Brief Assessment of Schizotypal Traits: A Multinational Study

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Abstract

The Schizotypal Personality Questionnaire-Brief (SPQ-B) was developed with the aim of examining variations in healthy trait schizotypy, as well as latent vulnerability to psychotic-spectrum disorders. No previous study has studied the cross-cultural validity of the SPQ-B in a large cross-national sample. The main goal of the present study was to analyze the reliability and the internal structure of SPQ-B scores in a multinational sample of 28,426 participants recruited from 14 countries. The mean age was 22.63 years (*SD* = 7.08; range 16-68 years), 37.7% (*n* = 10,711) were men. The omega coefficients were high, ranging from 0.86 to 0.92 for the total sample. Confirmatory factor analysis revealed that SPQ-B items were grouped either in a theoretical structure of three first-order factors (Cognitive-Perceptual, Interpersonal, and Disorganized) or in a bifactor model (three first-order factors plus a general factor of schizotypal personality). In addition, the results supported configural but not strong measurement invariance of SPQ-B scores across samples. These findings provide new information about the factor structure of schizotypal personality, and support the validity and utility of the SPQ-B, a brief and easy tool for assessing self-reported schizotypal traits, in cross-national research. Theoretical and clinical implications for diagnostic systems, psychosis models, and cross-national mental health strategies are derived from these results.

Keywords: Schizotypy; Schizotypal personality; Psychosis; Cross-cultural; SPQ-B; Psychosis risk

1. Introduction

In the past two decades, the early and reliable identification of individuals potentially at-risk for psychotic-spectrum disorders, based on psychometric indices, has become a focus of extensive and expanding research and debate (Addington et al., 2015; Fonseca-Pedrero et al., 2016b; Fusar-Poli et al., 2014; Kline and Schiffman, 2014; Mason, 2015). The identification of specific subgroups of individuals at high risk for psychotic-spectrum disorders may help us to elucidate risks and protective factors, as well as etiological mechanisms and developmental pathways that mitigate, delay, or even prevent the onset of clinically significant psychotic disorders (Barrantes-Vidal et al., 2015).

Schizotypal traits are considered a phenotypic-indicator of schizotypy (Meehl, 1962), a latent personality organization reflecting a putative liability for schizophrenia-spectrum disorders (Barrantes-Vidal et al., 2015; Fonseca Pedrero and Debbané, 2017; Lenzenweger, 2010). Schizotypal traits encompass anomalies and deficits across cognitive (e.g., paranoid ideation, ideas of reference), social/emotional (e.g., anhedonia, no close friends), and behavioural (e.g., odd behaviour and language) systems (Cohen et al., 2015; Fonseca-Pedrero et al., 2017). Previous findings support the notion of assumed phenomenological, temporal, and etiological continuity between the subclinical and clinical psychosis phenotype and lend validity to the concept of schizotypal traits (Cohen et al., 2015; Ettinger et al., 2014; Linscott and van Os, 2013).

Several measurement instruments allow clinicians and researchers to document the presence, frequency, and severity of schizotypal traits (Fonseca-Pedrero et al., 2016b; Mason, 2015). These tools have been developed with the aim of examining variation in healthy trait schizotypy as well as latent vulnerability to psychotic-spectrum disorders in both clinical and non-clinical population (e.g., general population, clinical, and genetic high risk samples). The Schizotypal Personality Questionnaire (SPQ) (Raine, 1991), in its brief version (SPQ-B) (Raine and Benishay, 1995), or its brief revised version (SPQ-BR) (Cohen et al., 2010), measure a broad range of psychotic-like traits– originally nine identified subordinate traits based on the operational definition of Schizotypal Personality Disorder (SPD) (American Psychiatric Association, 1987), and is among the more widely-used measured of this type.

The SPQ-B has been used with patients and relatives of patients with

schizophrenia-spectrum disorders (Compton et al., 2007; Moreno-Izco et al., 2015), adolescents (Fonseca-Pedrero et al., 2009), twins (Ericson et al., 2011), outpatients (Axelrod et al., 2001), and college students (Compton et al., 2009a; Fonseca-Pedrero et al., 2011; Mata et al., 2005; Raine and Benishay, 1995). The psychometric properties of the SPQ-B have been examined previously. For instance, the reliability of scores and several sources of evidence of validity have been demonstrated (e.g., Fonseca-Pedrero et al., 2016b; Mason, 2015). Moreover, translations of the measure have been validated in several countries (e.g., France, China, Spain, Turkey, Switzerland, etc.) (e.g., Aycicegi et al., 2005; Ma et al., 2015; Ortuño-Sierra et al., 2013).

Examination of the SPQ-B factor structure has yielded factorial solutions of two (Aycicegi et al., 2005), three (Compton et al., 2009a; Fonseca-Pedrero et al., 2011, 2009; Ma et al., 2015; Mata et al., 2005; Ortuño-Sierra et al., 2013; Tran et al., 2015), and four factors (Cohen et al., 2010; Fonseca-Pedrero et al., 2010). The three-factor model characterized by Cognitive-Perceptual (e.g., hallucinations, ideas of reference, magical thinking or paranoid ideation), Interpersonal (e.g., blunted affect, social anxiety or lack of close friends), and Disorganized (e.g., odd behavior and speech) dimensions has been widely replicated across studies. However, although the underlying structure of schizotypal personality, as assessed via the SPQ-B, has been analyzed, previous research has produced some contradictory results. These mixed findings are partially explained by variations in sampling method (random, convenience), sample characteristics (clinical, non-clinical, and country), and the data-analytic approach employed (exploratory vs. confirmatory factor analysis).

To the best of our knowledge, no previous studies has validated the psychometric quality of SPQ-B scores across multiple countries. For instance, we have little information about the factorial structure of SPQ-B scores and its possible variation across countries, particularly non-Western countries. Moreover, as previous studies have demonstrated with the SPQ, alternative models (e.g., Barron et al., 2017; Preti et al., 2015) may better explain the latent structure of SPQ-B scores. Thus, it is important to gather new information about the validity of this tool through cross-cultural research and collaborative multinational studies. Furthermore, and despite the globalization of psychosis research, no previous study has analyzed the psychometric quality of psychosis risk screeners in multinational samples.

The purpose of the present study was to analyze the psychometric properties of SPQ-B scores in a large sample recruited from 14 countries. Derived from this main

goal are the following specific objectives: a) to estimate the reliability of SPQ-B scores across countries; b) to study the internal structure of SPQ-B scores across countries; and c) to analyze the measurement invariance of SPQ-B scores across countries. We hypothesized that the three-factor model of the SPQ-B would have adequate goodness-of-fit indices across samples. Moreover, we hypothesized that new measurement models, such as a bifactor model, would fit adequately. In addition, we further hypothesized that SPQ-B scores would show configural measurement invariance across samples.

2. Method

2.1. Participants

Participants were gathered from 24 sites across 14 countries (Australia, Austria, Belgium, Canada, China, Germany, Greek, Italy, Mauritius, New Zealand, Spain, Tunisia, United States of America, and United Kingdom). Data from the present study, focused on reporting of full SPQ scores, has been published elsewhere (Fonseca-Pedrero et al., 2017) and the present study focused specifically on the SPQ-B. The overall sample consisted of 28,426 participants. The mean age was 22.63 years (*SD* = 7.08; range 16-68 years). A total of 14.5% (*n* = 4,113) of participants did not provide age. Participant were 10,711 males (37.7%) and 17,208 females (60.5%); 507 (1.8%) did not specify sex. Thus, 27,919 (98.2%) participants reported sex and 22,888 (80.52%) reported age. In this study, we considered information at the country, and not research site, level. Information about the age, sex, and other participant characteristics are reported in Table 1. Information about sampling procedures and demographic characteristics of the samples across sites are presented in the Supplementary Materials.

