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Facial emotion perception impairments in schizophrenia patients with comorbid antisocial personality disorder

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ABSTRACT

Impairment in facial emotion perception is believed to be associated with aggression. Schizophrenia patients with antisocial features are more impaired in facial emotion perception than their counterparts without these features. However, previous studies did not define the comorbidity of antisocial personality disorder (ASPD) using stringent criteria. We recruited 30 participants with dual diagnoses of ASPD and schizophrenia, 30 participants with schizophrenia and 30 controls. We employed the Facial Emotional Recognition paradigm to measure facial emotion perception, and administered a battery of neurocognitive tests. The Life History of Aggression scale was used. ANOVAs and ANCOVAs were conducted to examine group differences in facial emotion perception, and control for the effect of other neurocognitive dysfunctions on facial emotion perception. Correlational analyses were conducted to examine the association between facial emotion perception and aggression. Patients with dual diagnoses performed worst in facial emotion perception among the three groups. The group differences in facial emotion perception remained significant, even after other neurocognitive impairments were controlled for. Severity of aggression was correlated with impairment in perceiving negative-valenced facial emotions in patients with dual diagnoses. Our findings support the presence of facial emotion perception impairment and its association with aggression in schizophrenia patients with comorbid ASPD.

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1. Introduction

Facial emotion perception is an important domain of social cognition (Green et al., 2005) and refers to the ability to identify facial emotion expressions of other people (Ekman, 2003). Competence in perceiving facial emotions is essential for pro-social behaviour and effective social interactions. A recent meta-analysis (Kohler et al., 2010) pooled data from 86 studies and concluded that patients with schizophrenia tend to misperceive facial emotions with negative valences, including “fear”, “sadness”, and “disgust”. Patients with schizophrenia also tend to over-attribute the negative emotion of “disgust” to neutral facial expressions (Edwards et al., 2001; Kohler et al., 2003; Monkul et al., 2007).

Antisocial personality disorder (ASPD) has been suggested to be associated with impairments in facial emotion perception. A meta-analysis (Marsh and Blair, 2008) concluded that people with features of ASPD have difficulty in processing facial emotions, in particular the emotion of “fear”. Notably, many studies included in Marsh and Blair (2008)′s meta-analysis had recruited people with history of aggression and criminality but did not have a DSM-IV diagnosis of ASPD. A recent meta-analysis (Dawel et al., 2012) showed that people with psychopathy exhibited pervasive impairments in recognising facial expressions across different emotions, including “fear”, “sadness”, “surprise”, and “happiness”. It is noteworthy that psychopathy is characterised by callousness, poor empathy, lack of remorse and guilt, and may represent a more severe form of disorder along the ASPD spectrum (Dawel et al., 2012). The inherent difference in ASPD and psychopathy might have contributed to the divergent conclusions in these meta-analyses.

Interestingly, a clinical diagnosis of ASPD is prevalent among schizophrenia patients with a history of violence. The Epidemiological Catchment Area (ECA) study reported that the prevalence of schizophrenia was 6.9 and 11.8 times higher among men and women with ASPD respectively than their counterparts in the general population (Hodgins, 1993). Dual diagnoses of schizophrenia and ASPD had been found to be associated with more aggression (Moran et al., 2003), early-onset of substance misuse, high unemployment (Tengstrom and Hodgins, 2002) and poor

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treatment outcomes (Tyrer and Simmonds, 2003). Moreover, this clinical group differed from patients with either schizophrenia or ASPD alone in terms of their reduced skin conductance orienting to neutral tones (Schug et al., 2007). A recent meta-analysis (Schug and Raine, 2009) also showed that patients with schizophrenia with features of ASPD had lower IQ, poorer memory and executive functions, compared with non-psychotic people with ASPD and patients with schizophrenia. However, many previous studies defined the comorbidity of ASPD in samples with schizophrenia patients differently, using various criteria involving a history of criminality and imprisonment, or employing rating scales for violent behaviour, rather than using the DSM-IV diagnostic criteria for ASPD (Schug and Raine, 2009).

There is a paucity of evidence on facial emotion perception in schizophrenia patients with comorbid ASPD. A previous study reported that history of being arrested was negatively correlated with the ability to identify “fearful” and “angry” facial expressions in in-patients with schizophrenia (Weiss et al., 2006). However, this study did not recruit a control group for comparison. Another study reported that schizophrenia patients with high psychopathy scores were impaired in recognising “sad” facial expressions, compared to their counterparts with low psychopathy scores (Fullam and Dolan, 2006). Another study reported the opposite findings that violent and non-violent patients with schizophrenia had comparable facial emotion perception abilities (Demirbuga et al., 2013). Both Fullam and Dolan (2006) and Demirbuga et al., 2013's studies did not recruit healthy controls for comparison. Another study reported that schizophrenia patients with a history of serious violent crimes were impaired in facial emotion perception compared to non-violent schizophrenia patients (Silver et al., 2005), but the paradigm in this study did not measure facial emotion perceptions of “fearful” and “angry” expressions. Notably, all these previous studies (Demirbuga et al., 2013; Fullam and Dolan, 2006; Silver et al., 2005; Weiss et al., 2006) have conflated psychopathy, criminality and violence propensity with the diagnosis of ASPD. The heterogeneity of case definition in the literature might have contributed to inconclusive findings in previous studies.

