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Schizotypal Personality Questionnaire: New sources of validity evidence in college students

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ABSTRACT

Schizotypal traits represent the behavioral expression of vulnerability to psychosis in general population. Among the most widely used measurement instruments, we could find the Schizotypal Personality Questionnaire (SPQ) (Raine, 1991). However, some aspects of its psychometric quality have yet to be analyzed. The main goal of the present study was to gather new sources of validity evidence of the SPQ scores in non-clinical young adults. The final sample was made up of 1123 college students ($M=20.3$ years; S.D.=2.6). The study of the internal structure using exploratory factor analysis revealed that SPQ items were grouped in a theoretical structure of seven second-order factors. Confirmatory factor analyses showed that the four-factor model (Paranoid) displayed better goodness-of-fit indices than the other hypothetical dimensional models tested. More complex measurement models, such as those tested using second-order confirmatory factor analyses and Exploratory Structural Equation Modeling, also showed adequate goodness-of-fit indices. The reliability of the SPQ scores ranged from 0.80 to 0.91. A total of 11 items showed differential functioning by gender. Advances in psychosis phenotype measurement open up new horizons to understand the structure and content of schizotypy.

1. Introduction

Psychotic symptoms, such as hallucination experiences or paranoid ideation, can be found in the general population, below the clinical threshold, and without necessarily being associated with a mental disorder (Linscott and van Os, 2013; van Os et al., 2009). This set of experiences expressed at a subclinical level is known as schizotypal traits or psychotic-like experiences. Schizotypy is a complex construct intimately related to psychosis at genetic, biochemical, phenotypic, and behavioral levels (Kwapil and Barrantes-Vidal, 2013; Kwapil et al., 2008; Lenzenweger, 2010; Meehl, 1962; Raine, 2006), and captures the expression of schizophrenic symptoms and impairment from subclinical levels to full-blown psychosis. Independent follow-up studies show that healthy participants who report schizotypal traits, compared to those who do not report such experiences, are at greater risk of transition to schizophrenia-spectrum disorders (Chapman et al., 1994; Dominguez et al., 2011; Gooding, Tallent et al., 2005; Kwapil et al., 2013; Werbeloff et al., 2012). However, it is also true that recent studies indicate the low specificity of these experiences and that their evolution is limited not only to the formal diagnosis of psychosis but also to other mental disorders (e.g., depression) (Fisher et al., 2013). Schizotypy is also a relevant predictive factor when examining individuals who are at-high genetic risk (Shah et al., 2012) and at-high clinical risk to psychosis (Morrison et al., 2006). Furthermore, healthy individuals who report high scores on schizotypy measures also present subtle emotional, behavioral, neurocognitive, psychophysiological, and/or social deficits (Barrantes-Vidal et al., 2013a; Barrantes-Vidal et al., 2013b; Cella et al., 2013; Fonseca-Pedrero et al., 2013; Gooding et al., 2006; Gooding and Pflum, 2011; Gooding, Shea et al., 2005; Horan et al., 2008; Martin et al., 2012), similar to those found in patients with schizophrenia or schizotypal personality disorder. In this sense, schizotypal traits would represent the behavioral expression of latent vulnerability to psychosis, and could be considered as a risk marker for psychosis and related disorders (van Os et al., 2009).

Several measurement instruments for schizotypy assessment have been developed (Fonseca-Pedrero et al., 2008). The Chapman Scales (Chapman et al., 1976, 1978; Eckblad et al., 1982), the Oxford–Liverpool Inventory of Feelings and Experiences (Mason and Claridge,