----------Insert Table 1----------

2.2. Instrument

2.2.1. The Schizotypal Personality Questionnaire-Brief (SPQ-B)

The SPQ-B provides a common index of schizotypal traits across all countries. The SPQ-B is a 22-item (*True*/*False*) self-report scale based on the SPQ (Raine, 1991) for the assessment of SPD traits as defined by *DSM-III-R* diagnostic criteria (American Psychiatric Association, 1987). The SPQ-B includes items that fall within three domains: Cognitive-Perceptual (ideas of reference, paranoid ideation, magical thinking,

and unusual perceptual experiences), Interpersonal (social anxiety, no close friends, blunted affect, and paranoid ideation), and Disorganized (odd speech and behavior). In the present study, the items of the brief version were extracted from the original SPQ validated for each country. Item selection was based on the original brief SPQ: English (Raine, 1991), Spanish (Fonseca-Pedrero et al., 2014b), Italian (Fossati et al., 2003), Chinese (Chen et al., 1997), Arabic (Lahmar et al., 2014), French (Dumas et al., 2000), Creole (Reynolds et al., 2000), Greek (Tsaousis et al., 2015), and German version (Klein et al., 1997).

2.3. Procedure

Conventions for obtaining informed consent required by each investigator's research institution, as well as IRB or ethical committees were followed. All participants provided written informed consent prior to participation. The study was conducted in accordance with the guidelines of the Declaration of Helsinki (World Medical Association, 2013). In the present study the SPQ-B scores being reported are derived from the administration of the full 74 item SPQ (see Fonseca-Pedrero et al., 2017). Similarly, the SPQ was sometimes administered in the context of larger studies (see Supplemental Material for further information).

2.4. Data analyses

Descriptive statistics for the items of the SPQ-B items were calculated as the first step. In order to test the reliability of SPQ-B scores, and due to the limitations of Cronbach's α (Dunn et al., 2014), coefficient ω was estimated (Zinbarg et al., 2005). Next, in order to analyse the internal structure of SPQ-B scores, and based on previous literature, several confirmatory factor analyses (CFAs) were conducted at the item level. Considering the categorical nature of the data, we used the robust mean-adjusted weighted least square method (WLSMV) for parameter estimation (Muthén and Muthén, 1998-2012). The following goodness-of-fit indices were used: Chi-square (χ^2), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Weighted Root Mean Square Residual (WRMR). CFI and TLI values greater than .95 are preferred and those close to .90 are considered acceptable; RMSEA values should be under .08 for a reasonable fit, and under .05 for a good fit, whereas WRMR values less than .08 are considered evidence of good model (Brown, 2006; Hu and Bentler, 1999).

Taking into account previous studies, different measurement models were tested: a) a unidimensional model; b) a bidimensional solution with a Cognitive-Perceptual, and a Negative factor (Siever and Gunderson, 1983); c) the Raine et al. (1994) model that includes Cognitive-Perceptual, Interpersonal, and Disorganized dimensions with Items 7, 9, 14, and 17 overlapping (i.e., cross-loading) in both the Cognitive-Perceptual and Interpersonal dimensions; d) the Raine and Benishay (1995) three-factor solution with no item cross-loadings allowed, and; e) a bifactor model that includes a general factor of schizotypal personality and three first order factors (Cognitive-Perceptual,, Interpersonal, and Disorganized). Correlations among error terms were not permitted. Finally, and with the aim of studying measurement invariance across countries, we conducted successive multi-group CFAs models (MGCFAs models) for categorical outcomes (Muthén and Asparouhov, 2002).

The relatively few missing values in the data were replaced by regression-based estimates, to which an error component was added, based on the SPSS Missing Value Analysis module. SPSS 22.0 (IBM Corp Released, 2013), Mplus 7.4 (Muthén and Muthén, 1998-2012), FACTOR 10.5 (Ferrando and Lorenzo-seva, 2017), and R (R Development Core Team, 2011) were used for the data analyses.

3. Results

3.1 Descriptive statistics and internal consistency of the SPQ-B scores

Means and standard deviations for the SPQ-B items for all countries are shown in Table 2. Internal consistency values for SPQ-B scores in the total sample and by country are shown in Table 3. Omega coefficients were adequate for data from all participating countries. Values for the total sample were 0.86, 0.91, 0.89, and 0.92 for the Cognitive-Perceptual, Interpersonal, and Disorganized subscales, and the Total score, respectively. Across countries, values ranged from 0.77 (Cognitive-Perceptual for China) to 0.94 (total score for the United States, Interpersonal and Disorganization for Germany).

----------Insert Table 2 and 3----------

3.2. Internal structure of schizotypal traits

Goodness-of-fit indices for the analyzed models are presented in Table 4. As can be seen, the models that showed the best fit in all the countries were the bifactor and Raine et al. (1994) models (models c and e). The bifactor model displayed better goodness-of-fit indices, but, as explained below, the factor loadings in this solution revealed some inconsistencies. It is worth noting that, in several countries, some of the goodness-of-fit indices such as CFI and TLI were close to the standard cut-off values, but still inadequate. In particular, values of CFI lower than .90 were observed in both models, especially in the model of Raine et al. Nonetheless, RMSEA values in both factorial solutions were good for all of the countries analyzed. As noted by Yu (2002), the RMSEA index may be preferred for analysis with the WLSMV estimator and ordered categorical variables. Thus, by this standard, the goodness-of-fit indices for the analyzed models could be considered adequate.

Tables 5 and 6 show the factor loadings for each of the 22 items for the Raine et al. (1994) and the bifactor models, respectively. In addition, the means and range of the factor loadings for the SPQ-B items in the two models are presented. In the case of the Raine et al. (1994) model, correlations among the latent variables were calculated, with averages of 0.561 (Cognitive-Perceptual-Disorganized), 0.286 (Positive-Interpersonal), and 0.593 for the total sample. As can be seen, some factor loadings on the latent factors of the bifactor model were negative and nominally not significant, thus suggesting that this model could be further improved. Factor loadings for the Raine et al. (1994) model were all adequate and statistically significant.

----------Insert Table 5 and 6----------

3.3. Measurement invariance of the SPQ-B scores across countries

Measurement invariance across all participating countries was studied for the two models that displayed best fit, namely the Raine et al. (1994) model (χ^2 = 19973.89; *df* = 2828; CFI = 0.912; TLI = 0.90; RMSEA = 0.055, with 95% CI: 0.054-0.055; WRMR = 8.62) and the bifactor models (χ^2 = 14564.89; *df* = 2618; CFI = 0.938; TLI = 0.924; RMSEA = 0.047 with 95% CI: 0.047-0.048; WRMR = 7.01). The configural invariance model, in which no equality constraints were imposed, showed an adequate fit to the data for both models. Next, a strong invariance model was tested with the item thresholds and factor loadings constrained to equality across groups. The ΔCFI between the constrained and the unconstrained models was over 0.01, indicating that strong

invariance was not supported in the case of the bifactor model (χ^2 = 23498.71; *df* = 3086; CFI = 0.895; TLI = 0.890; RMSEA = 0.057 with 95% CI: 0.056-0.058; WRMR = 9.80). For the Raine et al. (1994) model, no convergence was found and the program did not allow us to calculate strong invariance parameters. The ΔCFI between the constrained and the unconstrained models was over 0.01, indicating that strong invariance was not supported. Hence, the results support configural invariance, whereas strong measurement invariance of the SPQ-B across the 14 countries studied was not tenable.

