Available online at www.sciencedirect.com

SCIENCE DIRECT®

Psychiatry Research 137 (2005) 71–85

PSYCHIATRY RESEARCH

www.elsevier.com/locate/psychres

# Taxonic structure of schizotypal personality disorder: A multiple-instrument, multi-sample study based on mixture models

Andrea Fossati [a,*], Alessandra Citterio [a], Federica Grazioli [a], Serena Borroni [a], Ilaria Carretta [a], Cesare Maffei [a], Marco Battaglia [a,b]

[a] *Faculty of Psychology, Vita-Salute San Raffaele University, via Stamira D'Ancona, 20, 20127 Milan, Italy*
[b] *Eugenio Medea Scientific Institute, Bosisio Parini, Italy*

Received 28 April 2004; received in revised form 3 December 2004; accepted 25 February 2005

**Abstract**

This study used a multi-sample, multiple-instrument strategy to evaluate the hypothesis that schizotypal personality disorder (SPD) is taxonic. In Study 1, 721 consecutively admitted inpatients and outpatients were evaluated with the Structured Clinical Interview for DSM-IV Axis II Personality Disorders (SCID-II) and the Personality Diagnostic Questionnaire-4+ (PDQ-4+). The data from both questionnaire types were submitted to multivariate normal mixture analysis, which was carried out on factor scores obtained from a three-factor model of SPD criteria; these results supported the hypothesis that SPD is taxonic. The same was true of Study 2, which administered the Semi-structured Interview for DSM-III-R Personality Disorders (SIDP-R) to an independent sample of 537 consecutively admitted outpatients. Similar findings were observed in Study 3, in which the SIDP-R was administered to 225 non-clinical subjects. The results show that the typology of DSM III-R and -IV SPD diagnosis is consistent with the latent structure of SPD features.


*Keywords:* Schizotypal disorder; Taxonomy; Mixture models; Latent structure analysis; Structural equation modeling

## 1. Introduction

There is strong evidence to suggest that schizotypal personality disorder (SPD) is linked to schizophrenia by familial/genetic (Kendler, 1988; Kendler et al., 1991, 1993; Torgersen et al., 1993; Battaglia and Torgersen, 1996) and developmental (Walker and Gale, 1995) factors. The two disorders share a common underlying liability (Battaglia et al., 1997; Holzman et al., 1988; Meehl, 1962, 1990; Lenzenweger and Korfine, 1995; Faraone et al., 2001), which is identified by some authors as "schizotaxia" (Meehl, 1962, 1990; Lenzenweger and Korfine, 1995; Faraone et al., 2001). Accordingly, research on the structure of SPD can also

* Corresponding author. Servizio di Psicologia Clinica e Psicoterapia, Istituto Scientifico H San Raffaele, via Stamira D'Ancona, 20, 20127 Milano, Italy. Tel.: +39 02 2643 3241; fax: +39 02 2643 3408.
*E-mail address:* fossati.andrea@hsr.it (A. Fossati).

0165-1781/$ - see front matter © 2005 Elsevier Ireland Ltd. All rights reserved.
doi:10.1016/j.psychres.2005.02.008

help investigators to understand the latent structure of liability to the schizophrenia spectrum (Lenzenweger and Korfine, 1995).

An important question is whether SPD, irrespective of the DSM-IV (American Psychiatric Association, 1994) categorical point of view, would be better conceptualized as continuous (i.e., dimensional) or discontinuous (i.e., taxonic) in nature. As Lenzenweger and Korfine (1995) pointed out, this question should be addressed empirically rather than theoretically. It raises at least two fundamental and different issues: (a) the statistical methods and (b) the diagnostic instruments employed.