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2006), and the Schizotypal Personality Questionnaire (SPQ) (Raine, 1991), or its brief version (SPQ-B) (Raine and Benishay, 1995), are some examples for the adult population. The Chapman Scales have been widely studied, and their psychometric properties are consistent across studies and samples (Barrantes-Vidal et al., 2013a; Kwapil et al., 2008). Regarding SPQ, its psychometric properties, reliability, and sources of validity evidence have been analyzed (Compton et al., 2009; Chen et al., 1997; Fonseca-Pedrero et al., 2008; Fossati et al., 2003; Wuthrich and Bates, 2006). Nevertheless, several limitations in the reliability of the scores or inconsistencies regarding the underlying factor structure have been found. In terms of reliability of scores, some studies have criticized the low levels of reliability found for the SPQ subscales (Cohen et al., 2010). In this sense, other authors have proposed a five-option Likert-type response format to improve reliability of the scores (Cohen et al., 2010; Fonseca-Pedrero et al., 2011; Wuthrich and Bates, 2006).

The study of the underlying factor structure of the SPQ subscales reveals that schizotypy is a multidimensional construct. Specifically, using the SPQ (or SPQ-B), Raine et al.'s (1994) three-factor model (Disorganized) has been widely replicated, and is relatively invariant across studies and other variables (e.g., age, sex) (Badcock and Dragovic, 2006; Chen et al., 1997; Fonseca-Pedrero et al., 2009, 2011; Fossati, et al., 2003; Ortuño-Sierra et al., 2013; Reynolds et al., 2000; Wuthrich and Bates, 2006). This model includes the Cognitive–Perceptual, Interpersonal, and Disorganization dimensions. However, Stefanis et al.'s (2004) four-factor model (Paranoid), which includes the Cognitive–Perceptual, Interpersonal (Negative), Disorganization, and Paranoid dimensions, has also been replicated in both the SPQ and SPQ-B. The goodness-of-fit indices found for the Stefanis et al. model are similar to, or even better than, those reported for Raine's model (Bora and Arabaci, 2009; Compton et al., 2009; Fonseca-Pedrero et al., 2011; Wuthrich and Bates, 2006). This fact, together with the lack of factorial consistency among studies, has led some authors to examine the factor structure of SPQ scores at the item level (Cohen et al., 2010; Chmielewski and Watson, 2008), or to refine the SPQ through the development of a revised brief version (Callaway et al., 2014; Cohen et al., 2010). These results have stimulated a debate on whether schizotypy is a three or four-dimensional construct, and whether the SPQ subscales have the necessary empirical support to be used, with scientific guarantees, in both research and clinical practice. Also, it is noteworthy that new factorial studies to test whether the SPQ subscales are one-dimensional or to test new measurement models through different approaches (e.g., Exploratory Structural Equation Modeling) should be conducted with the aim to capture the complexity of schizotypy phenotype. In order to advance in the underlying factor structure of the SPQ scores, further analyses incorporating new statistical procedures are needed.

As it can be seen, the dimensional structure of the SPQ at the item level has not received sufficient analysis, and the available factorial results until date are still inconsistent with regard to the number and content of the dimensions at the subscale level. Likewise, testing new measurement models which take into account that the items are grouped in subscales (first-order factor), and those ones loading in higher order dimensions of schizotypy (second-order factors), is needed. Furthermore, other psychometric properties of the SPQ, such as differential item functioning (DIF) by sex, have to be explored in depth yet. From this point of view, the aim of the present study was to gather new sources of validity evidence of the SPQ scores in a sample of non-clinical young adults. The internal structure of the SPQ has been examined, through exploratory factor analysis at the item level, and confirmatory factor analysis at both the subscale and item level. Moreover, the reliability of the SPQ scores and DIF by sex were calculated.