4. Discussion

The psychometric assessment of schizotypal traits offers distinctive benefits, such as being relatively inexpensive, non-invasive, and useful for screening large samples of the general population, as well as for identifying participants at increased risk for psychosis (e.g., Fonseca-Pedrero et al., 2016b; Lenzenweger, 2010; Mason, 2015). For these purposes, and in tandem with global mental health research strategies, there is a clear need for psychometrically sound tools for both psychosis risk and schizotypal screening, which are validated across countries, to use in international research studies and diverse cultural settings. To date, no study has attempted to validate the SPQ-B in a cross-national sample. Furthermore, it remains unclear whether the factorial structure underlying SPQ-B scores is invariant across multiple countries. Thus, the main goal of the present study was to analyse the reliability, internal structure and measurement invariance by country of SPQ-B scores in a multinational sample of participants recruited from 14 countries.

Our analyses highlighted several important findings. First, SPQ-B scores showed adequate levels of internal consistency across countries. The reliability of SPQ-B scores, estimated with coefficient omega, was generally above 0.8. This research provides further support for the reliability of the SPQ-B scores, extending previous findings to non-clinical samples from different countries and variable study contexts. Thus, the SPQ-B could be used as a screening instrument to identify individuals who may be at increased risk for psychosis-spectrum disorders as well as to examine variations in healthy trait schizotypy in cross-cultural studies.

Second, examination of the factorial structure underlying the SPQ-B scores indicated that schizotypal traits have a multidimensional, rather than unidimensional, structure. SPQ-B items were grouped, in the present analysis, in a theoretical structure

of three first-order factors (i.e., Cognitive-Perceptual, Interpersonal, and Disorganization dimensions) as well as in a bifactor model (three first-order factors plus general factor of schizotypal personality). In fact, this is the first study to show that it is possible to derive a total score for the SPQ-B and to obtain distinct subscores for the three classic schizotypal dimensions. Schizotypal personality is a multifaceted construct phenotypically similar to that found in patients with psychosis (e.g., Liddle, 1987). Just as the manifestation of schizophrenia is heterogeneous – encompassing a broad range of emotional, cognitive, perceptual, social and behavioral functions – schizotypy involves a diverse set of traits. Numerous studies, using the SPQ-B or its brief versions, have obtained evidence of such a three-factor structure for schizotypal personality (Compton et al., 2009a; Fonseca-Pedrero et al., 2011, 2009; Ma et al., 2015; Mata et al., 2005; Ortuño-Sierra et al., 2013; Tran et al., 2015), consistent with the Raine et al. (1994) model. Furthermore, the present results corroborate those found when comparing SPQ scores across samples (e.g., Bora and Arabaci, 2009; Compton et al., 2009b; Fonseca-Pedrero et al., 2016a; Fonseca-Pedrero et al., 2017; Fossati et al., 2003; Raine et al., 1994; Reynolds et al., 2000). Futhermore, this factorial structure is similar to those found in the new measure of schizotypy named the Multidimensional Schizotypy Scale (MSS) (Kwapil et al., in press).

Third, multigroup CFA showed that the SPQ-B three-factor model had configural, but not strong measurement invariance, across countries. Similar results have been found in prior research using the SPQ and its brief versions, as well as other schizotypy tools (e.g., the short form of the Oxford-Liverpool Inventory of Feelings and Experiences and Chapman's scales of psychosis proneness) (Cicero, 2015; Fonseca-Pedrero et al., 2015, 2014a; Kwapil et al., 2012; Ortuño-Sierra et al., 2013). For instance, Ortuño-Sierra et al. (2013), when comparing the factorial equivalence of the SPQ-B between Spanish and Swiss adolescents, found that SPQ-B scores had configural and partial strong invariance across the two samples. In addition, the present results demonstrated that several items showed differential functioning by country. To date, differential item functioning (DIF) for psychosis risk or schizotypy measures has yet to be thoroughly addressed. In cross-cultural research, it is vital to test whether varied groups show differing probabilities of success on (or likelihood of endorsing) an item after matching on the underlying construct (e.g., schizotypy) that the item is intended to measure (Byrne et al., 2009; Zumbo, 2007). DIF is of particular importance in international, comparative, and cross-cultural research particularly in efforts to ensure

fairness and equity in testing (Zumbo, 2007). The present findings suggest that some schizotypal traits reflecting emotion, behavior, and cognition may differ across countries, at least those that were included in the present study. In fact, schizotypal traits assessed in different cultures have the potential to provide us with information about cultural variations in social and affective functioning (Cohen et al., 2015). Similar results have been found when psychotic symptoms or psychotic-like experiences are analyzed in samples recruited around the world (Larøi et al., 2014; Nuevo et al., 2012; Woods et al., 2014). The finding of configural measurement equivalence across cultures provides essential evidence of construct validity for the schizotypal dimensions, as well as evidence of the cross-cultural validity of SPQ-B scores; however, examination of DIF by sex, age, and language will be an important next step in future studies.

The results of the present study should be considered in light of the following limitations. First, there is an inherent problem in the use of self-reports as indirect indicators of schizotypal traits. Second, the nature of the sample, composed of a majority of college students, precludes the generalization of the results to other populations of interest. Third, the fact that not all the samples employed the infrequency response to detect those participants who displayed random or pseudo-random patterns of responses may undermine the validity and generalizability of the results found in the present cross-national study. Finally, in the present study, the items of the SPQ-B were extracted from the original full version of the SPQ.

5. Conclusions

We have provided the first comprehensive validation study of the SPQ-B using a large, multinational sample from 14 countries. These results provides new information about the brief assessment of schizotypal traits using the same psychometric tool and analytic procedures to compare results obtained in different countries and linguistic groups. In addition, our results demonstrated that schizotypal personality is composed, at a minimum, of three dimensions (i.e., Cognitive-Perceptual, Interpersonal, and Disorganized), and is perhaps encompassed by a general schizotypal factor. The results derived from this cross-national study have theoretical and clinical implications for diagnostic systems, psychosis models, and cross-national mental health strategies.

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***Response to Reviewers**

Dear Professor Keshavan,

We would like to sincerely thank the reviewers for their comments regarding the first version of our manuscript. Many of the suggestions have led to important revisions, and we believe this process has considerably improved the quality and clarity of the revised manuscript. In addition to this version, we also enclose point-by-point responses that describe the changes made to the manuscript in response to these reviewers' comments and suggestions. You will find this commentary below, with our responses in italics. We hope you find these revisions to be in order and feel able to accept our manuscript for publication. However, if there are further issues requiring our attention, we would be grateful for a further opportunity to work together with you and your reviewers to rectify said issues.

Sincerely,

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Reviewer 1.

This is an analysis of a large set of samples of SPQ data across several countries to further examine the psychometric properties of the SPQ-B. The authors have compiled an impressive number of samples and are able to evaluate a number of models with these data. Overall results suggest some configural measurement invariance of the SPQ-B across countries. The report is competently written and the research area is important given the need for 1) brief and practical measures of schizotypy, and 2) cross-country, cross-ancestry investigation of schizotypy traits. This type of study fits in well with our attempts to square schizotypy models with a dimensional approach to psychopathology and a dimensional approach to risk for schizophrenia. However, several concerns should be addressed and clarity on these points will enhance the manuscript.

We are appreciative of the time and care the Reviewer invested in helping us to improve the quality of our presentation.

1) Why SPQ-B from full SPQ data? It sounds like all of the samples were originally full SPQ—why whittle this down without reporting full results? Reasoning here remains unclear.

