Individuals with psychometric schizotypy show similar social but not physical anhedonia to patients with schizophrenia

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ABSTRACT

Very few studies have examined physical and social anhedonia across the spectrum of schizophrenia. In the present study, we recruited three groups of participants ($n=84$ in each group): patients with schizophrenia, schizotypy and non-schizotypy as assessed by the Schizotypal Personality Questionnaire (SPQ). All participants completed the self-reported trait anhedonia scales (the Revised Physical Anhedonia Scale and the Social Anhedonia Scale). The clinical symptoms of schizophrenia patients were assessed using the Positive and Negative Syndrome Scale (PANSS) and the Scale for Assessment of Negative Symptoms (SANS). We found that the three groups differed in both physical and social anhedonia. The schizotypy group reported higher levels of physical anhedonia than the non-schizotypy group, and the patient group reported higher levels of physical anhedonia than the schizotypy group. For social anhedonia, the non-schizotypy group differed significantly from both the schizotypy and the patient group, while no significant difference was found between the last two groups. Our findings show that individuals with schizotypy exhibits similar social but not physical anhedonia compared with patients with schizophrenia, which further suggests that decreased pleasure experiences in the social environment may be a valuable target for identification and early intervention in high-risk populations.

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1. Introduction

Anhedonia, the reduced capacity to experience pleasure in normally pleasurable situations, has been considered a vulnerability indicator for the development of schizophrenia (Rado, 1953; Meehl, 1962). Although studies have reported reduced pleasure experiences measured by self-reported scales in schizophrenia patients (Blanchard et al., 1998; Burbridge and Barch, 2007) and individuals at-risk of schizophrenia spectrum disorders (Chan et al., 2012; Shi et al., 2012), very few studies have examined trait anhedonia across the schizophrenia spectrum. The Chapman scales are commonly used instruments in capturing trait anhedonia, which assess the defect of pleasure experiences in two aspects: physical and social anhedonia (Chapman et al., 1976). The Revised Physical Anhedonia Scale (Chapman and Chapman,

1978) assesses reduced pleasure experiences related to physical stimuli, such as pleasures of eating, feeling, sex, smell, and sound. In contrast, the Revised Social Anhedonia Scale (Eckblad et al., 1982) assesses diminished pleasure experiences from social environments, such as interaction with other people and talking or exchanging expressions of feeling. Both scales have been translated into other languages to assess anhedonia in different cultural contexts, with established reliability and validity (Chinese version: Chan et al., 2012; French version: Assouly-Besse et al., 1995; Spanish version: Fonseca-Pedrero et al., 2009; German version: Burgdorfer and Hautzinger, 1987).

High levels of trait anhedonia, in both physical and social aspects, have been consistently reported in patients with schizophrenia (Blanchard et al., 1998; Burbridge and Barch, 2007) and their biological relatives (Katsanis et al., 1990). Furthermore, longitudinal studies have found that reduced self-reported anhedonia are stable across different stages of illness in schizophrenia patients (Blanchard et al., 2001; Horan et al., 2008; Herbener and Harrow, 2002; Loas et al., 2009). Previous work has shown that

anhedonia is also present in non-clinical samples. In particular, individuals with schizotypy exhibited higher levels of social and physical anhedonia than individuals without schizotypy (Chan et al., 2012). The word "schizotypy" we used in the present study refers to schizotypal features such as magical thinking, odd behaviour and speech, constricted affect and so on in non-clinical populations. Although the reduced pleasure experiences in schizophrenia patients and psychometrically defined high-risk individuals have been found in previous studies, there is a lack of direct comparison between healthy controls, individuals with schizotypy, and patients with schizophrenia. Katsanis et al. (1990) examined physical and social anhedonia in three groups: psychiatric patients, their first-degree relatives and healthy controls. They found that both patients and relatives showed higher levels of anhedonia, and patients scored higher than relatives. To the best of our knowledge, no study has examined trait anhedonia across the schizophrenia spectrum, covering patients with schizophrenia, psychometric schizotypy and non-schizotypy controls. Thus, the primary purpose of the present study was to examine the levels of both types of trait anhedonia in schizotypy and non-schizotypy individuals as well as schizophrenia patients.

Another aim of this study was to examine the association between negative symptoms and self-reported anhedonia scores. Contrary to expectation, most previous studies found insignificant correlations between trait anhedonia and clinical ratings (such as SANS, PANSS or BPRS) in patients with schizophrenia (Blanchard et al., 2001; Horan et al., 2006, 2008). We believe that this may be due to the emphasis on observation of decreased engagement in social activities in clinical ratings when greater involvements in social interaction does not necessarily mean stronger pleasure experiences. Furthermore, clinical interviews usually only cover a relatively short time period, which may not capture anhedonia fully (Loas et al., 2009).

In addition, previous studies have found that trait anhedonia may be related to age and gender, which could be potential confounders when we compare groups on trait anhedonia. For example, males have been consistently found to have higher scores on the Chapman Anhedonia Scales in previous studies (Freedman et al., 1998; Kwapil et al., 2008), while age has also been found to be negatively correlated with physical anhedonia both in schizophrenia patients and their relatives (Katsanis et al., 1990). In the present study, we also examined the associations between these variables and trait anhedonia within each group and took them as covariates in subsequent analyses if necessary.

We hypothesized that both types of trait anhedonia are present in both patients with schizophrenia and non-clinical populations, with schizophrenia patients showing the highest level of anhedonia, non-schizotypy group showing the lowest level and schizotypy group in the middle. Significant correlations between clinical ratings on negative symptoms and trait anhedonia scores in patients, and significant correlations between the negative dimension of the Schizotypal Personality Questionnaire (SPQ) (Raine, 1991) and social anhedonia scores in non-clinical sample were expected.

