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Facial affect recognition in early and late-stage schizophrenia patients

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ABSTRACT

Prior studies have shown deficits in social cognition and emotion perception in first-episode psychosis (FEP) and multi-episode schizophrenia (MES) patients. These studies compared patients at different stages of the illness with only a single control group which differed in age from at least one clinical group. The present study provides new evidence of a differential pattern of deficit in facial affect recognition in FEP and MES patients using a double age-matched control design. Compared to their controls, FEP patients only showed impaired recognition of fearful faces ($p = .007$). In contrast to this, the MES patients showed a more generalized deficit compared to their age-matched controls, with impaired recognition of angry, sad and fearful faces ($p_s < .01$) and an increased misattribution of emotional meaning to neutral faces. PANSS scores of FEP patients on Depressed factor correlated positively with the accuracy to recognize fearful expressions ($r = .473$). For the MES group fear recognition correlated positively with negative PANSS factor ($r = .498$) and recognition of sad and neutral expressions was inversely correlated with disorganized PANSS factor ($r = -.461$ and $r = -.541$, respectively). These results provide evidence that a generalized impairment of affect recognition is observed in advanced-stage patients and is not characteristic of the early stages of schizophrenia. Moreover, the finding that anomalous attribution of emotional meaning to neutral faces is observed only in MES patients suggests that an increased attribution of salience to social stimuli is a characteristic of social cognition in advanced stages of the disorder.

1. Introduction

A specialized cognitive domain that has recently been emphasized in connection to schizophrenia is that of social cognition, that is, the set of processes by which we draw inferences about the beliefs and intentions of others (e.g., Green and Horan, 2010). Acknowledging its importance in schizophrenia illness and the evidence suggesting that impairments in this domain may be a mediator between neurocognitive deficits and functional outcome (Schmidt et al., 2011), evaluation of social cognition has been included in the MATRICS Consensus Cognitive Battery (MCCB) (Nuechterlein et al., 2008; Rodriguez-Jimenez et al., 2012). Social cognition includes domains such as theory of mind (ToM), attributional style or social perception. A crucial component of social cognitive abilities is facial affect recognition and deficits in the recognition and interpretation of facial expressions of emotion are well documented in schizophrenia (Edwards et al., 2002; Kohler et al., 2010). The pattern most frequently found is that of preserved recognition of positive expressions (happiness) and impaired recognition of negative ones (anger, fear, sadness and disgust) (e.g., Bediou et al., 2005; Combs et al., 2006; Janssens et al., 2012; Kohler et al., 2003).

Recently the interest in the study of social cognition (Ventura et al., 2015; Bertrand et al., 2007) and emotion perception (Comparelli et al., 2013) in first-episode schizophrenia has increased and there is evidence that impaired performance is present before the full expression of the disorder (Addington et al., 2008; Allott et al., 2014; Amminger et al., 2012; Corcoran et al., 2015; Edwards et al., 2001; see Phillips and Seidman, 2008, for a review and van Donkersgoed et al., 2015 for a meta-analysis). Several studies have compared emotion recognition performance in early stage and chronic schizophrenia patients, in an attempt to establish if these deficits are stable or vary over time. However, the comparison of recent onset and chronic patients is not without its challenges. The few longitudinal studies on this matter have followed patients during relatively short periods of time. For example Addington et al. (2006) followed patients over one year and found that both first- and multi-episode patients were impaired in cognition, social functioning and facial affect recognition and that first-episode subjects showed stable deficits over the first year despite improved

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symptomatology. Similarly, Ventura et al. (2015) followed first episode patients during six months and found stable ToM deficits even in remitted patients.

Cross-sectional studies comparing patients at different stages of the illness have shown deficits in facial affect recognition (Comparelli et al., 2013; Pinkham et al., 2007; Sachs et al., 2004; Vohs et al., 2014), usually reporting similar deficits in early and later stages. For example, Comparelli et al. (2013) found no differences among prodromal, first episode or multi-episode schizophrenia patients when data were corrected for socio-demographic and clinical variables. In the same line, Vohs et al. (2014) found no differences between first episode psychosis and prolonged psychosis groups in different measures of social cognition. Pinkham et al. (2007) and Sachs et al. (2004) also found deficits in emotion recognition tasks and emotion perception for patients of early and chronic schizophrenia. Nevertheless an exception is the study by Kucharska-Pietura et al. (2005) who found greater impairments in emotion perception in individuals with chronic schizophrenia.

The study of differences in emotion recognition abilities between patients at different stages of the illness is of potential clinical relevance because there is evidence that impaired performance is specifically related to social competence and functioning on the first stages (Fett et al., 2013; see Irani et al., 2012 for a meta-analysis). Designing social cognitive remediation strategies in this regard should be in accordance with the deficits. If there were differences in facial emotion recognition at different stages of the illness the intervention should suit the specific deficits of each stage.