We apologise that this aspect of our manuscript was not explained sufficiently clearly. The reason we focused on the SPQ-B data in the present study is because data from the full version of the SPQ has already been reported elsewhere (Fonseca-Pedrero et al., 2017). We now mention this point in the new version of our manuscript. Moreover, as compared to the previously reported work, here we are able to report on a larger dataset, which includes additional participants from the United Kingdom, as well as participants from two new countries (Germany and Austria). To repeat the point, the main goal of the present study was to study the brief version of the SPQ brief version, which has not previously been the subject of this sort of investigation. In our revision, we have added (in the Supplemental Material) two new tables that present sampling procedures and demographics characteristic of each subsample.

2) What were the procedures for imputing missing data from "regression-based estimates"? i.e. what R package and function was used, parameters, etc. Using imputation in the study of psychometric properties should be justified in the Methods.

We apologise for this oversight. As we now explain in our revision, based on the SPSS missing value analysis module, the relatively few missing values in the data were replaced by regression-based estimates to which an error component was added.

3) There is a big focus on country, but not language or sex or culture. It feels like these are given no consideration despite plenty of power to do so. The authors could enhance the manuscript by exploring invariance across these constructs.

We agree that these are potentially useful ways for enhancing our manuscript. However, there are a number of separate issues that need to be considered. In terms of language, it may indeed be useful to examine invariance across language (as opposed to nation), but this would in fact greatly reduce the number of observed sampling cases in the present work. We believe it is more fruitful – and from a practical point of view, more substantive – to report on invariance at the level of the nation. Likewise, we agree that focusing on invariance across culture might be useful, but we do not believe there is an easy way of categorizing our samples based on a common definition of culture. That is, there are multiple ways in which "culture" could be defined, but no one definition would best serve our purposes in the present study. Moreover, due to space limitations, we made an a priori decision to focus on a singular factor (i.e., nation) in the present study. Nevertheless, we agree with the reviewer that there are opportunities to further interrogate this dataset and it is our plan to present a future manuscript that deals specifically with measurement invariance in terms of sex and age.

Reviewer 2.

This is a psychometric study of SPQ-B (i.e. one of the most popular self-report tools for schizotypal traits) on a broad trans-national sample mostly based on college students. Despite the huge size (28,426 participants from 14 countries), the nature of the sample (with the related limitations in terms of representativeness) constrains the impact and generalizability of the results. I herewith enlist some issues that could improve the import of the manuscript.

1) Methods: as "the items of the SPQ-B were extracted from the original full version of the SPQ", it could be important to present the whole SPQ data rather than circumscribing the analysis to SPQ-B.

As detailed above, we report data from the full version of the SPQ elsewhere (Fonseca-Pedrero et al., 2017). However, given that both reviewers expressed interest in this issue, we have decided to add a new table in the supplemental material providing further information about the sample used in this cross-national study and the full dataset that we have compiled (please see eTable 1 and eTable 2).

2) The results indicate that several items showed differential functioning by country. Please, expand and clarify. Which items? Why? Is there any clear and interpretable cultural trend? Also the consequences in terms of scoring should be discussed.

We agree completely with this point. As noted, we have found that several items of the SPQ-B showed differential item functioning (DIF) by country. However, when using CFA, it is difficult to determine precisely which items show DIF because the approach involves making multiple simultaneous comparisons. For instance, in this study, 14 countries are represented. This means that we have to compare each country with every other country (in this case, that means making 14 x13 comparisons for each item of each dimension of the SPQ-B). The reviewer's point is interesting and worthy of attention; however, space constraints preclude us from addressing this issue in depth in the present manuscript, given that our focus is on the validation of the SPQ-B. Nonetheless, in light of the importance of this issue, we have added new information about the DIF analyses that we conducted to the revised manuscript. Further, as clinicians and psychometrically oriented researchers, we concur that DIF analyses could be the focus of an additional manuscript and will explore that possibility.

3) The SPQ-B has a tentative cut-off score of 17 for the diagnosis of potential SPD in US. Do the authors expect such cut-off to be similar across other nations?

That is an interesting issue and an excellent question. We think that, due to the country effects on SPQ-B scores that we observed, use of a uniform cut-off score is inadvisable for at least two reasons. First, our results do not yield evidence of measurement invariance of SPQ-B scores by country. Second, in order to verify criterion validity as well as predictive validity, we would need to analyze SPQ-B scores in each country separately. We have added some information about this topic in the new version of the manuscript.

4) The sample apparently includes adolescents as well. Are SPQ-B features similar above and below 18 years age (at least in the countries where the data are available)?

Adolescents (16-17 years old) constitute less than 0.8% of the omnibus sample of the present study. Moreover, in a study of the SPQ-B that the lead research team published in Schizophrenia Research*, we found evidence of adequate psychometric properties in an adolescent samples (Fonseca-Pedrero, et al., 2009).*

5) Also, is there any evidence of an age-effect on schizotypal traits?

As we mentioned above (Point 3, Reviewer 1), we intend to specifically investigate age invariance in a future study. Given space limitations, we do not feel we have the space to consider this issue in the present study.

6) Despite the intrinsic limitation of a psychometric study on college students, the authors mention "important theoretical and clinical implications for psychosis risk screening, etiological models of psychosis-spectrum disorders, and international diagnostic systems." I failed to find them in the manuscript.

We agree and thank the reviewer for raising this point. We have modified the sentence to which the reviewer referred in the new version of the manuscript. We now highlight the relevance of conducting cross-national studies that examine psychosis and schizotypal personality traits. This is the first international study to examine the degree to which schizotypal traits manifest similarly across countries. We thus address an issue that is relevant to diagnostic classification systems (e.g., DSM) that treat this set of traits as equivalent across western and non-western countries.

7) It is not enirely clear how the full sample was generated. Perhaps merging the single study databases or each sub-study coordinator provided final data for its own sample? DO the author plan to make the final, anonymized dataset available on open-access?

Thank you for raising this point. We have added information to the revised manuscript information about how we generated the full sample. Please see the Supplemental Material, Tables 1 and 2. While we agree in principle that data-sharing is important, we are unable to do so for the full dataset because not all collaborating partners have institutional and/or ethics permission to do so. Nevertheless, where permissible, interested readers are able to contact the corresponding author for information about individual datasets that may be shared, and the corresponding author will forward any such requests to individual collaborators.

8) The number of co-authors is massive (>30, presumably reflecting the administrative support in the single nation-studies that compose the final sample). Single-projects funding and support does not appear in the due section and might be worth specifying.

In the present document we have included this information for all authors. As the reviewer, knows this manuscript was submitted to Schizophrenia

Research with the approval of all co-authors. Not all projects had funding support, (e.g. Spain). We have added this information in the supplemental material and role funding source.

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Conflict of interest

All the authors have declared that there are no conflicts of interest in relation to this study.

Contributors

E.F-P designed the study, coordinated the data collection, contributed to the data analyses, and was lead author of the manuscript. J. O-S. contributed to the data analyses and manuscript preparation. All the authors contributed to the study design and manuscript preparation. All authors have approved the final manuscript.

