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The hierarchic structure in schizotypy and the five-factor model of personality

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ABSTRACT

Schizotypal personality traits (schizotypy) might be seen as on a continuum with schizophrenia. However, controversy remains with regard to whether this continuum is quasi-dimensional, applying only to people with schizophrenia and schizotypy, or fully dimensional, applying to all people. If the fully dimensional model is accurate, schizotypy could be described by the same personality theories as are applied to people in general. We examined the relationship between schizotypy and the five-factor model of personality (FFM), which is arguably the most established contemporary personality theory. When we assumed a hierarchic structure of schizotypy factors, we found that the FFM scales could explain schizotypy fairly well regardless of the questionnaires used, suggesting that schizotypy might represent a variation better understood by reference to typical dimensions of personality, though it might still indicate a predisposition to schizophrenia. This article discusses this conclusion in relation to each of the five personality factors. A perspective that situates schizophrenia on a continuum with general personality variations implies that this disorder constitutes a potential risk for everyone and, thus, helps to promote understanding and correct misunderstandings that contribute to prejudice.

1. Introduction

Individual differences on measures of schizotypal personality (schizotypy) have commonly been explored as a means of examining the nature and structure of schizophrenia symptoms. Research on schizotypal personality in the general population may provide an important opportunity to study the biological and cognitive markers of vulnerability to schizophrenia without the confounding effects of long-term hospitalization, medication, and severe psychotic symptoms (Raine et al., 1995). Relatives of patients with schizophrenia score significantly higher on measures of schizotypal personality (Vollema et al., 2002), though the results might depend on the questionnaire used (e.g., Clementz et al., 1991). This suggests that, within the spectrum of schizophrenia and related disorders, there is a range that includes schizotypal traits and that this range is at least partly genetic (Lenzenweger, 2006).

Patients with schizophrenia are impaired in perceptual as well as cognitive functions. In the past dozen years, several theoretical models of schizophrenia symptoms have been proposed, often inspired by advances in cognitive neuroscience. It was recently suggested that these models of schizophrenia may also apply to schizotypal personality traits (Asai et al., 2008; Asai and Tanno, 2007, 2008, 2009). Cyhlarova and Claridge (2005) indicated that people with schizotypal traits, identified by questionnaires or semi-structured interviews, might have a predisposition to schizophrenia. Although people with schizotypal traits might experience schizophrenic-like experiences, many live normal lives. The traits of schizophrenia are generally considered to span a continuum. However, controversy remains regarding whether this continuum is quasi-dimensional, applying only to those people with schizophrenia and schizotypy who have schizophrenic genes, or fully dimensional, applying to all people (Claridge and Davis, 2003). According to the former perspective, only those with high scores on measures of schizotypy exhibit schizotypal traits. According to the latter perspective, all people have schizophrenic genes and thus might exhibit schizotypal personality traits to some extent; those who have strong schizotypal traits might develop schizophrenia. Correlations between cognitive dysfunctions and schizotypal scores in the general population (e.g., Asai et al., 2008; Lenzenweger and Maher, 2002: suggesting a negative correlation between visuo-motor performance and schizotypy scores) provide support for the fully dimensional model of schizotypy, although some previous studies support the quasi-dimensional model (e.g., Smyrnis et al., 2007: suggesting that highly schizotypal people performed more poorly than did the total sample in an eye-tracking task, but no correlation was found between schizotypy scores and performance). According to these studies, the linear relationship between schizotypy scores and other measures indicating schizophrenic vulnerability might support a fully dimensional model, whereas the fact that only high scorers performed differently might support a quasi-dimensional model.

