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## Trajectories of schizotypy and their emotional and social functioning: An 18-month follow-up study

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### ABSTRACT

Schizotypy is a set of personality traits that convey liability to develop schizophrenia. Studying schizotypy in healthy individuals may facilitate the understanding of the psychopathological processes underlying schizophrenia. The present study aimed to examine the developmental trajectories of schizotypy over time using a longitudinal study design. The Chapman Scales for Psychosis Proneness were administered to 1541 college students at baseline, and subsequently at six-monthly intervals up to 18 months. Latent class growth analysis was conducted to track the different trajectories. In addition, self-reported scales were used to measure idea of reference, emotional experiences and expression, stress and coping, as well as social functioning. We identified four latent classes with distinct trajectories: “nonschizotypy” group (LC1), “stable high schizotypy” group (LC3), “high reactive schizotypy” group (LC2) and “low reactive schizotypy” group (LC4). These findings suggest that there may be distinct developmental trajectories for schizotypy. Two groups may be of particular interest: the “stable high schizotypy” group that displayed the worst clinical and functioning outcomes on almost all measures and the “high reactive schizotypy” group characterized by a relatively rapid decline in functioning.

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### 1. Introduction

Schizotypy is a set of personality traits that convey liability to develop schizophrenia (Meehl, 1962, 1989). More recently, the full-dimensional model assumes that schizotypy is a set of traits distributed in the general population with its extreme exhibited in patients with schizophrenia (Claridge and Beech, 1995; Nelson et al., 2013). Because schizotypy can be psychometrically identified in the general population, investigating schizotypy may provide a unique opportunity to better understand the underlying psychopathological process of psychosis while avoiding the confounding effect of antipsychotic medications

and duration of the illness. In previous studies, researchers used different terms in order to refer to schizotypal traits. In a review by Nelson et al. (2013), the authors suggested that “the schizotypy, schizotypal personality, ‘SPD-proneness’ and ‘non-clinical dimensions of psychosis’ are all subsumed under the umbrella of schizotypy”. In the current study, we chose to use the term “schizotypy” while at the same time, keeping the terms that different researchers used in their studies.

Cross-sectional investigations of individuals with schizotypy indicate that they are characterized by impairments in neurocognition (Ettinger et al., 2015), emotion and social cognition (Cohen et al., 2015) as well as social functioning (Wang et al., 2013). Schizotypal individuals have also been found to have social occupational impairment (Fonseca-Pedrero et al., 2010; Jahshan and Sergi, 2007). Studies also found that within the schizotypal group, individuals with negative schizotypy had poorer social functioning than those with positive schizotypy (Blanchard et al., 2011; Henry et al., 2008).

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Longitudinal studies of psychometrically-defined schizotypal features have been conducted to examine individuals with psychometrically-defined schizotypy in order to better understand the heterogeneous developmental outcomes of schizotypy. For example, Kwapil (1998) found that 24% of psychometrically defined social anhedonia high scorers were diagnosed with schizophrenia-spectrum disorders 10 years later, compared to 1% in the control group, suggesting that social anhedonia may be a predictor of schizophrenia spectrum disorders. Further reanalysis of the Chapmans' longitudinal data set (Kwapil et al., 2013) showed that both positive and negative dimensions of schizotypy could predict psychosocial adjustment and the presence of psychotic-like and schizotypal symptoms. In particular, positive schizotypy was associated with mood and substance use disorders, whereas negative schizotypy was associated with schizoid symptoms and social functioning at 10-year follow-up (Kwapil et al., 2013). In their independent replication of psychometric high-risk individuals, Gooding et al. (2005, 2007) observed that individuals with elevated social anhedonia scale scores at baseline were significantly more likely to meet diagnostic criteria for schizophrenia-spectrum personality disorders at the five-year follow-up, relative to the other high-risk and control groups. Gooding et al. (2005) also found that at follow-up, individuals with social anhedonia reported more frequent and more severe psychotic-like experiences than healthy controls. The Maryland Longitudinal Study of Schizotypy (MLSS) indicated that individuals with social anhedonia showed poorer attention and processing speed at the three-year follow-up compared to controls (Cohen et al., 2012).

The above longitudinal studies highlighted the importance of identifying potential risk factors, which are important for the early identification and intervention for schizophrenia spectrum disorders. Consistent with Meehl's (1962) model of schizotypy, most of the individuals in the aforementioned longitudinal studies were not expected to transition to psychosis. Thus, the focus of these studies was on the detectable manifestations of the latent schizotypy, i.e., psychotic-like symptoms and functional impairments. Moreover, the fact that transition to psychosis did not occur for most of the individuals with schizotypy in these studies suggests that the developmental trajectory of schizotypy is consistent with the developmental principle of multifinality (Gooding and Iacono, 1995). Given the heterogeneity of outcomes associated with schizotypy, it is important to examine the development of schizotypal individuals and determine whether there may be schizotypal subgroups that show distinct developmental trajectories. To date, few studies had examined the developmental trajectories of schizotypy.