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Supplementary Material for online publication only

Click here to download Supplementary Material for online publication only: Supplementary material_SPQ_B_2.docx

Table(s)

Table 1

Demographic characteristics of the sample

	Country		Gender		Age		
	n	%	Male	Females	*M*	*SD*	Range
US	10,477	36.9	3,162	7,212	22.0	6.7	16-55
Spain	1,123	4.0	224	899	20.2	2.0	18-29
New Zealand	1,698	6.0	515	1,183	20.1	3.0	17-51
Italy	649	2.3	305	344	24.3	3.5	19-38
Australia	1,931	6.8	634	1,294	28.5	11.2	17-55
Belgium	893	3.1	245	648	24.9	9.1	17-55
UK	1,199	4.2	404	795	22.8	6.5	16-68
Tunisia	458	1.6	137	321	20.4	1.4	18-29
China	4,907	17.3	2,973	1,533	19.7	1.0	17-24
Canada	1,849	6.5	562	1,287	20.8	2.9	18-53
Greece	1,041	3.7	390	651	32.4	9.9	17-55
Mauritius	1,201	4.2	688	513	23.4	1.2	21-27
Austria	611	1.4	294	317	33.2	12.6	19-66
Germany	389	2.1	178	211	32.7	13.2	19-66
Total	28,426	100	10,711	17,208	22.63	7.08	16-68

Table 2. *Descriptive statistics for the SPQ-B across countries and total sample*

Items	USA (*n* = 10,477)		Spain (*n* = 1,123)		New Zealand (*n* = 1,698)		Italy (*n* = 649)		Australia (*n* = 1,931)		Belgium (n = 893)		UK (*n* = 1,199)		Tunisia (*n* = 458)		China (*n* = 4,907)		Canada (*n* = 1,849)		Greece (*n* = 1,041)		Mauritus (*n* = 1,201)		Austria (*n* = 390)		Germany (*n* = 610)		Total Sample (*N* = 28,426)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1	0.32	0.47	0.46	0.50	0.23	0.42	0.38	0.49	0.42	0.49	0.47	0.50	0.42	0.49	0.53	0.50	0.31	0.46	0.30	0.46	0.43	0.50	0.41	0.49	0.29	0.45	0.26	0.44	0.34	0.48
2	0.4	0.49	0.30	0.46	0.38	0.49	0.26	0.44	0.51	0.50	0.34	0.47	0.48	0.50	0.36	0.48	0.45	0.50	0.29	0.45	0.23	0.42	0.26	0.44	0.27	0.44	0.27	0.45	0.38	0.49
3	0.31	0.46	0.30	0.46	0.28	0.45	0.31	0.46	0.26	0.44	0.33	0.47	0.34	0.47	0.54	0.50	0.31	0.46	0.27	0.45	0.28	0.45	0.47	0.50	0.15	0.36	0.15	0.36	0.31	0.46
4	0.24	0.43	0.34	0.48	0.25	0.44	0.27	0.45	0.33	0.47	0.28	0.45	0.31	0.46	0.37	0.48	0.69	0.46	0.24	0.43	0.35	0.48	0.19	0.39	0.13	0.34	0.11	0.31	0.34	0.47
5	0.36	0.48	0.46	0.50	0.25	0.43	0.32	0.47	0.39	0.49	0.30	0.46	0.33	0.47	0.68	0.47	0.85	0.36	0.30	0.46	0.35	0.48	0.37	0.48	0.25	0.43	0.23	0.42	0.44	0.50
6	0.16	0.37	0.42	0.49	0.14	0.34	0.09	0.29	0.17	0.38	0.10	0.30	0.26	0.44	0.12	0.33	0.13	0.34	0.12	0.33	0.07	0.26	0.18	0.38	0.12	0.32	0.12	0.33	0.16	0.37
7	0.24	0.43	0.17	0.37	0.17	0.38	0.29	0.45	0.15	0.35	0.25	0.44	0.24	0.43	0.57	0.5	0.09	0.29	0.23	0.42	0.38	0.49	0.61	0.49	0.13	0.34	0.07	0.26	0.22	0.42
8	0.19	0.39	0.13	0.34	0.13	0.34	0.18	0.38	0.14	0.35	0.28	0.45	0.23	0.42	0.48	0.5	0.37	0.48	0.17	0.37	0.15	0.36	0.28	0.45	0.19	0.4	0.16	0.37	0.22	0.41
9	0.3	0.46	0.18	0.38	0.31	0.46	0.12	0.33	0.28	0.45	0.22	0.41	0.38	0.49	0.27	0.44	0.16	0.36	0.27	0.44	0.17	0.37	0.34	0.48	0.15	0.35	0.12	0.33	0.25	0.44
10	0.35	0.48	0.22	0.42	0.34	0.48	0.12	0.33	0.34	0.47	0.13	0.34	0.36	0.48	0.24	0.43	0.21	0.41	0.32	0.47	0.13	0.33	0.36	0.48	0.38	0.49	0.31	0.46	0.30	0.46
11	0.38	0.49	0.34	0.48	0.33	0.47	0.15	0.35	0.45	0.50	0.30	0.46	0.36	0.48	0.50	0.5	0.29	0.45	0.30	0.46	0.22	0.42	0.58	0.49	0.18	0.38	0.15	0.36	0.35	0.48
12	0.15	0.35	0.10	0.30	0.14	0.35	0.09	0.28	0.17	0.37	0.17	0.37	0.25	0.43	0.16	0.37	0.19	0.39	0.08	0.27	0.15	0.35	0.18	0.39	0.15	0.36	0.20	0.40	0.15	0.36
13	0.37	0.48	0.41	0.49	0.42	0.49	0.25	0.44	0.35	0.48	0.46	0.50	0.46	0.50	0.45	0.5	0.43	0.50	0.32	0.47	0.27	0.44	0.36	0.48	0.28	0.45	0.30	0.46	0.38	0.47
14	0.45	0.50	0.47	0.50	0.38	0.49	0.59	0.49	0.29	0.45	0.42	0.49	0.50	0.50	0.68	0.47	0.25	0.43	0.42	0.49	0.56	0.50	0.73	0.45	0.38	0.49	0.38	0.49	0.42	0.49
15	0.35	0.48	0.41	0.49	0.28	0.45	0.16	0.36	0.25	0.44	0.34	0.48	0.38	0.49	0.38	0.49	0.53	0.50	0.35	0.48	0.47	0.50	0.26	0.44	0.34	0.47	0.32	0.47	0.37	0.48
16	0.30	0.46	0.36	0.48	0.30	0.46	0.24	0.43	0.34	0.47	0.31	0.46	0.40	0.49	0.28	0.45	0.21	0.41	0.25	0.44	0.26	0.44	0.43	0.50	0.18	0.39	0.16	0.37	0.29	0.45
17	0.30	0.46	0.24	0.43	0.24	0.43	0.19	0.40	0.21	0.41	0.44	0.50	0.36	0.48	0.72	0.45	0.22	0.41	0.23	0.42	0.46	0.50	0.55	0.50	0.19	0.39	0.11	0.32	0.29	0.45
18	0.23	0.42	0.12	0.33	0.17	0.38	0.06	0.24	0.15	0.36	0.16	0.36	0.26	0.44	0.22	0.42	0.12	0.33	0.22	0.41	0.14	0.34	0.37	0.48	0.26	0.44	0.22	0.42	0.20	0.39
19	0.27	0.44	0.13	0.33	0.19	0.39	0.11	0.31	0.17	0.37	0.36	0.48	0.29	0.46	0.31	0.46	0.07	0.26	0.20	0.40	0.11	0.32	0.23	0.42	0.15	0.36	0.14	0.35	0.20	0.40
20	0.24	0.43	0.17	0.38	0.14	0.35	0.14	0.35	0.17	0.38	0.29	0.45	0.29	0.45	0.39	0.49	0.31	0.46	0.20	0.40	0.21	0.41	0.33	0.47	0.17	0.38	0.17	0.37	0.24	0.43
21	0.34	0.47	0.35	0.48	0.31	0.46	0.18	0.39	0.25	0.43	0.28	0.45	0.33	0.47	0.38	0.49	0.16	0.36	0.28	0.45	0.22	0.42	0.38	0.49	0.15	0.36	0.12	0.33	0.28	0.45
22	0.48	0.5	0.54	0.50	0.43	0.50	0.47	0.50	0.37	0.48	0.59	0.49	0.51	0.50	0.66	0.47	0.04	0.20	0.48	0.50	0.48	0.50	0.52	0.50	0.46	0.50	0.42	0.49	0.40	0.49

