Schizophrenia Research 152 (2014) 440–445

Contents lists available at ScienceDirect

Schizophrenia Research

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

Facial affect recognition in symptomatically remitted patients with schizophrenia and bipolar disorder

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ARTICLE INFO

Article history:
Received 12 April 2013
Received in revised form 5 November 2013
Accepted 12 November 2013
Available online 19 December 2013

Keywords:
Schizophrenia
Bipolar disorder
Affect recognition
Psychosocial outcome
Social cognition

ABSTRACT

Both schizophrenia and bipolar disorder (BD) have consistently been associated with deficits in facial affect recognition (FAR). These impairments have been related to various aspects of social competence and functioning and are relatively stable over time. However, individuals in remission may outperform patients experiencing an acute phase of the disorders. The present study directly contrasted FAR in symptomatically remitted patients with schizophrenia or BD and healthy volunteers and investigated its relationship with patients' outcomes.
Compared to healthy control subjects, schizophrenia patients were impaired in the recognition of angry, disgusted, sad and happy facial expressions, while BD patients showed deficits only in the recognition of disgusted and happy facial expressions. When directly comparing the two patient groups individuals suffering from BD outperformed those with schizophrenia in the recognition of expressions depicting anger. There was no significant association between affect recognition abilities and symptomatic or psychosocial outcomes in schizophrenia patients. Among BD patients, relatively higher depression scores were associated with impairments in both the identification of happy faces and psychosocial functioning.
Overall, our findings indicate that during periods of symptomatic remission the recognition of facial affect may be less impaired in patients with BD than in those suffering from schizophrenia. However, in the psychosocial context BD patients seem to be more sensitive to residual symptomatology.

1. Introduction

Facial affect recognition (FAR) is the ability to recognize and discriminate emotion in the faces of others (Ekman et al., 1972) and is central to successful socialization and effective interpersonal communication (Beale and Keil, 1995; Blair, 2003). It represents one component of the multidimensional model of social cognition (Green et al., 2005). FAR has consistently been shown to be impaired in patients with schizophrenia and bipolar disorder (BD) (Hofer et al., 2010). In schizophrenia, some studies have reported on a positive correlation between the duration of illness and poor affect recognition abilities (Mueser et al., 1997; Kucharska-Pietura et al., 2005), whereas others have not found any differences between patients experiencing a first episode and those in a later stage of the disorder in this regard (Addington et al., 2006; Pinkham et al., 2007; Leung et al., 2011). These impairments have also been detected in the prodromal state of psychosis (Addington et al., 2008; Phillips and Seidman, 2008) and in individuals at familial high risk for schizophrenia (Eack et al., 2010). Accordingly, impairments in FAR have been considered to represent a possible endophenotype related to genetic risk and the development of psychosis (Green, 2006; Kohler et al., 2010) and to represent an enduring deficit and a trait marker of psychosis (Addington et al., 2006).

Similarly, impairments in FAR have been demonstrated to be present during both mood episodes (Lembke and Ketter, 2002; Gray et al., 2006) and periods of remission in patients suffering from BD (Yurgelun-Todd et al., 2000; Bozikas et al., 2006; Derntl et al., 2009; Hoertnagl et al., 2011).

We have previously reported on particular impairments in the recognition of facial expressions depicting disgust and happiness in symptomatically remitted BD patients. Moreover, correct recognition of both happiness and fear was positively associated with functional outcomes (Hoertnagl et al., 2011). In order to expand on this previous research we have now investigated an extended sample of remitted BD patients and compared their performance on a task of FAR with the performances of symptomatically remitted patients with schizophrenia and a non-psychiatric control group on the same task. Taking into account methodological limitations of previous studies, we

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http://dx.doi.org/10.1016/j.schres.2013.11.024

included a larger sample of BD and schizophrenia patients meeting strict remission criteria. The second aim was to explore the relationship between FAR abilities and patients' psychosocial functioning and quality of life (QoL).

2. Materials and methods

Forty outpatients with paranoid schizophrenia and 57 outpatients with bipolar I disorder according to DSM-IV as well as 50 healthy control subjects between the ages of 18 and 60 years were included in a cross-sectional study. In patients, diagnoses were confirmed by using the Mini International Neuropsychiatric Interview (MINI) (Sheehan et al., 1998). In order to ensure symptomatic remission, schizophrenia patients had to meet the severity component of the Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1987) proposed by Andreasen et al. (2005), whereas BD patients had to have a score of 8 or less on both the Montgomery–Asberg Depression Rating Scale (MADRS) (Montgomery and Asberg, 1979) and the Young Mania Rating Scale (YMRS) (Young et al., 1978). Healthy participants had to have a score of 63 or less on the Brief Symptom Inventory (BSI) (Franke, 2000) and to have no history of any psychiatric illness. Exclusion criteria included any other axis I disorder, developmental disorders and any physical illness that may have affected the participants' cognitive performance.

