Cross-cultural invariance of the factor structure of the Schizotypal Personality Questionnaire across Spanish and American college students

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ABSTRACT

The main goal of this study was to examine the cross-cultural invariance of the factor structure of the Schizotypal Personality Questionnaire (SPQ) (Raine, 1991) in two large samples of Spanish and American young adults. The final sample was made up of 2313 college students (508 men, 22%). Their mean age was 20.5 years (S.D.=3.2). The results indicated that the Stefanis et al. (2004) four-factor model yielded the best goodness-of-fit indices compared to alternative models. Moreover, the results support configural, metric, and partial measurement invariance of the covariances of the SPQ across the two samples. The finding of measurement equivalence across cultures provides essential evidence of construct validity for the schizotypy dimensions and of the cross-cultural validity of SPQ scores. The finding of comparable dimensional structures in cross-cultural samples lends further support to the continuum model of schizotypy and schizophrenia spectrum disorders. Future studies should continue to examine the validity of scores on the SPQ and other schizotypy measures and their variation or consistency across cultures.

1. Introduction

Schizotypy is a complex construct intimately related to schizophrenia-spectrum disorders, such as schizophrenia and related psychotic disorders; psychotic affective disorders; and schizoid, schizotypal, and paranoid personality disorders (Raine, 2006; Kwapil et al., 2008; Lenzenweger, 2010; Kwapil and Barrantes-Vidal, 2013). Schizotypy is considered to be a personality organization involving an aggregate of cognitive, behavioral, and emotional traits and experiences distributed throughout the population along a dynamic continuum of adjustment that ranges from psychological well-being, to schizophrenia-spectrum personality disorders, to full-blown psychosis (Claridge, 1997). Along this continuum we might find "intermediate" phenotypic expressions of these sets of traits and experiences that, though not reaching

clinical levels, would be associated with elevated current psychopathological intensity, severity, and social impairment (Kwapil et al., 2008; Horan et al., 2008; Yung et al., 2009; Gooding and Pflum, 2011; Fonseca-Pedrero et al., 2011; Debbané et al., 2013; Cella et al., 2013).

Empirical evidence indicates that individuals from the general population with high scores on schizotypal self-reports are at heightened risk for the later development of psychotic disorders (Chapman et al., 1994; Poulton et al., 2000; Gooding et al., 2005; Nordentoft et al., 2006; Dominguez et al., 2011; Kwapil et al., 2013; Werbeloff et al., 2012; Zammit et al., 2013). Similar results are found in the offspring of patients with schizophrenia (Shah et al., 2012), in patients with schizotypal personality disorder (Woods et al., 2009), and in those with prodromal symptoms (Morrison et al., 2006). Collectively, these findings suggest that schizotypal experiences and traits represent the behavioral expression of liability to psychotic disorders (van Os et al., 2009; Linscott and van Os, 2013).

The goal of the "psychometric high-risk" paradigm is the early detection of individuals at heightened risk for psychosis, using

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their score profiles on self-report measures. This paradigm is considered a reliable, valid, and useful method for the psychometric detection of individuals at risk for psychosis. In comparison to other techniques, the use of these tools constitutes a rapid, efficient, and noninvasive method of assessment. The Schizotypal Personality Questionnaire (SPQ) (Raine, 1991), and the Chapman Scales (Kwapil et al., 2008), are the self-report measures most widely used for schizotypy assessment. The SPQ is of particular utility toward this end, given that it spsychometric properties have been extensively analyzed in previous research (Chen et al., 1997; Fossati et al., 2003; Wuthrich and Bates, 2006; Fonseca-Pedrero et al., 2008; Compton et al., 2009a; Cohen et al., 2010; Fonseca-Pedrero et al., 2014).

The literature consistently holds that schizotypy is a multidimensional construct; however, several competing models describe different dimensions. Among the most widely replicated models is the three-factor model proposed by Raine et al. (1994). This model comprises Cognitive-Perceptual (Positive), Interpersonal (Negative), and Disorganized dimensions (Reynolds et al., 2000; Fossati et al., 2003; Badcock and Dragovic, 2006; Wuthrich and Bates, 2006; Bora and Arabaci, 2009a). However, the Stefanis et al. (2004) (Paranoid) model, which includes Cognitive-Perceptual, Interpersonal, Disorganization, and Paranoid dimensions, has also been replicated. Indeed, the goodness-of-fit indices found for the Stefanis et al. (2004) model are similar to or even better than those reported for Raine's model (Wuthrich and Bates, 2006; Bora and Arabaci, 2009b; Compton et al., 2009a; Fonseca-Pedrero et al., 2014). Notably, although the dimensionality of schizotypy has been exhaustively analyzed, it is still unknown whether the dimensions of schizotypy, measured via the SPQ, are invariant or equivalent across cultures.

