Profiling of experiential pleasure, emotional regulation and emotion expression in patients with schizophrenia

Ying-min Zou [a,b], Ke Ni [a,b,c], Zhuo-ya Yang [a,b], Ying Li [a,b,d], Xin-lu Cai [a,b,e,f], Dong-jie Xie [a,b], Rui-ting Zhang [a,b], Fu-Chun Zhou [g], Wen-xiu Li [d], Simon S.Y. Lui [h], David H.K. Shum [a,i,j], Eric F.C. Cheung [h], Raymond C.K. Chan [a,b,*]

[a] Neuropsychology and Applied Cognitive Neuroscience Laboratory, CAS Key Laboratory of Mental Health, Institute of Psychology, Beijing, China
[b] Department of Psychology, University of Chinese Academy of Sciences, Beijing, China
[c] Qigihar Mental Health Center, Heilongjiang, China
[d] Haidian District Mental Health Prevent-Treatment Hospital, Beijing, China
[e] Sino-Danish College, University of Chinese Academy of Sciences, Beijing 100190, China
[f] Sino-Danish Center for Education and Research, Beijing 100190, China
[g] Beijing Key Laboratory of Mental Disorders, Beijing Anding Hospital, Capital Medical University, Beijing, China
[h] Castle Peak Hospital, Hong Kong Special Administrative Region
[i] Menzies Health Institute Queensland, Griffith University, Gold Coast, Australia
[j] School of Applied Psychology, Griffith University, Brisbane, Australia

ARTICLE INFO

ABSTRACT

Background: Emotion deficits may be the basis of negative symptoms in schizophrenia patients and they are prevalent in these patients. However, inconsistent findings about emotion deficits in schizophrenia suggest that there may be subtypes.
Aim: The present study aimed to examine and profile experiential pleasure, emotional regulation and expression in patients with schizophrenia.
Methods: A set of checklists specifically capturing experiential pleasure, emotional regulation, emotion expression, depressive symptoms and anhedonia were administered to 146 in-patients with schizophrenia and 73 demographically-matched healthy controls. Psychiatric symptoms and negative symptoms were also evaluated by a trained psychiatrist for patients with schizophrenia.
Results: Two-stage cluster analysis and discriminant function analysis were used to analyze the profile of these measures in patients with schizophrenia. We found a three-cluster solution. Cluster 1 ($n = 41$) was characterized by a deficit in experiential pleasure and emotional regulation, Cluster 2 ($n = 47$) was characterized by a general deficit in experiential pleasure, emotional regulation and emotion expression, and Cluster 3 ($n = 57$) was characterized by a deficit in emotion expression. Results of a discriminant function analysis indicated that the three groups were reasonably discrete.
Conclusion: The present findings suggest that schizophrenia patients can be classified into three subtypes based on experiential pleasure, emotional regulation and emotion expression, which are characterized by distinct clinical representations.

© 2017 Elsevier B.V. All rights reserved.

1. Introduction

Emotion deficits, such as blunted experiential pleasure and diminished emotion expression, may be the basis of negative symptoms (Oorschot et al., 2013), and are prevalent among patients with schizophrenia (Aleman and Kahn, 2005; Kring and Elis, 2013). However, not all patients with schizophrenia have emotion deficits (Hooker and Park, 2002). For example, recent-onset patients with schizophrenia (Lui et al., 2015) do not exhibit decreased pleasure experience in daily life compared with healthy controls, but patients with chronic schizophrenia do (Y. Li et al., 2015; Z. Li et al., 2015). Moreover, different aspects of emotion deficits may also contribute to different aspects of negative symptoms (Mandal et al., 1999; Oorschot et al., 2013). A recent re-conceptualization of negative symptoms stresses that negative symptoms are mainly composed of two factors, namely, diminished pleasure/motivation and diminished emotional expression (Blanchard and Cohen, 2005; Kring et al., 2013). Empirical findings also suggest that reward circuit abnormalities underlying negative symptoms may involve reduced activation of the rostral medial prefrontal cortex, the right parahippocampus/amygdala, and other limbic regions when

processing in-the-moment positive stimuli, and decreased activation of the left putamen (Yan et al., 2015).

As reviewed by Kring and Elis (2013), three components of emotion deficits in schizophrenia have been studied extensively: expression, experience and physiology. Emotion experience deficits in schizophrenia are thought to reflect a blunted inner experience of emotional stimuli in daily life (Myin-Germeys et al., 2000). Diminished pleasure experience has attracted much attention in previous studies (Chan et al., 2010; Kring and Caponigro, 2010; Z. Li et al., 2015a) because of its prevalence and contribution to poor prognosis. Emotion expression deficits refer to diminished outer expression of emotion (Mandal et al., 1998; Aghevli et al., 2003). Kring and Elis (2013) concluded that emotion experience and expression could be taken as different components of emotion response. To better understand why patients with schizophrenia show deficits in emotion response, Trémeau (2006) suggested that the regulatory domain should be taken into consideration. In a consensus model of emotion proposed by Gross (1998, 2002), emotion starts with a cue, and subjective evaluation of the emotional cue triggers emotion response tendencies (e.g. behavioural, experiential and physiological), which can be modulated before emotion response appears. In short, emotion response is regulated in two ways: processing the input (antecedent-focused emotion regulation) and dealing with the output (response-focused emotion regulation) (Gross and Thompson, 2007). The most common antecedent-focused emotion regulation is reappraisal, which is defined as the subjective interpretation of emotional cues before emotion response tendencies are shaped (Gross, 1998). For response-focused emotion regulation, the most commonly used strategy is suppression, which is defined as the inhibition of emotion expression, which rarely influences the subjective experience of emotion (Gross and Levenson, 1993, 1997; Webb et al., 2012).