Aside from these experimental studies, questionnaire-based studies have also contributed to this discussion. For example, the similarity in the factor structure between schizophrenia and

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schizotypy has been suggested as indicating a continuum linking the two (see for the review, Mason et al., 1997). As to schizophrenia, the classical two-factor model (Positive and Negative symptoms; Crow, 1980) has developed into a three-factor model with the addition of Disorganized symptoms (Liddle 1987; Liddle and Barnes 1990), largely as a result of clinical observations. With regard to schizotypy, it is well known that the Schizotypal Personality Questionnaire (SPQ; Raine, 1991), which was developed to assess schizotypal personality disorder as defined in DSM-III-R (American Psychiatric Association, 1987), has a three-factor structure similar to that for schizophrenia, with Cognitive (Positive), Interpersonal (Negative), and Disorganization (Disorganized Schizotpy) factors (Chen et al., 1997; Dumas et al., 2000; Fossati et al., 2003; Gruzelier et al., 1995; Gruzelier 1996; Raine et al., 1994; Reynolds et al., 2000; Rossi and Daneluzzo, 2002), though some studies have suggested a four-factor structure in SPQ (e.g., Stefanis et al., 2004).

In addition, more recently, Mason et al. (1995) developed a new schizotypy scale, the Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE) based on factor analysis using the existing questionnaires related to schizotypy (Bentall et al., 1989; Claridge et al., 1996). O-LIFE has a four-factor structure: Unusual Experiences corresponding to Positive, Introvertive Anhedonia corresponding to Negative, Cognitive Disorganization corresponding to Disorganized, and Impulsive Nonconformity. The last factor, which refers to antisocial behaviors (disinhibited, violent, self-abusive, and reckless), emerges only in O-LIFE-measured schizotypy. This result might occur because the O-LIFE treats schizotypy as a personality quality present in the general population, because this measure was developed using standard personality measures (Claridge et al., 1996) including the Eysenck Personality Questionnaire (EQP: Eysenck and Eysenck, 1975), whereas the SPQ treats schizotypy as a predisposition to schizophrenia. According to Vollema and Bosch (1995), schizotypy measures might be divided into two categories: measures for symptoms and measures for traits. Whereas the SPQ is considered to belong to the former category (Vollema and Bosch, 1995), the O-LIFE seems to belong in the latter. Although these two questionnaires both provide comprehensive measures of schizotypy, they are based on differing perspectives on schizotypy. Because both have actually been used to measure schizotypy and vulnerability markers for schizophrenia, it is important to consider the differences in their origins. Whereas the SPQ was developed based on schizophrenic symptoms and criteria for diagnosis and thereby reflects the perspective of the quasi-dimensional model (i.e., with or without schizophrenic genes “schizotaxia”; Meehl, 1962, 1990), the O-LIFE incorporated previous personality theories and thus reflects the perspective of the fully dimensional model (i.e., “healthy schizotpy”; McCreery and Claridge, 2002). No study has examined the relationship between SPQ and O-LIFE. Therefore, in Study 1, we administered SPQ and O-LIFE simultaneously to examine their relationship.

If schizotypy is present in all people and is one expression of typical personality structure (the fully dimensional model), schizotypy might be described by standard personality theory (e.g., Widiger and Frances, 2002). Some studies have examined the relationship between schizotypy and the Five-Factor Model of personality (FFM), arguably the most well-accepted contemporary personality theory, which explains human personality in terms of five factors: N (Neuroticism), E (Extraversion), O (Openness to Experiences), A (Agreeableness), and C (Conscientiousness) (for a review, see O'Connor, 2002). Although many studies have examined the relationship between schizotypy and FFM (Ball et al., 1997; Blais, 1997; Costa and McCrae, 1990; Coolidge et al., 1994; Duijsens and Diekstra, 1996; Dyce and O'Connor, 1998; Haigler and Widiger, 2001; Hyer et al., 1994; Ross et al., 2002; Soldz et al., 1993; Tien et al., 1992; Trull, 1992; Yang et al., 2002; Yeung et al., 1993; West, 1999; Wiggins and Pincus, 1989), they have either examined only some aspects of schizotypy or have treated schizotypy not as a multi-factorial structure but as a unitary phenomenon. Because it is well established that schizotypy can be understood as multi-faceted, as can personality in general, both should be examined simultaneously. In Study 2, we used SPQ and O-LIFE to examine the relationship between each factor of schizotypy and the factors included in FFM.