Patients were recruited from the psychiatric outpatient services of the Medical Universities Innsbruck and Salzburg, while healthy controls were recruited from the community and were chosen to match patients in age, sex, and education. All participants signed informed consent forms in accordance with the local ethics committees.

2.1. Premorbid intelligence

Premorbid intelligence was measured by using the German adaptation of the National Adult Reading Test (Nelson, 1992), the Mehrfachwahl-Wortschatz-Test B (MWT-B) (Lehrl, 1977), a reliable and valid multiple-choice vocabulary test. The items of the MWT-B consist of 37 lines, each comprising five words. The subject is asked to find the correct word in every line and to underline it. Each word correctly recognized scores one point.

2.2. Facial affect recognition test

FAR was assessed with the Facially Expressed Emotion Labeling (FEEL) test (Kessler et al., 2002). This computer program displays portrait pictures of actors with the typical facial expression of one of the six basic emotions for 300 ms each, after the same faces have been shown with a neutral expression. Subjects then have to decide quickly and accurately which of the six emotions they have just seen by clicking on the appropriate label (forced-choice response format). With 42 pictures being shown the FEEL score ranges from 0 to 42. In addition, we calculated misidentification scores for each of the six emotions.

2.3. Psychosocial functioning

Psychosocial functioning was evaluated by assessing the participants' partnership and employment status, and by assessing their living situation. In addition, the Global Assessment of Functioning Scale (GAF) (American Psychiatric Association, 1994) and the self-administered 26-item version of the World Health Organization Quality of Life assessment instrument (WHOQOL-BREF) (The WHOQOL Group, 1998) were used in patients.

2.4. Statistical analyses

Comparison of the three groups (schizophrenia, BD, and control) with regard to sociodemographic and clinical variables was performed by means of one-way analysis of variance, Kruskal–Wallis test and chi-square test, depending on the variable type (normally distributed metric, non-normally distributed metric, and categorical, respectively). Normality was checked by assessing the skewness of the distribution, considering values above 1 or below −1 as a substantial departure from a symmetrical distribution. Due to the non-normal distribution of the majority of the subscales of the WHOQOL-BREF quality of life (QoL) scores of the two patient groups were compared by means of the Mann–Whitney *U*-test.

Comparison of the three groups with respect to FAR (FEEL test) was performed by means of analysis of covariance (ANCOVA) with adjustment for gender since the three groups differed significantly in this variable. If statistical significance ($p \leq 0.05$) was attained in the overall comparison of the three groups, subsequent pairwise comparisons were performed by means of the least-significant difference method. In the case of three groups, this sequential testing procedure grants that the family-wise alpha-level of 0.05 is retained without correction for multiple testing (Levin et al., 1994). In some cases, the dependent variable had to be subjected to an appropriate transformation prior to the ANCOVA in order to obtain approximate normality (e.g., $x \rightarrow \sqrt{\{\text{highest possible score} - x\}}$). As most of the misinterpretation scores showed substantial departures from a normal distribution, the Kruskal–Wallis test was used for group comparisons with regard to misinterpretations, followed by Mann–Whitney *U*-tests for pairwise comparisons (after checking by means of Spearman rank correlation that the potentially confounding variable gender was not significantly associated with any of the misinterpretations).

In patients, associations of FAR with residual symptomatology, psychosocial functioning and QoL were evaluated by Spearman rank correlations due to the non-normal distribution of the majority of the variables involved. Separate correlation analyses were performed for the two patient groups. To account for the large number of statistical tests performed, all correlation analyses were subjected to a Bonferroni correction. Significant correlations were inspected more closely by means of partial correlation analysis adjusting for age and gender as potential confounders. Significant correlations between FAR and QoL were also adjusted for patients' residual symptomatology to check whether the latter may act as a common cause of both reduced affect recognition abilities and impaired QoL.

3. Results

3.1. Sample characteristics

Demographic and clinical characteristics of the study sample are summarized in Table 1. Patients and control subjects were comparable with respect to age and education, and there were no significant differences between the two patient groups with regard to duration of illness. However, the three groups differed significantly in gender distribution ($p = 0.037$). As expected, patients and control subjects differed significantly with respect to partnership, employment status and living situation. The mean GAF score was significantly lower in schizophrenia than in BD patients.

An overview of patients' QoL, as assessed by the WHOQOL-BREF, is given in Table 2. Compared to patients with schizophrenia those with BD achieved significantly lower scores in the domains 'physical health', 'psychological health', and global QoL.

3.2. Facial affect recognition

An overview of patients' and control subjects' FAR abilities, as assessed by the FEEL test, is given in Table 3. Within the schizophrenia group, recognition was best for facial expressions depicting happiness followed by those depicting surprise, anger, disgust, sadness, and fear. In contrast, BD patients recognized facial expressions depicting happiness best followed by those depicting anger, surprise, sadness, disgust, and fear. Compared to healthy control subjects, schizophrenia patients