Subscales																													
POS	2.41	2.07	2.21	1.79	2.21	1.88	1.62	1.71	2.57	1.92	2.18	1.84	2.86	2.09	3.09	1.81	2.97	1.55	1.99	1.87	2.10	1.80	2.69	1.90	1.71	1.84	1.52	1.62	2.44	1.93
INT	2.79	2.42	2.86	2.09	2.29	2.24	2.28	1.79	2.32	1.99	2.82	2.20	2.99	2.36	3.92	2.11	1.79	1.63	2.58	2.28	2.90	2.23	3.86	2.08	2.18	2.13	1.95	1.94	2.58	2.35
DIS	1.55	1.70	1.57	1.41	1.30	1.46	1.08	1.38	1.26	1.51	1.82	1.53	1.88	1.80	2.30	1.62	1.62	1.41	1.28	1.53	1.10	1.34	1.84	1.68	1.06	1.47	1.03	1.44	1.51	1.59
Total score	6.74	4.99	6.64	3.91	5.80	4.27	4.98	3.83	6.15	4.04	6.82	4.29	7.73	4.89	9.31	4.16	6.37	3.46	5.85	4.43	6.09	4.17	8.39	4.65	4.95	4.28	4.50	3.79	6.54	4.50

Note. SD = Standard Deviation; POS = Positive; INT = Interpersonal; DIS = Disorganized

Table 3

Omega coefficients for the SPQ-B scores across countries and total sample

SPQ-B	US	Spain	NZ	Italy	Australia	Belgium	UK	Tunisia	China	Canada	Greece	Mauritus	Austria	Germany	Total
Positive	0.88	0.84	0.87	0.87	0.84	0.85	0.86	0.79	0.77	0.87	0.88	0.83	0.88	0.91	0.86
Interpersonal	0.93	0.90	0.93	0.89	0.88	0.91	0.92	0.85	0.88	0.92	0.92	0.86	0.92	0.94	0.91
Disorganization	0.91	0.85	0.92	0.91	0.91	0.84	0.93	0.85	0.88	0.90	0.90	0.86	0.92	0.94	0.89
Total Score	0.94	0.89	0.93	0.93	0.91	0.91	0.93	0.88	0.89	0.93	0.92	0.91	0.92	0.93	0.92

Note. NZ= New Zealand

Table 4

Goodness-of-fit indices of the models tested in the confirmatory factor analysis

	χ^2	*df*	CFI	TLI	RMSEA (90% CI)	WRMR
Model a: Unidimensional						
US	13644.01	209	.820	.801	.085 (.084-.081)	6.825
Spain	5375.73	209	.700	.668	.090 (.088-.092)	4.469
New Zealand	2717.42	209	.775	.751	.084 (.081-087)	3.178
Italy	743.17	209	.826	.808	.063 (.058-.068)	1.709
Australia	2730.01	209	.740	.713	.079 (.076-.082)	3.220
Belgium	1505.39	209	.748	.722	.083 (.079-.087)	2.423
UK	2654.50	209	.761	.736	.099 (.095-.010)	3.188
Tunisia	598.52	209	.783	.754	.064 (.061-.066)	1.523
China	4309.68	209	.772	.751	.064 (.062-.067)	3.904
Canada	3036.70	209	.785	.762	.086 (.083-.088)	3.371
Greece	1578.64	209	.793	.774	.080 (.079-.082)	2.475
Mauritus	741.28	209	.921	.912	.046 (.042-.050)	1.564
Austria	721.908	209	.803	.782	.079 (.073-.086)	1.727
Germany	971.177	209	.749	.723	.077 (.072-.082)	1.998
Total sample	42494.65	209	.768	.743	.084 (.084-.085)	12.104
Model b:Bidimensional						
US	14069.65	208	.855	.839	.080 (.079-.081)	6.960
Spain	1479.03	208	.742	.713	.074 (.070-.077)	2.423
New Zealand	2285.08	208	.814	.793	.077 (.074-.080)	2.921
Italy	667.05	208	.850	.834	.058 (.053-.063)	1.611
Australia	2430.40	208	.774	.748	.072 (.068-.074)	3.042
Belgium	1357.85	208	.783	.749	.078 (.074-.081)	2.305
UK	2.293.71	208	.796	.774	.091 (.088-.095)	2.968
Tunisia	525.48	208	.817	.796	.058 (.052-.064)	1.415
China	3870.22	208	.796	.773	.060 (.058-.062)	3.703
Canada	2456.85	208	.829	.810	.076 (.074-.079)	3.035
Greece	1205.26	208	.853	.838	.073 (.068-.075)	2.164
Mauritus	608.31	208	.940	.934	.040 (.036-.044)	1.412
Austria	580.94	208	.856	.841	.069 (.061-.074)	1.531
Germany	801.94	208	.805	.783	.068 (.063-.073)	1.814
Total sample	37064.26	208	.797	.775	.079 (.078-.080)	11.325
Model c: Three factor model						
US	8297.27	202	.915	.903	.062 (.061-.063)	5.184
Spain	990.75	202	.840	.820	.059 (.055-.063)	1.943
New Zealand	1336.89	202	.900	.880	.058 (.055-.060)	2.186
Italy	414.88	202	.931	.921	.040 (.035-.046)	1.211
Australia	1180.56	202	.899	.885	.050 (.047-.053)	2.054
Belgium	897.01	202	.865	.846	.062 (.058-.066)	1.820
UK	1444.63	202	.897	.861	.072 (.068-.075)	2.285
Tunisia	396.64	202	.871	.871	.046 (.039-.053)	1.195
China	2847.80	202	.852	.831	.052 (.050-.053)	3.170

Canada	1482.74	202	.903	.889	.059 (.056-.061)	2.291
Greece	872.69	202	.899	.884	.056 (.053-.060)	1.790
Mauritus	521.96	202	.952	.945	.036 (.033-.040)	1.292
Austria	374.84	202	.933	.924	.047 (.039-.054)	1.154
Germany	482.39	202	.908	.895	.048 (.042-.053)	1.342
Total sample	22683.56	202	.876	.859	.063 (.062-.063)	8.727
Model d:Three factor model (no overlap)						
US	10267.63	206	.895	.882	.068 (.067-.069)	5.860
Spain	1245.25	206	.789	.763	.067 (.063-.071)	2.208
New Zealand	1675.86	206	.868	.852	.065 (.062-.068)	2.476
Italy	510.998	206	.901	.889	.048 (.043-.053)	1.383
Australia	1474.20	206	.869	.853	.056 (.054-.059)	2.333
Belgium	1020.36	206	.842	.823	.067 (.062-.071)	1.971
UK	1.656.99	206	.858	.841	.077 (.073-.080)	2.484
Tunisia	418.60	206	.877	.862	.047 (.041-.054)	1.246
China	3552.65	206	.813	.791	.058 (.056-.059)	3.541
Canada	1809.23	206	.878	.863	.065 (.062-.068)	2.572
Greece	1124.98	206	.861	.845	.065 (.062-.069)	2.063
Mauritus	614.40	206	.939	.932	.041 (.037-.044)	1.414
Austria	484.997	206	.893	.880	.059 (.052-.066)	1.362
Germany	701.291	206	.837	.817	.063 (.058-.068)	1.671
Total sample	28597.38	206	.844	.825	.070 (.069-.070)	9.878
Model e: bifactor						
US	5847.31	187	.941	.927	.054 (.053-.055)	4.123
Spain	687.21	187	.898	.875	.049 (.045-.053	1.544
New Zealand	902.85	187	.936	.921	.047 (.044-.051)	1.695
Italy	338.92	187	.950	.939	.035 (.029-.041)	1.051
Australia	1036.82	187	.912	.892	.049 (.046-.051)	1.830
Belgium	695.55	187	.901	.878	.055 (.051-.060)	1.532
UK	957.491	187	.925	.907	.059 (.055-.062)	1.749
Tunisia	339.87	187	.912	.891	.042 (.035-.049)	1.072
China	2124.12	187	.892	.866	.046 (.044-.048)	2.640
Canada	1006.38	187	.938	.923	.049 (.046-.052)	1.780
Greece	709.26	187	.921	.903	.052 (.048-.056)	1.547
Mauritus	415.24	187	.966	.958	.032 (.028-.036)	1.127
Austria	299.357	187	.957	.947	.039 (.031-.047)	.956
Germany	373.595	187	.939	.924	.040 (.034-.046)	1.102
Total sample	17695.42	187	.904	.881	.057 (.057-.058)	7.357

Note. χ^2 = Chi square; *df* = degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; WRMR= Weighted Root Mean Square Residual.