2. Study 1

We examined the relationship between the two schizotypy questionnaires (SPQ and O-LIFE) for the first time. Both measure schizotypy comprehensively, but the two have different assumptions and different factorial structures. With regard to schizophrenia symptoms, the two scales seem to have three factors in common: Positive, Negative, and Disorganized Schizotypy. O-LIFE has an additional factor: Impulsive Nonconformity (ImNo). However, Mason et al. (1997) assumed that the Interpersonal factor of SPQ corresponds to Cognitive Disorganization in O-LIFE, and that Disorganization as assessed by SPQ corresponds to Impulsive Nonconformity as measured by O-LIFE. We constructed path models and examined these relationships. We hypothesized that the three factors in the SPQ and O-LIFE would correspond with the respective factor in the other, and that the relationships proposed by Mason et al. (1997) would emerge.

2.1. Method

We administered the SPQ and the O-LIFE to 270 university students (group 0; aged 18–24 years, mean 19.8, standard deviation (S.D.) 1.04; 181 men, 89 women) from an introductory psychology class. The SPQ (Raine, 1991) is a 74-item true/false self-report questionnaire based on the DSM-III-R diagnostic criteria for Schizotypal Personality Disorder (American Psychiatric Association, 1987). The SPQ has a three-factor structure (Cognitive (Cog), Interpersonal (Int), and Disorganization (Dis)). The O-LIFE (Mason et al., 1995) is a newly developed 104-item true/false self-report questionnaire based on the results of a massive factor analysis of existing schizotypy-related scales (Bentall et al., 1989; Claridge et al., 1996). The O-LIFE has a four-factor structure (Unusual Experiences (UnEx), Introvertive Anhedonia (InAn), Cognitive Disorganization (CoDi), and Impulsive Nonconformity (ImNo)). Both questionnaires have been translated from English into Japanese using a standard process including back-translations, and their validities and reliabilities have been confirmed. We used SPSS 17.0 and Amos 17.0 for the statistical analysis. We conducted a correlation analysis, a multi regression analysis, and a path analysis, which can treat many-to-many relationships as one model, progressively. In path analysis, generally the most fitted model is explored based on the *a priori* hypothesis. The constructed models can be evaluated using multiple measures: the χ^2 test, GFI (goodness-of-fit index), AGFI (adjusted GFI), NFI (Normer fit index), CFI (comparative fit index), RMSEA (root mean square error of approximation), and AIC (Akaike information citerion). If the P value resulting from χ^2 test is greater than 0.05, the model is thought to have good fit. If the values of GFI, AGFI, NFI, CFI are greater than 0.90 (or 0.95 in a more stringent analysis), the model is thought to have good fit (e.g., Bentler and Bonnet, 1980; Hu and Bentler, 1999). If the value of RMSEA is less than 0.10 (or 0.05 in a more stringent analysis), the model is thought to have good fit (e.g., Browne and Cudeck, 1993). Generally speaking, when the model has more than two good scores, including RMSEA and one other, the model is considered to have good fit. AIC is a comparative measure to compare two models with good fit; a smaller value indicates good fit.

2.2. Results and discussion

We calculated each factor score for SPQ and O-LIFE for the following analyses. First, we calculated Pearson's correlation between each SPQ and each O-LIFE factor (Table 1). Except for one pair (InAn in O-LIFE and Cog in SPQ), all factors were positively correlated. In

Table 1
Intercorrelations between O-LIFE and SPQ (Group 0).

		SPQ		
		Cog	Int	Dis
O-LIFE	UnEx	0.77**	0.36**	0.51**
	InAn	0.09	0.65**	0.16**
	CoDi	0.45**	0.67**	0.48**
	ImNo	0.46**	0.22**	0.39**

** $P<0.01$