Although comparative studies with non-clinical samples have shown that accurate recognition of at least some basic emotions develops relatively early (e.g., Soken and Pick, 1992; Widen and Russell, 2003) the accuracy and speed with which emotional expressions are recognized and the sensitivity to subtle expressive changes continues to develop during adolescence before reaching peak performance in adulthood (e.g., De Sonneville et al., 2002; Thomas et al., 2007). Studies on facial expression recognition in the general population have consistently shown that happy expressions are recognized faster and more accurately than any other basic emotional expression including anger, fear, sadness, disgust, and surprise (Calder et al., 2000; Leppänen and Hietanen, 2003; Nelson and Russell, 2013; see Nummenmaa and Calvo, 2015, for a review). Moreover, there is evidence of age-associated changes in the accuracy with which negative and positive emotional expressions are recognized (Iidaka et al., 2002; Lambrecht et al., 2012). From this point of view, it is clear then, that reported deficits in schizophrenia patients that are not based in comparisons with age-appropriated control groups run the risk of over- or underestimating possible differences with controls. In order to rule out this possibility it is crucial to include control groups that are equated in terms of age, but up to our knowledge there is no prior research on facial affect recognition comparing adult and adolescent patients with the corresponding age-matched controls. This type of comparison would provide a better method to evaluate the separate contribution of age (i.e., cohort) and schizophrenia (i.e., diagnosis) to the deficits in affect recognition reported in previous studies.

The main goal of the present study was to assess performance on facial affect recognition in early- and late-stage patients with schizophrenia, comparing each group with appropriate age-matched controls. Our main interest was in knowing if the patients of the early-stage sample also showed impaired recognition of negative expressions compared to their age-matched controls as is usually found in chronic patients. The general tendency points that deficits in facial affect recognition are similar in first and later stages of the illness, so we should expect to find the same differences between both early stage and late stage schizophrenia patients compared with healthy controls. However, we wanted to confirm if these differences still can be found when FEP and MES patients are compared with an appropriated control group, matched in terms of sex and age. Secondarily, as a way to assess the potential contribution of medication dose and severity of symptomatology, it was analyzed the correlation of these variables and recognition of facial affect. To this purpose, we conducted a cross-sectional study comparing a group of multi-episode schizophrenia patients (MES) and first-episode psychosis patients (FEP) with their corresponding gender and age-matched control groups on a facial affect recognition task.

2. Method

2.1. Participants

The present study was carried out including 19 multi-episode schizophrenia (MES) outpatients, who were consecutively referred by their treating psychiatrists. All MES patients had been diagnosed with schizophrenia according to ICD-10 criteria (WHO, 1992), and had >6 years of evolution of the illness. The MES patients had been clinically stable (no hospital admissions, no changes in treatment and no significant psychopathological changes) for at least 6 months. Exclusion criteria were currently substance abuse (except for caffeine and nicotine), history of brain injury or intellectual disability. The first episode psychosis (FEP) group included 21 patients (<18 years) who were defined as having psychotic symptoms of <1 year and were diagnosed according to ICD-10 (WHO, 1996) for children and adolescents criteria with schizophrenia or schizotypal disorder. They were evaluated at their first contact with mental health services as soon as the psychiatrist considered that the patient was able to collaborate. Data from those patients who met criteria for schizotypal disorder were included in the study only if after a few months the corresponding psychiatrist confirmed that their diagnosis developed into schizophrenia. All patients were on atypical antipsychotic treatment except for one of the MES group. The MES patient group was recruited from the "Hospital Universitario 12 de Octubre" (Madrid, Spain) and the FEP patient group from the "Hospital Infantil Universitario Niño Jesús" (Madrid, Spain). Each group's performance was compared to that of a similar number of control participants matched in age and gender with no self-reported history of psychotic illness and recruited from the same socio-cultural environment than patients. Patients and controls were evaluated with the same computer equipment in a room enabled for this purpose.

The procedure was approved by the Ethics Committee and the informed consent was obtained from all participants (and their parents in the case of minors) prior to their inclusion in the study.

2.2. Materials

2.2.1. Facial affect recognition

Forty pictures from the NimStim set (Tottenham et al., 2009) were used as stimuli. The faces corresponded to nine Caucasian models (five female, four male), each showing happy, angry, fearful, sad or neutral expression. Pictures were converted to gray scale, equated in luminance and cropped to conceal most of the hair to remove distracting, noisy aspects that are not informative of emotional expression (Calvo and Lundqvist, 2008). The stimuli were presented on a 15″ LCD monitor (refresh rate: 60 Hz). Pictures were selected based on a previous pilot study with a sample of 30 students from the Complutense University of Madrid. The participants in this pilot study were asked to rate each picture in terms of valence and arousal and to select the label that best described the expression shown by each face. We selected those faces that reached a minimum recognition agreement of 75% as stimuli for the present study. This procedure was previously used in Romero-Ferreiro et al. (2015).

2.2.2. Clinical assessment

Clinical status was evaluated using the Spanish version (Peralta and Cuesta, 1994) of the Positive and Negative Syndrome Scale (PANSS — Kay et al., 1987, see Table 1). The Positive and Negative Syndrome

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