Failure to recognise facial emotions is believed to contribute to poor detection of social-affective signals and incorrect inferences of the mental states of other people, which may result in aggressive behaviour (Dodge, 1986). It has been postulated that facial emotion expressions could serve as reinforcing or aversive stimuli for one's response in social interaction. The Violence Inhibition Mechanism (VIM) model (Blair 1995) argued that distress cues, such as sad or frightened faces, could elicit empathy and consequently inhibit aggression. Moreover, the Integrated Emotion Systems (IES) model (Blair, 2004) postulated that negative-valenced facial expressions are able to condition developing children to avoid engaging in antisocial behaviours that would elicit these expressions. In the light of these postulations, it is clinically and theoretically important to understand the facial emotion perception ability of patients with schizophrenia with comorbid APSD, and to clarify whether impairment of this important social cognition is associated with aggression. Empirical evidence for plausible neuropsychological factors contributing to aggression would be useful for devising effective management. The present study aimed to (1) examine whether schizophrenia patients with comorbid ASPD are more impaired in facial emotion perception than their counterparts without ASPD as well as healthy controls, and (2) examine the association between facial emotion perception impairment and aggression in a relatively homogeneous group of schizophrenia patients with comorbid ASPD. Based on previous findings, we hypothesised that (1) both schizophrenia patients with and without comorbid ASPD would perceive facial emotions more poorly than healthy controls, but schizophrenia patients with comorbid ASPD would exhibit the worst facial emotion perception ability, and (2) impairment of perception of negative-valenced facial emotions would be correlated with aggression.

2. Methods

2.1. Participants

Participants were 30 male in-patients with dual diagnoses of DSM-IV schizophrenia and ASPD, 30 male in-patients with DSM-IV schizophrenia, and 30 healthy controls. All the patients participating this study were recruited from the psychiatric wards of Castle Peak Hospital in Hong Kong; while controls were recruited from the neighbouring community. Diagnoses were ascertained using the Chinese version of the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (SCID; First, 1997). Psychiatrists who administered the SCID had received training in administering the SCID and had an inter-rater reliability (kappa coefficient) of above 0.8. Exclusion criteria included (1) any Axis I psychiatric disorders apart from schizophrenia, (2) mental retardation, (3) history of head injury, (4) history of electroconvulsive therapy in the past 12 months, (5) neurological disorder, (6) history of substance abuse within the past six months, and (7) severe hearing or visual impairment. For healthy controls, additional exclusion criteria were applied, which included (1) history of any Axis I and Axis II psychiatric disorders, and (2) family history of mental illness in first-degree biological relatives.

2.2. Measurements

2.2.1. Facial emotion perception

The computer-based Facial Emotion Recognition paradigm (Yip and Lee, 2003; Chan et al., 2008) used a set of male and female Asians' faces adopted from the Japanese and Caucasian Facial Expressions of Emotion (JACFEE) photoset (Matsumoto and Ekman, 1988). The set of photographs chosen for use in this paradigm has been found to have good agreement (male faces: 81.4%; female faces: 78.9%) in the local Chinese population in a previous study (Yip and Lee, 2003). We presented 12 photographs sequentially on the computer screen. Each photograph was shown for 10 s, which expressed one of the six basic emotions (happy, sad, surprise, fearful, disgust and angry facial expressions) with identical signal strength. Two different photographs of faces were presented for each basic emotion, as in Chan et al. (2008). Participants were required to indicate which type of emotions the photographs were conveying. The paradigm took 10 min to complete. The number of correct answers was recorded. We calculated the scores for each type of emotions by dividing the number of correct answers by the total number of trials. A score of 1 indicated full accuracy in facial emotion perception; whereas a score of 0 indicated that the participant failed in all of the trials.

2.2.2. Measurements of clinical symptoms and neurocognitive functions

The SCID (First, 1997) was administered to ascertain the diagnosis. The Nonverbal Intelligence-3 (TONI-3) Test (Brown et al., 1997) was used to estimate intelligence. The Life History of Aggression scale (LHA; Coccaro et al., 1997) was used to ascertain the severity of aggression. Cerebral hemisphere dominance was assessed by the Annett Handedness Scale (Annett, 1970). We used the Scale for the Assessment of Positive Symptoms (SAPS) (Andreasen, 1984a) and the Scale for the Assessment of Negative Symptoms (SANS) (Andreasen, 1984b) to assess clinical symptoms.

We also administered a battery of neurocognitive tests. The Digit Span Test (DST; Wechsler, 1987) was used to assess working memory. The DST required participants to repeat the digits in verbatim and in reverse order. The Victorian version of the Stroop Test (Stroop, 1935; Lee and Chan, 2000) measured selective attention, cognitive flexibility and processing speed. We calculated the interference score of the Stroop Test by computing the difference between the reaction time in the colour-word condition and the word condition. The animal-category semantic Verbal Fluency Test (VFT) was used to measure the executive function of initiation. The test required participants to spontaneously generate words within a restricted semantic category. The number of correct words generated in one minute was recorded. The modified Wisconsin Card Sorting Test (WCST; Nelson, 1976) was used to measure executive functions of cognitive flexibility, set-shifting and perseveration. The longest category passed, and perseverative errors in the WCST were recorded.

2.2.3. Procedures

All the measurements were administrated by trained psychiatrists. This study was approved by the local clinical and research ethics committee. All participants understood the study procedures and gave written informed consents. The measurements were administered in a fixed order as follows: the SCID, the Facial Emotion Recognition paradigm, TONI-3, DST, Stroop, VFT, and WCST.

2.3. Statistical analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 21.0 for Windows. To compare the group difference

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