotypy in adults (Langdon and Coltheart, 2004; Pickup, 2006), it was hypothesised that adolescents with higher levels of positive schizotypy and positive PLEs would present poorer performance on a verbal ToM task. By contrast, following Pickup (2006), we anticipated a lack of association between ToM ability and the negative dimensions of PLEs and schizotypy, as well as with the total PLE and schizotypy scores. In accordance with the findings of Lee et al. (2005) and Wang et al. (2008) in adult samples, it was predicted that self-reported depressive symptoms would be associated with poorer ToM in adolescents. The effect of vocabulary ability, age, and gender on ToM functioning was also examined. A positive association between vocabulary ability and ToM performance was expected based on previous findings (Bosacki and Astington, 1999). Previous research also suggested that girls would report higher ToM scores (Bosacki and Astington, 1999) and higher scores on the positive dimensions of PLE and schizotypy, whereas boys' ToM were expected to score higher on the negative dimensions (Mason and Claridge, 2006; Scott et al., 2008). Based on the findings of Scott et al. (2009) in a sample of adolescents (13–17 years old), similar levels of PLEs and schizotypy were expected across the age range included in the present sample.

2. Methods

2.1. Participants and procedure

This cross-sectional study examined 72 adolescents (33 girls) aged between 13 and 16 years (mean = 14.51, S.D. = 0.63 years). Participants were selected randomly from a larger sample ($n = 777$) of students attending compulsory secondary education in six schools from Barcelona, Spain. Schools were selected via stratified sampling to form a representative sample of the schools from all city districts. Questionnaires assessing PLEs and schizotypy were administered by trained psychologists to the main sample ($n = 777$) in the classroom. The ToM task and vocabulary scale were administered individually to the sub-sample of 72 adolescents by a trained psychologist in a quiet room of the school. Written informed consent was obtained from participants, as well as authorisation from their parents. This study was approved by the Department of Clinical and Health Psychology (Universidad Autónoma de Barcelona) ethics committee.

2.2. Measures

2.2.1. Psychotic-like experiences and depressive symptoms

PLEs were assessed using the Spanish version of the Community Assessment of Psychic Experiences (CAPE) (Stefanis et al., 2002; http://cape42.homestead.com), a self-report of psychotic experiences that examines positive (20 items) and negative (14 items) psychotic symptoms, and depressive symptoms (7 items). The CAPE measures the frequency of occurrence of symptoms using a four-point scale ranging from 1 (never) to 4 (nearly always). A total score on each dimension is derived by summing the scores on each item. Thus, scores on the positive dimension range from 20 to 80 points, from 14 to 56 on the negative dimension, and from 7 to 28 on the depressive dimension. The overall total score results from adding up the scores of the three dimensions. The scale has established validity and reliability (Stefanis et al., 2002; Konings et al., 2006).

2.2.2. Psychometric schizotypy

Schizotypy was measured with the Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE) (Mason et al., 1995), a self-report questionnaire designed for the assessment of schizotypy or psychosis-proneness in the general population. The O-LIFE comprises 125 yes/no items and four subscales. The Unusual Experiences (UnEx) scale (30 items) measures the positive dimension of psychosis and describes perceptual aberrations, magical thinking and hallucinatory experiences. The Cognitive Disorganization (CogDis) scale (24 items) assesses thought disorder and disorganised aspects of psychosis, and includes items that examine attention/concentration difficulties, problems in decision-making, and social anxiety. The Introvertive Anhedonia (IntAnh) scale (27 items) measures attenuated forms of negative symptoms of psychosis: lack of enjoyment from social contact and physical activities, coupled with avoidance of emotional and physical intimacy that could reflect the schizoid temperament. The Impulsive Nonconformity (ImpNon) scale (22 items) measures forms of impulsive, antisocial and eccentric behaviour that suggest lack of self-control (Mason et al., 1995; Mason and Claridge, 2006). The O-LIFE was translated into Spanish by Barrantes-Vidal (1997), and has been used previously to assess schizotypy in Spanish samples (Medina et al., 2007; Caparrós et al., 2008).

2.2.3. 'Theory of Mind' (ToM)

ToM was assessed using the Strange Stories task (Happé, 1994). This verbal task was translated and adapted into Spanish by Pousa (2002), and comprises 16 short passages, with stories of two types: ToM and control stories, each followed by a test question. The eight ToM stories involve double bluff, mistakes, persuasion, and white lies. The test question following these stories requires an inference about the character's thoughts, feelings, and intentions. The control story condition also comprises eight stories involving people. Although the test question for these stories requires inferences to be made, the mental state of the characters is not relevant. During test administration, a practice story was first given to participants and then they were presented with the 16 stories, alternating ToM with control stories. Adolescents were asked to read the stories to themselves until they considered that they had understood them. Then they were instructed to turn the page to read the test question and give an answer to the examiner. Time taken from the beginning of the reading until the answer was initiated, was recorded. Answers were scored 0, 1 or 2, with 0 being given to an incorrect answer, 1 to a partial or implicit answer, and 2 for a full and explicitly correct answer. Total score was computed as the sum of the scores on each answer.

2.2.4. Vocabulary ability

Since studies have shown that ToM measures are often language dependent (Bosacki and Astington, 1999), language ability was measured using the vocabulary subtest from the Wechsler Intelligence Scale for Children (WISC-R; Wechsler, 1995). This subtest indexes language development, verbal conceptualisation and comprehension, and semantic understanding, by requesting oral definitions for 32 vocabulary items. Scores of 0, 1, or 2 are assigned to each item according to the accuracy of the definition provided.

2.3. Statistical analyses

Analyses were conducted using SPSS 16.0 for Windows (SPSS, Chicago, IL, USA). Internal consistency of the O-LIFE and CAPE total and subscale scores was determined using Cronbach's alpha statistic. Normal distributions were identified in ToM tasks, control stories reading time, the O-LIFE subscales, the CAPE positive and negative subscales, and vocabulary scores. Following Miles and Shevlin (2001) a logarithmic transformation was performed on ToM stories reading time and the CAPE depressive subscale as they were slightly positively skewed.

Within the total sample, differences on the scores of both story type (ToM, control) and story reading times were examined using paired *t*-tests. Effect size (ES) estimates were indicated by Cohen's *d*, which was calculated by dividing the difference between the mean scores of ToM/control stories or story reading times by the pooled standard deviation. Cohen's (1992) criteria to define a small (0.20), medium (0.50) and large