The ontogeny of schizotypy in the general population is still unclear. Geng et al. (2013) examined the change in schizotypal features measured by the Schizotypal Personality Questionnaire (SPQ) (Raine, 1991) in college students in an 18-month follow-up study and identified three classes with different trajectories: a low schizotypy group presented the lowest scores that kept decreasing over time; a high schizotypy group with the highest scores that kept increasing over time; and a medium schizotypy group with moderate scores that remained stable over time. Furthermore, the three groups showed significant differences in terms of paranoid symptoms, emotional experiences and expression, and cognitive functions (Geng et al., 2013).

The purpose of the present study was, therefore, to examine the trajectories of schizotypy over time using a longitudinal design. Similar to Hallquist and Lenzenweger (2013), we expected to observe individual differences in outcomes over time. Based on the prior work (Geng et al., 2013), we hypothesized that there would be at least three latent classes with high, medium and low levels of schizotypy. We chose latent class growth analysis to differentiate the sample into latent classes in order to observe schizotypy across four time points. We were also interested in changes in the behavioural manifestations of psychotic symptoms, emotional experiences, and social functioning. We predicted that within the distinct latent classes, schizotypy would differ in terms

of their patterns of associations with psychotic-like symptoms, emotional processing as well as social functioning.

## 2. Method

### 2.1. Participants

Study participants were 1541 (595 male, 946 female) college students (mean age = 18.8 years; SD = 0.85; years of education: mean = 12.3 years; SD = 0.66) out from an original sample of 1600 students at baseline. The attrition rate of 3.7%. Participants were assessed at six-month intervals up to 18 months (four times in total). They were tested in a group format with 30 to 100 participants per group. The total test administration time was about 40 min. Participants received monetary remuneration (about two US dollars each time) in return for questionnaire completion. The present study was approved by the Ethics Committee of the Institute of Psychology, the Chinese Academy of Sciences. Written informed consent from all participants was obtained before the study began.

### 2.2. Measures

#### 2.2.1. The chapman psychosis proneness scales

We administered the Chinese versions of Chapman psychosis-proneness scales, namely: the Revised Physical Anhedonia Scale (Chapman et al., 1976) and Revised Social Anhedonia Scale (Chapman et al., 1976; Eckblad and Chapman, 1983) for the negative dimension of schizotypy, and the Magical Ideation Scale (Eckblad and Chapman, 1983) and Perceptual Aberration Scale (Chapman et al., 1978) for the positive dimension of schizotypy. On all four scales, a higher score indicates greater severity of the respective schizotypal features. We have validated the Chinese scales in previous studies with their factor structure reported (Chan et al., 2012a; Chan et al., 2015; Wang et al., 2012). In the current study, the sum of all four scales ("total schizotypal trait score") was used for the latent class growth modeling analysis.

#### 2.2.2. The idea of reference scale

The **Idea of Reference (IOR) scale** was adopted from the paranoia checklist developed by Freeman et al. (2005), which consists of 15 items measuring paranoid ideation. For each item, participants were asked to rate psychotic-like experiences involving paranoia on a five-point scale for three dimensions: frequency, degree of conviction and degree of distress. A higher score indicates either higher frequency, greater conviction or more distress caused by the respective experience. The validity and reliability of the Chinese version have been established in a previous study (Chan et al., 2011). This measure was used for the last three time points but not at the baseline.

#### 2.2.3. Temporal experience of pleasure scale

The Chinese version of the Temporal Experience of Pleasure Scale (TEPS; Chan et al., 2012b) is a self-report questionnaire designed to measure individual trait dispositions in both anticipatory and consummatory pleasure experiences. The original TEPS consists of a 10-item anticipatory pleasure scale and an 8-item consummatory pleasure scale (Gard et al., 2006). In this study, we adopted the validated 19-item Chinese version of the TEPS (Chan et al., 2012b), which includes 19 items and has a four-factor structure in the Chinese context (abstract anticipatory, contextual anticipatory, abstract consummatory, and contextual consummatory factors).

#### 2.2.4. Emotional expressivity scale

The 17-item Emotional Expressivity Scale (EES) was developed to capture individual differences in the outward display of emotion regardless of valence (Kring et al., 1994). Participants rated themselves on a six-point Likert scale from 1 (never) to 6 (always) in terms of how often they expressed their emotions. The Chinese version of the

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