The evaluation of measurement invariance (Horn and McArdle, 1992; Meredith, 1993) is important for determining the generalizability of latent constructs across groups. In the study of measurement invariance or measurement equivalence, one goal is to analyze whether the measurement instrument and the construct being measured are operating in the same way across diverse samples of interest. When comparisons between groups (e.g., Spanish and American college students) are made, it is typically assumed that the measurement instrument, the number of factors, the factor loadings, the item content, and the underlying construct behave in the same manner across the groups being compared (Byrne and Stewart, 2006; Byrne, 2008). However, this assumption must be tested. It is crucial to examine the measurement invariance of the assessment tool so that findings based on comparisons of the groups can be valid. Thus, it would be inappropriate to make comparisons with respect to schizotypy dimensions if, for example, American and Spanish college students interpret the content of the items differently or if the instrument does not behave in the same way across groups (Ortuño-Sierra et al., 2013). If measurement invariance does not hold, inferences and interpretations drawn from the data may be erroneous or unfounded.

As yet, there has been no in-depth examination of the question of whether the dimensional structure of the SPQ is invariant across cultures. According to Kwapil et al. (2012) findings of comparable dimensional structures in cross-cultural samples would lend further support to the continuum model of schizotypy and schizophrenia spectrum disorders, and would provide evidence of the validity and utility of the SPQ scores for cross-cultural research. The present study examined the cross-cultural invariance of the factor structure of the SPQ scores in large samples of Spanish and American college students. Evaluations of measurement invariance provide essential construct validity evidence for schizotypy dimensions and the cross-cultural validity of SPQ scores. We hypothesized that the Stefanis et al. (2004) model would be invariant across the samples.

2. Method

2.1. Participants

The final sample was made up of 2313 (508 men, 22%) university students from Spain and the United States. These samples have been used in previous work (Compton et al., 2009a; Fonseca-Pedrero et al., 2014). The mean age of the sample as a whole was 20.5 years (S.D.=3.2). The final Spanish sample was composed of a total of 1123 university students (19.9% male, $n=224$) from different courses at three Spanish institutions, the University of Oviedo (Education and Psychology), the University of La Rioja (Education) and the University of La Laguna (Psychology). The mean age of the Spanish participants was 20.2 years (S.D.=2.0), with a range of 17–29. 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 some other psychological disorder. The total number of American students was 1190 (23.9% male; $n=284$); all were enrolled at an urban state university in the southeastern United States. The mean age of the American participants was 20.9 years (S.D.=4.0), with a range of 17–50. Comparison of the two subsamples yielded statistically significant differences in age ($t=5.54$; $p<0.001$) and sex ($\chi^2=5.18$; $p=0.023$).

2.2. Measure

The Schizotypal Personality Questionnaire (SPQ; Raine, 1991) is a self-report instrument made up of 74 items with a dichotomous response format (Yes/No). The instrument was developed for measuring schizotypal traits according to DSM criteria (American Psychiatric Association, 1987). Items are distributed across nine 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 have been widely analyzed (Fossati et al., 2003; Wuthrich and Bates, 2006; Fonseca-Pedrero et al., 2008; Compton et al., 2009a). In the present work we used the version adapted and validated for the Spanish context (Fumero et al., 2009) and the English version (Raine, 1991). The Spanish adaptation was constructed in line with international guidelines for the translation and adaptation of tests (Hambleton et al., 2005; Muñiz et al., 2013). The reliability of the SPQ scores for the Spanish sample in the present study ranged from 0.80 to 0.91; for the American sample, SPQ subscale reliabilities ranged from 0.70 to 0.83.

2.3. Procedure

In Spain, the measurement instrument was administered to groups of 10–50 students, during normal lecture hours, and in a room with the appropriate conditions. The study was presented to the participants as a research project on diverse personality traits. It was stressed that participation was voluntary and students were given assurances of the confidentiality of their responses. They received no type of incentive for taking part. 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 of and intervention for psychological disorders in early adulthood and the analysis of psychopathological and personality variables. The study was approved by the research and ethics committees at the University of Oviedo, University La Rioja, and University of La Laguna.

For the American sample, individuals aged ≥ 18 years who were enrolled in introductory psychology classes were invited to participate via a recruitment statement posted on an online program used to manage the undergraduate research participation pool. Interested students reviewed an online informed consent form before proceeding to the survey, and then completed a set of confidential, web-based questionnaires. Automated data entry produced computerized survey data files for data cleaning and analysis. Participating students received course credit, though students were not required to participate in this or any other study. Collection of the data was approved by the Institutional Review Board at Georgia State University.

