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The independence of schizotypy from affective temperaments – A combined confirmatory factor analysis of SPQ and the short TEMPS-A

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ABSTRACT

Sparse evidence of a co-aggregation of the risk of schizophrenia and bipolar disorder provides support for a shared but nonspecific genetic etiology of bipolar disorder and schizophrenia. Temperaments are conceptualized as trait sub-syndromic conditions of major pathologies. This study set out to test the hypothesis of a continuum between schizotypy and affective temperaments versus the alternative hypothesis of their independence based on a cross-sectional, survey design involving 649 (males: 47%) college students. The short 39-item TEMPS-A and the SPQ were used as measures of the affective temperaments and of schizotypy, respectively. Confirmatory factor analyses were applied to a unidimensional model, to a standard correlate traits model, to second-order representations of a common latent structure, and to a bifactor model. Confirmatory bifactor modeling provided evidence against a complete independence of the dimensions subsumed by the affective and the schizotypal traits. The best solution distinguished between two sub-domains grouping positive symptoms and negative symptoms as measured by the SPQ subscales, and a sub-domain related to the affective temperaments as measured by the TEMPS-A. Limitations due to the use of subscales from two different tools should be taken into account.

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1. Introduction

Focus on the early detection and intervention in psychosis has spread all over the world in the past 20 years (McGorry, 1993; McGlashan, 1996; Birchwood et al., 1998; Cocchi et al., 2008; McGorry et al., 2009; De Koning et al., 2009). Emphasis on this model has renewed interest in the assessment of vulnerability traits for psychosis in both the schizophrenia and the bipolar disorder spectra (Stefanis et al., 2004; Kwapil et al., 2008; Barrantes-Vidal et al., 2009; 2010; Kwapil et al., 2011; Walsh et al., 2012; Fonseca-Pedrero et al., 2012).

Rado (1953) coined the term “schizotype” (from “schizophrenic genotype”) to describe individuals without psychosis but who displayed attenuated symptoms phenotypically similar to those

observed in schizophrenia. Vulnerable traits including interpersonal aversiveness, anhedonia, affective ambivalence and cognitive distortions were more often reported among the relatives of patients diagnosed with schizophrenia than among people from the general population, giving some credit to the genetic basis of schizotypy (Kety et al., 1968; Vollema et al., 2002; Tarbox and Pogue-Geile, 2011). More recent studies provided further evidence of a genetic basis of the schizotypal traits (Jang et al., 2005; Lin et al., 2007; Schürhoff et al., 2007; Ericson et al., 2011). These traits span from attenuated psychotic symptoms in the form of unusual subjective experiences and odd beliefs or magical thinking (Chapman et al., 1978; Mason, 1995; Mason and Claridge, 2006), to attenuated negative symptoms such as anhedonia, apathy and social withdrawal (Chapman et al., 1976), until more bizarre or disorganized behaviors expressed through eccentricity, lack of spontaneity or impulsive nonconformity (Chapman et al., 1984; Mason and Claridge, 2006). Schizotypal traits encompass, but do not overlap completely with the recently emphasized ultra high-risk criteria for the detection of people at high risk of psychosis (Fusar-Poli et al., 2013; Yung and Nelson, 2013).

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Regarding bipolar disorder, current research has focused on screening tools aimed at detecting potential unrecognized cases of affective disorders, such as the Mood Disorder Questionnaire (Hirschfeld et al., 2000, 2003; Hardoy et al., 2005), or the Hypomania Checklist (HCL-32) (Angst et al., 2005; Carta et al., 2006; Angst et al., 2010), and on the measures of affective temperaments, like the Hypomanic Personality Scale (Eckblad and Chapman, 1986; Meyer and Hautzinger, 2003) and the Temperament Evaluation of Memphis, Pisa, Paris and San Diego (TEMPS), a tool aimed at measuring the affective temperaments that define the bipolar spectrum, with depressive (D), cyclothymic (C), hyperthymic (H), irritable (I), and anxious (A) subscales (Akiskal et al., 1998; Placidi et al., 1998; Akiskal and Akiskal, 2005a).

There is some evidence that people scoring higher on measures of psychosis-proneness during adolescence or early youth are at a higher risk of being diagnosed with a condition characterized by psychotic features in adulthood (Chapman et al., 1994; Kwapil et al., 1997; Gooding et al., 2005). The same evidence, albeit limited, was reported for some measure of the affective temperaments (Kwapil et al., 2000; Miettunen et al., 2011).

1.1. Temperaments and genetic risk of psychosis

Schizophrenia and bipolar disorder are heritable. The relatives of people diagnosed with schizophrenia or bipolar disorder have an increased lifetime morbid risk of the proband's diagnosis when compared to people from the general population (Maier et al., 1993). Studies on multi-affected families showed that the disorders were transmitted independently (Maier et al., 1993; Somnath et al., 2002), although sparse evidence was found on the co-aggregation of the risk of schizophrenia and bipolar disorder (Van Snellenberg and de Candia, 2009), providing support for the theories that argue for a shared but nonspecific genetic etiology of bipolar disorder and schizophrenia, with psychotic symptoms being a potential key indicator for genetic studies (Johnson et al., 2003; Rende et al., 2005). Indeed, some genetic studies reported that schizophrenia and bipolar disorder partly share a common genetic cause (Lichtenstein et al., 2009). There is some evidence that genetic and environmental influences may become more important as the severity of disorders increases (van Os et al., 2010). However, genetic commonality might extend to phenotypical precursors of psychosis.