Table 5

Factor loadings for the Bifactor model.

	US	Spain	NZ	Italy	Australia	Belgium	UK	Tunisia	China	Canada	Greece	Mauritus	Austria	Germany	Total sample	Across samples	
General factor																Mean	Range
1	0.68	0.47	0.73	0.39	0.37	0.57	0.64	0.42	0.53	0.61	0.54	0.66	0.66	0.54	0.58	0.55	0.37-0.73
2	0.32	0.18	0.18	0.33	0.23	0.19	0.27	0.21	0.20	0.24	0.22	0.51	0.51	0.30	0.27	0.25	0.18-0.50
3	0.57	0.37	0.41	0.67	0.53	0.56	0.50	0.44	0.54	0.47	0.49	0.63	0.63	0.49	0.54	0.51	0.37-0.67
4	0.38	0.22	0.33	0.49	0.37	0.27	0.30	0.18	0.07	0.30	0.15	0.33	0.33	0.49	0.20	0.28	0.07-0.49
5	0.34	0.23	0.30	0.47	0.39	0.32	0.33	0.31	0.12	0.31	0.29	0.31	0.31	0.45	0.22	0.31	0.12-0.47
6	0.60	0.31	0.50	0.63	0.50	0.77	0.57	0.51	0.73	0.51	0.45	0.72	0.72	0.52	0.57	0.56	0.31-0.77
7	0.71	0.70	0.74	0.59	0.68	0.63	0.66	0.33	0.51	0.73	0.74	0.57	0.57	0.89	0.65	0.63	0.33-0.74
8	0.78	0.57	0.70	0.73	0.62	0.55	0.75	0.57	0.62	0.72	0.58	0.70	0.70	0.64	0.67	0.66	0.55-0.73
9	0.56	0.54	0.56	0.71	0.57	0.57	0.46	0.56	0.67	0.55	0.54	0.59	0.59	0.84	0.59	0.57	0.43-0.71
10	0.46	0.35	0.33	0.57	0.33	0.43	0.46	0.37	0.37	0.41	0.45	0.47	0.47	0.29	0.44	0.42	0.33-0.57
11	0.51	0.33	0.42	0.44	0.23	0.36	0.47	0.39	0.38	0.42	0.60	0.42	0.42	0.59	0.44	0.42	0.23-0.59
12	0.31	0.17	0.17	0.33	0.23	0.16	0.14	0.30	0.17	0.27	0.21	0.32	0.32	0.36	0.25	0.22	0.05-0.33
13	0.57	0.31	0.40	0.63	0.50	0.39	0.47	0.61	0.24	0.51	0.51	0.54	0.54	0.43	0.48	0.47	0.31-0.63
14	0.67	0.66	0.69	0.43	0.54	0.64	0.66	0.35	0.43	0.66	0.68	0.53	0.53	0.58	0.59	0.58	0.35-0.69
15	0.53	0.43	0.53	0.43	0.25	0.48	0.41	0.47	0.21	0.43	0.50	0.42	0.42	0.48	0.40	0.42	0.21-0.50
16	0.52	0.34	0.39	0.45	0.42	0.47	0.52	0.35	0.38	0.50	0.45	0.50	0.50	0.58	0.50	0.44	0.38-0.50
17	0.64	0.64	0.56	0.72	0.57	0.47	0.60	0.28	0.45	0.59	0.63	0.51	0.51	0.63	0.62	0.56	0.45-0.72
18	0.69	0.61	0.65	0.34	0.53	0.55	0.67	0.59	0.70	0.67	0.66	0.34	0.34	0.63	0.63	0.59	0.34-0.73
19	0.66	0.46	0.61	0.59	0.59	0.56	0.61	0.69	0.74	0.63	0.52	0.65	0.65	0.58	0.65	0.61	0.46-0.74
20	0.78	0.65	0.75	0.75	0.70	0.78	0.76	0.73	0.73	0.76	0.74	0.67	0.67	0.72	0.75	0.73	0.65-0.78
21	0.54	0.38	0.43	0.50	0.38	0.37	0.45	0.46	0.47	0.47	0.60	0.53	0.53	0.69	0.47	0.47	0.37-0.60
22	0.55	0.57	0.57	0.18	0.35	0.45	0.58	0.15	0.59	0.57	0.60	0.46	0.46	0.61	0.47	0.47	0.15-0.62

Latent factors																	
Positive																	
2	0.64	0.65	0.69	0.71	0.42	0.57	0.70	0.73	0.60	0.61	0.76	0.39	0.81	0.92	0.58	0.66	0.39-0.92
4	0.45	0.40	0.41	0.27	0.44	0.42	0.41	0.42	0.47	0.46	0.32	0.39	0.51	0.51	0.55	0.42	0.27-0.51
5	0.63	0.61	0.59	0.48	0.63	0.66	0.61	0.50	0.60	0.65	0.67	0.41	0.60	0.68	0.70	0.59	0.41-0.68
9	0.04	0.26	0.30	0.12	0.24	0.25	0.29	0.29	0.09	0.38	0.35	0.28	0.18	0.11	0.19	0.23	0.04-0.38
10	0.32	0.32	0.28	0.17	0.43	0.24	0.27	0.23	0.22	0.39	0.31	0.24	0.10	0.18	0.23	0.26	0.10-0.39
12	0.51	0.59	0.64	0.65	0.35	0.70	0.58	0.45	0.30	0.47	0.61	0.35	0.84	0.69	0.49	0.55	0.30-0.84
16	0.42	0.43	0.40	0.30	0.41	0.31	0.35	0.41	0.37	0.41	0.37	0.11	0.27	0.40	0.31	0.35	0.11-0.43
17	0.21	0.18	0.22	0.09	0.13	0.57	0.24	0.26	0.08	0.24	0.18	0.19	0.20	0.08	0.11	0.21	0.08-0.57
Interpersonal																	
1	0.18	0.34	0.22	0.42	0.25	0.33	0.07	0.31	0.28	0.18	0.22	-0.03	0.38	0.31	0.22	0.25	0.01-0.33
7	0.13	-0.12	0.16	0.09	0.31	0.16	0.22	0.18	-0.07	0.04	-0.10	0.03	-0.10	-0.11	0.19	0.06	0.03-0.24
11	0.68	0.75	0.76	0.83	0.47	0.79	0.78	0.65	0.60	0.77	0.69	0.56	0.70	0.56	0.67	0.68	0.47-0.83
14	0.22	0.07	0.17	0.32	0.45	0.20	0.14	0.36	0.19	0.17	-0.05	0.19	0.14	0.16	0.30	0.19	-0.05-0.45
15	0.56	0.50	0.52	0.58	0.62	0.50	0.56	0.53	0.49	0.61	0.45	0.33	0.52	0.56	0.46	0.52	0.33-0.62
18	0.27	0.28	0.37	0.30	0.53	0.28	0.29	0.27	0.39	0.30	0.36	0.25	0.39	0.37	0.35	0.33	0.25-0.53
21	0.72	0.85	0.76	0.68	0.59	0.86	0.84	0.66	0.62	0.78	0.72	0.71	0.58	0.54	0.75	0.71	0.59-0.86
22	0.39	0.17	0.36	0.45	0.63	0.35	0.29	0.50	0.53	0.38	0.19	0.31	0.23	0.34	0.44	0.37	0.17-0.63
Disorganized																	
3	0.44	0.40	0.64	0.35	0.52	0.31	0.53	0.08	0.26	0.56	0.57	-0.09	0.54	0.51	0.42	0.40	0.08-0.64
6	0.70	0.74	0.70	0.54	0.77	0.62	0.74	0.44	0.44	0.70	0.78	0.05	0.74	0.75	0.65	0.62	0.05-0.78
8	0.04	0.09	0.04	-0.25	0.18	-0.15	0.08	0.06	-0.27	0.09	0.20	0.05	0.36	0.21	-0.02	0.05	0.04-0.27
13	0.36	0.28	0.38	0.10	0.33	-0.20	0.46	-0.25	0.17	0.39	0.33	0.12	0.45	0.44	0.29	0.24	0.09-0.52
19	0.54	0.79	0.59	0.58	0.65	0.42	0.54	0.49	0.40	0.57	0.55	0.07	0.70	0.57	0.49	0.53	0.07-0.79
20	-0.11	-0.02	-0.07	-0.20	-0.08	-0.32	-0.07	-0.38	-0.54	-0.07	-0.10	0.95	0.13	0.17	-0.16	0.05	0.01 -0.95