The question of the latent structure of SPD features has been addressed using a variety of taxometric methods (Erlenmeyer-Kimling et al., 1989; Lenzenweger and Korfine, 1992; Korfine and Lenzenweger, 1995; Tyrka et al., 1995; Lenzenweger, 1999; Blanchard et al., 2000; Meyer and Keller, 2001) including latent class analysis (Nestadt et al., 1994; Battaglia et al., 1999; Fossati et al., 2001) and admixture analysis (Lenzenweger and Moldin, 1990). Although findings are consistent in their support of a taxonic model of schizotypal personality, they are not entirely conclusive. Specifically, some of these studies were based on techniques such as latent class analysis, which conceptualize a priori the latent variable(s) as categorical (Clogg, 1995) and risk imposing a categorical structure to the latent variables(s) rather than identifying natural classes of subjects (i.e., taxa).

More robust findings have come from studies based on taxometric analyses (Erlenmeyer-Kimling et al., 1989; Lenzenweger and Korfine, 1992; Korfine and Lenzenweger, 1995; Tyrka et al., 1995; Lenzenweger, 1999; Blanchard et al., 2000; Meyer and Keller, 2001), which consistently reported a taxonic structure for schizotypal personality with a mean estimated taxon base rate of 0.13 (Lenzenweger, 1999). However, despite the robustness of these studies, some issues require further resolution. For instance, four studies were based on covariance curves of dichotomous items (Lenzenweger and Korfine, 1992; Korfine and Lenzenweger, 1995; Tyrka et al., 1995; Meyer and Keller, 2001); recently, Miller (1996) performed a large number of Monte Carlo simulations and showed that maximum covariance (MAXCOV) analyses of dichotomous items are likely to give spurious evidence of a taxonic structure when the actual data distribution is dimensional (i.e., no latent classes), with latent taxon base rate estimates closely corresponding to the frequency of endorsement. Moreover, under these conditions, consistency tests may fail to reveal inconsistencies in the nontaxonic situation (Miller, 1996). For example, Tyrka et al. (1995) reported a base rate estimate for the schizotypy latent taxon that was both extremely high ($P=0.491$) and very similar to the average observed item base rate ($P=0.412$).

Another issue requiring further resolution concerns the breadth of schizotypy indicators used to establish a taxon. Although Erlenmeyer-Kimling et al. (1989) and Tyrka et al. (1995) used several schizotypy indicators, most taxometric studies are based on a selected number of schizotypal features, either positive (Lenzenweger and Korfine, 1992; Korfine and Lenzenweger, 1995; Lenzenweger, 1999; Meyer and Keller, 2001) or negative (Blanchard et al., 2000) in nature. Moreover, the taxonic structure of magical ideation features is still controversial (Meyer and Keller, 2001). Further studies based on instruments assessing a larger number of schizotypal traits could strengthen the case for the taxonicity of schizotypal personality.

Finally, if one were to consider the application of the MAXCOV–HITMAX or MAXEIG technique to the psychometric measures that encompass all the DSM-III-R (American Psychiatric Association, 1987) and DSM-IV (American Psychiatric Association, 1994) SPD criteria (Haslam, 2003), another limitation would arise: a requirement of the MAXCOV–HITMAX analysis is that all observable indicators measure the same latent construct (Waller and Meehl, 1998), and this requirement cannot be met, since a number of studies show that SPD is not a unitary construct (Muntaner et al., 1988; Bentall et al., 1989; Hewitt and Claridge, 1989; Raine and Albutt, 1989; Rosenberg and Miller, 1989; van den Bosch and Luteijn, 1990; Venables, 1990; Venables et al., 1990; Kendler et al., 1991, 1995; Kelley and Coursey, 1992; Kendler and Hewitt, 1992; Torgersen et al., 1993; Nestadt et al., 1994; Raine et al., 1994; Venables and Bailes, 1994; Vollema and van den Bosch, 1995; Bergman et al., 1996; Battaglia et al., 1997, 1999; Fossati et al., 2001). What is more, even though MAXCOV-–HITMAX analysis is highly efficient in identifying a taxonic structure when two natural classes (i.e., the taxon and its complement) of subjects exist (Waller and Meehl, 1998), it may not be the best statistical technique to test hypotheses that