The genes common to both classes of psychosis might pertain to schizotypy (Schürhoff et al., 2005). Patients with bipolar disorder were reported to score higher on measures of schizotypy than people from the general population (Rossi and Daneluzzo, 2002; Rybakowski and Klonowska, 2011; Hori et al., 2012), albeit at a lower intensity than the people diagnosed with schizophrenia (Heron et al., 2003, but see Rossi and Daneluzzo, 2002).

Temperaments are conceptualized as trait sub-syndromic conditions of major pathologies. Since they play an evolutionary role, the genes that are expressed with temperamental traits are maintained in the general population (Akiskal and Akiskal, 2005b; Nettle and Clegg, 2006). Affective temperaments are thought to represent the liability factor for the development of major mood disorders (Akiskal and Akiskal, 2005b; Rihmer et al., 2010). Schizotypal traits are thought to represent the liability factor for the development of psychosis within the spectrum of schizophrenia (Tarbox and Pogue-Geile, 2011). If schizotypy is also a risk factor for the development of psychotic symptoms in people with a mood disorder, and bipolar disorder in particular, strong associations should be observed between measures of affective temperaments and schizotypy in both clinical and non-clinical samples.

1.2. Affective temperaments and schizotypy

Despite the interest in the hypothesis of a continuum between the dimensions of bipolar disorder and schizophrenia, the studies testing this hypothesis in non-clinical samples are sparse and inconclusive. In a study carried out with 1856 company employees in Japan, Akiyama et al., 2005 found that affective temperaments, as measured by the Japanese version of the TEMPS-A, and the schizoid temperament, as measured by the Japanese version of the Munich Personality Test (Von Zerssen et al., 1988), were independent when evaluated with factor analysis. In a sample including 4900 individuals from the Northern Finland 1966 Birth Cohort, Miettunen et al., 2010 found moderate ($r > 0.240 < 0.400$) to high ($r > 0.400$) correlations between the Hypomanic Personality Scale and the Perceptual Aberration Scale (Chapman et al., 1978), a measure of distorted perceptions of one's body and other objects. Links of the Hypomanic Personality Scale with measures of social and physical anhedonia were less important ($r < 0.240$). In a study involving 3807 university students attending the Paris Descartes University, Morvan et al., 2011 found moderate ($r > 0.240 < 0.400$) to high ($r > 0.400$) correlations between the cyclothymic, the dysthymic and the irritable subscales of the 39-item French version of the TEMPS-A and the Paranoid, Cognitive-Perceptual, Negative and Disorganized factors of the Schizotypal Personality Questionnaire (SPQ; Raine, 1991) as defined by Compton et al., 2009. In a sample including 55 bipolar disorder discordant sibling pairs and 113 healthy controls, Mahon et al. (2013) found significant and positive correlations (Spearman's rho > 0.400) between the three main subscales of the SPQ and the subscales of the TEMPS-A, with the exception of the hyperthymic subscale.

1.3. Aims of the study and involved measures

This study set out to test the hypothesis of a continuum between schizotypy and affective temperaments versus the alternative hypothesis of schizotypy's being independent from affective temperaments. In this study the short 39-item TEMPS-A and the SPQ were used as measures of affective temperaments and of schizotypy, respectively.

The TEMPS-A is a widely used measure of affective temperaments that was translated and validated in many countries over the five continents (e.g., Vázquez et al., 2012 and the list in Preti et al., 2010). The TEMPS-A is thought to measure five affective temperaments that define the bipolar spectrum. Evidence supporting the factor structure and measurement invariance of the TEMPS-A was provided for the short version of the TEMPS-A (Preti et al., 2013).

The SPQ, as well, is a widely used measure of schizotypy that has been translated and validated in many countries (e.g., Reynolds et al., 2000). Usually the SPQ is considered to measure a multidimensional construct, including a cognitive-perceptual domain (ideas of reference, odd beliefs or magical thinking, unusual perceptual experiences, and paranoid ideation/suspiciousness subscales); an interpersonal domain (excessive social anxiety, no close friends, constricted affect, and paranoid ideation/suspiciousness subscales); and a disorganized domain (odd or eccentric behavior and odd speech subscales) (Raine et al., 1994; Reynolds et al., 2000). However some authors proposed a two-factor structure of the SPQ, with a positive symptoms dimension (ideas of reference, odd beliefs or magical thinking, unusual perceptual experiences, and paranoid ideation/suspiciousness, odd or eccentric behavior and odd speech subscales) separated from a negative symptoms dimension (excessive social anxiety, no close friends, constricted affect subscales) (Siever and Gunderson, 1983). Other authors proposed a more complex, four-factor model consisting of a cognitive-perceptual domain (odd beliefs or magical

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