2. Method

2.1. Participants

The final sample consisted of a total of 1123 university students, 224 were males (19.9%), from different courses at three Spanish institutions: University of Oviedo (Education and Psychology), University of La Rioja (Education), and University of La Laguna (Psychology). Participants mean age was 20.15 years, ranging from 17 to 29 (S.D.=1.98). Participants were asked if they had any psychological disorder. If yes, they were removed from the sample. Just 2.2% of the sample reported having a first-degree relative who had been diagnosed with a psychotic disorder or schizophrenia, while 11.1% reported having a first-degree relative with antecedents of some other psychological disorder. In order to make the relevant statistical analyses, a cross-validation study with the total sample divided into two subsamples was carried out. The first subsample consisted of 594 students (119 men; $M=20.24$; S.D.=2), and the second of 529 students (105 men; $M=20.05$ years; S.D.=1.9). There were no statistically significant differences, neither by sex ($\chi^2=0.006$; $p=0.106$) nor by age ($F=2.610$; $p=0.938$), between the two subsamples.

2.2. Instruments

The Schizotypal Personality Questionnaire (SPQ) (Raine, 1991) is a self-report instrument made up of 74 items with a dichotomic response format (Yes/No), developed to measure schizotypal personality according to DMS-III-R criteria (American Psychiatric Association, 1987). The items are distributed in 9 subscales: Odd beliefs or Magical thinking, Unusual perceptual experiences, Ideas of reference, Paranoid ideation/suspiciousness, Excessive social anxiety, No close friends, Constricted affect, Odd or eccentric behavior, and Odd speech. The psychometric properties of the SPQ scores have been analyzed (Compton et al., 2009; Fonseca-Pedrero et al., 2008; Fossati et al., 2003; Wuthrich and Bates, 2006). In the present work we used the adapted and validated version for the Spanish context (Fumero et al., 2009). This adaptation was made according to the International Test Commission Guidelines for translating and adapting tests (Muñiz et al., 2013).

2.3. Procedure

Participants fulfilled SPQ in a group session (10–50 students), during a normal hour class. Participants were informed about the research and, after signing the consent form, were asked to complete anonymous questionnaires. They did so voluntarily. They received no type of incentive for their participation in the study. Administration of the measurement instrument was always under the supervision of a researcher. This study is part of a broader research initiative on early detection and intervention in the context of psychological disorders in early adulthood and the analysis of psychopathological and personality variables. The study was approved by the Research and Ethics Committees at Oviedo, La Rioja, and La Laguna Universities.

2.4. Data analysis

First of all, descriptive statistics of the SPQ subscales for the total sample were calculated. Second, a cross-validation study, dividing the total sample into two subsamples, was carried out. In the first subsample we conducted exploratory factor analysis (EFA) on the SPQ scores. We first examined the one-dimensionality of the nine subscales independently. We used the tetrachoric correlation matrix. The procedure employed for determining the number of factors was optimal implementation of Parallel Analysis (Timmerman and Lorenzo-Seva, 2011). Then, we carried out a second-order EFA (principal axis factoring and Oblimin rotation) at the item level. Only the factors with eigenvalues above 1 (Kaiser's criterion) were included in the second-order EFA. The aim of the second-order EFA was to reduce the dimensionality of the data and to improve their interpretation.

Thirdly, with the second subsample, we tested different hypothetical dimensional models by means of confirmatory factor analysis (CFA) and Exploratory Structural Equation Modeling (ESEM). The models tested at the level of the SPQ subscales are shown in Table 1. Given the continuous nature of the variables, the method used was Restricted Maximum Likelihood estimator. At the item level we tested two models: (a) a second-order dimensional model, in which the items are grouped in subscales, and the subscales in the second-order dimensions of schizotypy, for both Raine et al.'s (1994) and Stefanis et al.'s (2004) models; and (b) a dimensional model within ESEM approach, in which the items are grouped in the nine theoretical factors (subscales). In both cases we took into account the dichotomic nature of the variables, so that we used the Weighted Least Squares Method estimator. The ESEM approach makes it possible to solve some of the problems associated with CFAs of multidimensional constructs, such as those cases in which there are no satisfactory goodness-of-fit indices, lack of DIF, or modifications are made to the hypothesized models (e.g., correlating the error terms) (Asparohov and Muthén, 2009; Marsh et al., 2010). In ESEM, all the factor loadings