2. Methods

2.1. Participants

Our study included three groups of participants: a clinical group of patients with schizophrenia, and two groups without mental disorder but with different levels of schizotypal features (the schizotypy and non-schizotypy groups). Participants with schizophrenia ($n=84$, mean age $=32.6$ years, S.D.$=14.5$, 64 males) were recruited from hospitals in Beijing, Guangdong, and Hong Kong. All of them met the ICD-10 (WHO, 1993) diagnostic criteria for schizophrenia. The duration of illness (DOI) ranged from one month to 41 years, with a mean DOI of 11.4 years

(S.D.$=12.6$). All except three of the patients with schizophrenia were treated with second generation antipsychotic medications. The mean chlorpromazine equivalence was 330.21 mg (S.D.$=196.81$). To select participants with and without schizotypal features (schizotypy vs. non-schizotypy groups), we first asked 872 college students from three universities in Beijing and Shanghai to complete the SPQ (Raine, 1991). Participants whose scores were at the top tenth percentile were recruited into the schizotypy group ($n=84$). Next, we randomly chose an equal number of participants among those scoring at the bottom 50% and recruited them into the non-schizotypy group ($n=84$). The schizotypy group consisted of 26 males and had a mean age of 19.1 years (S.D.$=1.1$). The non-schizotypy group consisted of 33 males and had a mean age of 18.7 years (S.D.$=0.9$). The three groups differed significantly in age ($F\,(2,249)=74.88$, $p<0.001$) and gender ($\chi^2=38.97$, $p<0.001$), an effect that was driven by the difference between the patient group and the other two groups (age: patients vs. schizotypy: $p<0.001$; patients vs. non-schizotypy: $p<0.001$; and schizotypy vs. non-schizotypy: $p>0.05$; gender: the patients' group had more males than the other two groups: patients vs. schizotypy: $p<0.001$; patients vs. non-schizotypy: $p<0.001$; schizotypy vs. non-schizotypy: $p>0.10$).

2.2. Procedures

All groups were assessed using two self-reported scales capturing trait anhedonia. The Chinese versions of the Social Anhedonia Scale (CSAS) and the Physical Anhedonia Scale (CPAS) were adapted from the English version of the Chapman scales (Chapman and Chapman, 1978; Eckblad et al., 1982). The CPAS contains 61 True–False items with higher scores indicating more severe physical anhedonic experiences. The CSAS contains 40 True–False items and higher scores indicate less pleasure from social interactions. After the standard translation and back-translation process, the Chinese versions of both scales have been shown to have good reliability (see Chan et al., 2012 for details on the adaptation of these measures in Chinese). The inverse correlations between both physical and social anhedonia scales and the Temporal Experience of Pleasure Scale (TEPS; Gard et al., 2006), which was developed to assess pleasure experiences, suggest that the Chapman Anhedonia Scales have good construct validity (Chan et al., 2012). In our sample, both the Cronbach's alpha coefficients for the CPAS and CSAS were 0.85.

Participants with schizophrenia were interviewed using the Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1987) and the Scale for the Assessment of Negative Symptoms (SANS) (Andreasen, 1982). The PANSS consists of 16 items that make up three subscales (positive, negative and general) and measures the severity of clinical symptoms of schizophrenia. The SANS consists of 24 items that assess five symptom complexes: affective flattening, alogia, avolition-apathy, anhedonia, and attentional impairment. We used the *subscale score* for each symptom complex and the *summary score* to indicate the severity of each symptom complex and negative symptoms as a whole, respectively.

The Schizotypal Personality Questionnaire (SPQ) (Raine, 1991) was used to screen participants with and without schizotypal features. It was developed based on the DSM-III-R criteria for schizotypal personality disorder and has been commonly used as an instrument to capture schizotypal traits in the general population. The SPQ consists of 74 items, including nine traits: idea of reference, excessive social anxiety, odd beliefs or magical thinking, unusual perceptual experiences, odd or eccentric behaviour, no-close-friends, odd speech and constricted affect. The three-factor structure of the Chinese version of the SPQ includes the cognitive-perceptual, the interpersonal and the disorganized factors, and has been found to have good reliability and validity (Chen et al., 1997). In our sample, the Cronbach's alpha coefficient for the whole scale was 0.95, and 0.69 to 0.86 for the nine traits.

Questionnaire administration was conducted in a group format for the non-clinical sample. For the clinical sample, schizophrenia patients were approached by the researchers individually. The total administration time was about 20–30 min. The clinical ratings were conducted by trained psychiatrists who were the treating clinicians of the patients. All participants gave written informed consents prior to testing. The present study was approved by the ethics committees of the Institute of Psychology, the Beijing Huilongguan Hospital, Shantou Mental Health Centre in Guangdong Province and Castle Peak Hospital in Hong Kong.

2.3. Data analysis

On all items of the Chapman scales, we found nine missing values and we used the medians scores of the participants' group to replace these missing values. Before group comparisons, we examined the gender effect on trait anhedonia by independent sample t tests and age effect by Pearson correlation analyses within each group. The results showed that males reported higher levels of social anhedonia than females in both the schizophrenia group and the schizotypy group (p values <0.05); while females reported higher levels of physical anhedonia than males in the non-schizotypy group ($p<0.05$). We did not find any significant correlations between age and trait anhedonia scores in all three groups ($p>0.10$). However, since both age and gender have been reported in previous studies to affect scores on the anhedonia scales and there were significant differences in age and gender ratio for the three groups in our study, we performed the MANOVA without covariates and also took age and gender as covariates in subsequent