With respect to data analysis, most previous studies have employed group comparison between patients and healthy controls rather than cluster analysis. Because emotion deficits consist of several domains, group comparisons focusing on a specific domain cannot address the issue of heterogeneity of patients. For example, Strauss and Herbener (2011) identified two emotional experience subgroups in schizophrenia, using their rating scores of emotional pictures as an index. In their study, Cluster 1 was comparable with healthy controls, whereas for Cluster 2, participants with schizophrenia rated negative pictures more negatively and felt more aroused than healthy controls. Moreover, participants in Cluster 2 had more severe negative symptoms than those in Cluster 1. This finding suggests that there may be subgroups of schizophrenia patients with different patterns of emotion deficits.

Integrating the emotion response and regulation framework, we aimed to examine the subtypes of emotion deficits in patients with schizophrenia in three domains: experiential pleasure, emotional regulation and emotion expression. Based on Strauss and Herbener's (2011) previous findings and the findings that emotional regulation would influence emotion experience and expression, we hypothesized that there would be subtypes of schizophrenia patients characterized by their unique manifestations of experiential pleasure, emotional regulation and emotion expression. In particular, the potential subtypes would be manifested in terms of 1) no deficits in experiential pleasure, emotion expression and emotional regulation; 2) a deficit in experiential pleasure; 3) a deficit in emotion expression; 4) a deficit in emotional regulation; 5) a deficit in experiential pleasure and emotion expression; 6) a deficit in experiential pleasure and emotional regulation; 7) a deficit in emotion expression and emotional regulation; and 8) a general deficit in experiential pleasure, emotional expression and regulation.

2. Method

2.1. Participants

One hundred and forty-six patients with schizophrenia and 73 demographically-matched healthy controls were recruited for the present study. All patients fulfilled DSM-IV (American Psychiatric Association, 1994) criteria for schizophrenia. Diagnosis and clinical ratings were carried out by an experienced psychiatrist. Patients were recruited from the Qigihar Mental Health Center, the Haidian District Mental Health Hospital and the Beijing Anding Hospital. Inclusion criteria were: (a) meeting DSM-IV criteria for schizophrenia; (b) an IQ of >70, estimated using the short-form of the Chinese Wechsler Adult Intelligence Scale (WAIS-R; Gong, 1992); (c) years of education of more than nine years; and (d) aged 18 to 60 years. Potential participants were excluded if they met any of the following criteria: (a) a history of head trauma; (b) a history of substance or alcohol dependence; (c) mental retardation; (d) a history of neurological disorders; and (e) a history of having TMS or ECT in the past 12 weeks. All patients were clinically stable outpatients and medicated with antipsychotic medications with an average chlorpromazine equivalence of 322.05 ($\pm$165.95) mg/day. The mean duration of illness was 30.39 ($\pm$15.23) months.

Healthy controls were recruited from the neighbouring communities of the hospitals. The inclusion criteria were: (a) an estimated IQ of >70; (b) years of education of more than nine years; (c) aged 18 to 60 years; and (d) a Beck Depression Inventory-I (BDI-I, Beck et al., 1988) score of lower than 7. Exclusion criteria were: (a) a history of head trauma; (b) a history of substance or alcohol dependence; (c) mental retardation; (d) a history of neurological disorders; and (e) a personal or family history of mental illness.

Schizophrenia patients and healthy controls did not differ in gender ($\chi^2_{218} = 0.699$, $p = 0.485$), age ($t_{218} = 0.667$, $p = 0.156$), years of education ($t_{218} = 0.869$, $p = 0.385$) and estimated IQ ($t_{218} = 0.254$, $p = 0.699$). All participants gave informed consent, and received 100RMB as compensation for their time. The study protocol was approved by the Ethics Committees of all the institutes involved in this study.

2.2. Measures

All participants completed the self-report scales listed below. The IQ test was administered by trained research psychologists. For schizophrenia patients, an experienced psychiatrist ascertained their diagnoses and administered the clinical rating scales.

2.2.1. Self-report scales

The Temporal Experience of Pleasure Scale (TEPS; Chan et al., 2012; Gard et al., 2006) was administered to evaluate pleasure experience. The Chinese version of the TEPS comprises 19 items and consists of four factors: Abstract Anticipatory (e.g., "I looking forward to a lot of things in my life."), Contextual Anticipatory (e.g., "When I hear about a new movie starring my favorite actor, I can't wait to see it."), Abstract Consummatory (e.g., "I enjoy taking a deep breath of fresh air when I walk outside."), and Contextual Consummatory (e.g., "I really enjoy the feeling a good yawn."). Participants rated each item of pleasure experience from 1 to 6 (1 = very false to me, 6 = very true to me). A higher score indicates feeling or anticipating more pleasure in daily life. In the present study, the Cronbach's α of the TEPS was 0.843.

The Toronto Alexithymia Scale (TAS-20; Taylor et al., 2003; Yuan et al., 2003) was used to assess difficulties in verbal expression of positive (e.g., "Looking for hidden meanings in movies or plays distracts from their enjoyment.") and negative emotions (e.g., "When I am upset, I don't know if I am sad, frightened, or angry."). The 20-item Chinese version of this scale utilizes a five-point Likert rating scale (1 = totally disagree, 5 = totally agree) and has three factors (difficulty recognizing feeling, difficulty describing feeling; and externally oriented thinking). A higher score indicates greater difficulty in verbal expression of emotion. Previous studies have shown that schizophrenia patients only scored higher than healthy controls on difficulty in identifying and describing feeling, but not on externally oriented thinking (Cedro et al., 2001). We would, therefore, leave out the externally oriented thinking factor in our data analysis. The Cronbach's α of the TAS in this study was 0.765.