Table 6

Factor loadings for the Raine et al. (1994) model

Items	Us	Spain	NZ	Italy	Australia	Belgium	UK	Tunisia	China	Canada	greece	Mauritus	Austria	Germany	Total sample	across samples	
																Mean	Range
Positive																	
2	0.60	0.53	0.54	0.54	0.43	0.47	0.58	0.57	0.49	0.53	0.60	0.63	0.72	0.74	0.55	0.57	0.43-0.74
4	0.60	0.45	0.57	0.61	0.59	0.50	0.52	0.40	0.31	0.53	0.32	0.43	0.73	0.69	0.46	0.52	0.31-0.73
5	0.62	0.56	0.63	0.64	0.68	0.64	0.61	0.58	0.41	0.61	0.64	0.42	0.76	0.78	0.54	0.61	0.41-0.78
7	0.31	0.46	0.29	0.42	0.34	0.31	0.26	0.21	0.37	0.38	0.36	0.52	0.49	0.35	0.23	0.36	0.20-0.52
9	0.54	0.56	0.50	0.58	0.53	0.55	0.48	0.52	0.40	0.59	0.59	0.55	0.51	0.31	0.46	0.51	0.39-0.59
10	0.63	0.53	0.52	0.66	0.54	0.57	0.62	0.51	0.54	0.61	0.64	0.56	0.35	0.32	0.59	0.54	0.51-0.64
12	0.54	0.49	0.50	0.55	0.41	0.50	0.41	0.55	0.38	0.49	0.53	0.41	0.81	0.61	0.49	0.51	0.38-0.81
14	0.22	0.25	0.27	0.18	0.14	0.27	0.28	0.08	0.12	0.29	0.31	0.30	0.06	0.17	0.13	0.21	0.06-0.31
16	0.75	0.59	0.64	0.56	0.62	0.65	0.73	0.59	0.63	0.72	0.70	0.56	0.73	0.70	0.71	0.66	0.56-0.75
17	0.46	0.52	0.45	0.58	0.38	0.47	0.46	0.38	0.34	0.52	0.45	0.50	0.42	0.30	0.357	0.44	0.38-0.58
Interpersonal																	
1	0.74	0.61	0.78	0.60	0.48	0.70	0.66	0.56	0.65	0.67	0.61	0.70	0.67	0.67	0.66	0.65	0.48-0.78
7	0.53	0.35	0.61	0.29	0.59	0.49	0.57	0.28	0.29	0.47	0.48	0.11	0.50	0.60	0.57	0.44	0.11-0.61
9	0.52	0.21	0.29	0.28	0.23	0.23	0.17	0.26	0.47	0.19	0.21	0.15	0.50	0.57	0.31	0.31	0.15-0.57
11	0.79	0.73	0.76	0.88	0.47	0.81	0.87	0.70	0.60	0.79	0.87	0.60	0.84	0.77	0.73	0.75	0.47-0.87
14	0.59	0.52	0.58	0.45	0.67	0.54	0.52	0.46	0.45	0.52	0.48	0.32	0.58	0.52	0.63	0.52	0.32-0.57
15	0.73	0.65	0.73	0.73	0.59	0.72	0.64	0.72	0.40	0.69	0.65	0.53	0.65	0.68	0.59	0.65	0.40-0.73
17	0.35	0.33	0.31	0.28	0.65	0.20	0.32	0.08	0.28	0.25	0.38	0.10	0.36	0.50	0.41	0.31	0.08-0.65
18	0.79	0.71	0.78	0.49	0.80	0.66	0.77	0.70	0.87	0.78	0.77	0.43	0.75	0.73	0.77	0.72	0.43-0.87
21	0.82	0.80	0.77	0.87	0.68	0.84	0.88	0.77	0.71	0.84	0.88	0.73	0.90	0.82	0.79	0.81	0.68-0.90
22	0.69	0.63	0.71	0.41	0.68	0.61	0.68	0.40	0.79	0.71	0.67	0.58	0.69	0.63	0.65	0.64	0.40-0.79

Disorganized																	
3	0.67	0.54	0.61	0.71	0.71	0.60	0.67	0.44	0.55	0.63	0.64	0.62	0.70	0.68	0.64	0.63	0.44-0.71
6	0.77	0.59	0.74	0.71	0.81	0.75	0.80	0.52	0.76	0.72	0.68	0.73	0.83	0.79	0.71	0.73	0.59-0.83
8	0.80	0.63	0.74	0.71	0.66	0.56	0.78	0.57	0.64	0.76	0.66	0.72	0.78	0.79	0.68	0.70	0.57-0.79
13	0.65	0.44	0.52	0.64	0.61	0.39	0.60	0.60	0.26	0.62	0.61	0.56	0.60	0.53	0.55	0.55	0.39-0.62
19	0.79	0.77	0.80	0.68	0.85	0.60	0.79	0.67	0.78	0.79	0.69	0.67	0.87	0.80	0.76	0.76	0.60-0.87
20	0.77	0.67	0.77	0.74	0.65	0.76	0.75	0.70	0.70	0.76	0.76	0.71	0.79	0.85	0.73	0.74	0.65-0.85
Factor Correlations																	
F2-F1	0.64	0.04	0.52	0.77	0.56	0.67	0.60	0.60	0.59	0.60	0.553	0.79	0.50	0.42	0.62	0.58	0.04-0.79
F3-F1	0.38	0.05	0.25	0.32	0.22	0.23	0.30	0.27	0.20	0.30	0.264	0.59	0.40	0.21	0.29	0.29	0.05-0.59
F3-F2	0.70	0.04	0.61	0.57	0.47	0.62	0.59	0.68	0.73	0.62	0.656	0.80	0.61	0.67	0.65	0.59	0.04-0.80