2.4. Data analyses

First, descriptive statistics were calculated for the SPQ subscales in both samples. Second, we conducted several Confirmatory Factor Analyses (CFAs) for testing different factorial models of schizotypy (Table 1). Given the continuous nature of the variables, the method used was maximum likelihood estimation with robust standard errors. Goodness-of-fit to the sample data was determined on the basis of multiple indices: the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR). Hu and Bentler (1999) suggested that RMSEA should be 0.06 or less for a good model fit and CFI and TLI should be 0.95 or more, though any value over 0.90 tends to be considered acceptable. As an alternative method of comparing competing models, the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC), two information-theory approaches to

Table 1

Proposed measurement models used in the Confirmatory Factor Analysis for the Schizotypal Personality Questionnaire subscales.

Model	Factor	IREF	MGT	UPE	PI	ESA	NCF	CA	OB	OS
One-factor	General	X	X	X	X	X	X	X	X	X
Siever and Gunderson (1983)	Positive	X	X	X	X				X	X
	Negative					X	X	X		
Raine et al. (1994)	Cognitive perceptual	X	X	X	X					
	Interpersonal				X	X	X	X		
	Disorganized								X	X
Stefanis et al. (2004)	Cognitive perceptual		X	X						
	Paranoid	X			X	X				
	Negative				X	X	X	X		
	Disorganized								X	X

IREF: Ideas of Reference; MGT: Magical Thinking; UPE: Unusual Perceptual Experiences; PI: Paranoid Ideation; ESA: Excessive Social Anxiety; NCF: No Close Friends; CA: Constricted Affect; OB: Odd Behavior; OS: Odd Speech.

model fit, were included. Models with smaller AIC and BIC values have better fit than competing models with larger values.

Third, with the aim of studying measurement invariance, successive multi-group CFAs were conducted. Measurement equivalence is frequently tested via multi-sample comparisons using structural equation modeling within the framework of a CFA model (Byrne, 2008, 2012). Basically, a hierarchical set of steps is followed when testing measurement invariance. These steps typically start with the determination of a well-fitting, multi-group baseline model and continue with the establishment of successive equivalence constraints in the model parameters across groups (Horn and McArdle, 1992; Meredith, 1993; Byrne, 2008, 2012). For testing measurement invariance across groups, we can use two methods: analysis of covariance structures (COVS) and analysis of mean and covariance structures. COVS may be the most appropriate approach for a construct validity study of a particular measurement instrument (Byrne, 2012).

The baseline model is called the configural model, which is the first and least restrictive model specified; this model is important because it represents the baseline against which all subsequent specified invariance models are compared. The configural model is established by specifying and testing the CFA model for each group separately. Once the theoretical model has been validated in both groups, a configural invariance model, which requires the pattern of fixed and freely estimated model parameters to be equivalent across groups, is then examined. In this model, no equality constraints are imposed on the model parameters between groups. The configural invariance model is tested by assessing the model fit. When configural invariance is met, it is assumed that the general factor structure is at least similar, though not necessarily equivalent, across groups. The next step is to impose equality constraints on the regression weights across the groups, and the final step is to impose constraints on the factor variances and covariances across the groups.

The models analyzed can be seen as nested models to which constraints are progressively added. For the comparison of the nested models, researchers have traditionally used chi-square difference tests ($\Delta\chi^2$) (Cheung and Rensvold, 2002; Byrne, 2012). However, because interpretation of the $\Delta\chi^2$ is complicated by its sensitivity to sample size, Cheung and Rensvold (2002) proposed a more practical criterion, the ΔCFI, to determine whether the compared models are equivalent. Thus, when there is a change greater than 0.01 in the CFI between two nested models, the least constrained model is accepted and the other is rejected – that is, the most restrictive model does not hold. If the change in CFI is less than 0.01, it is considered that all specified equal constraints are tenable, and we can therefore continue with the next step in the analysis of measurement invariance. However, when this criterion is not met and some parameters (e.g., factor loadings) are non-invariant (i.e., not specified to be equal across groups), partial measurement invariance can be considered (Byrne et al., 1989). It may be possible for the evaluation of group equivalence to proceed even in instances where some non-invariant parameters have been encountered (Byrne et al., 1989). Statistical analyses for the present study were carried out using the programs SPSS 15.0 (Statistical Package for the Social Sciences, 2006) and Mplus 5.2 (Muthén and Muthén, 1998–2007).

3. Results

3.1. Descriptive statistics

The means and standard deviations for the SPQ subscales in the Spanish and American samples are shown in Table 2. Scores on each of the SPQ subscales except Excessive Social Anxiety were significantly higher in the American sample ($p < 0.01$). Note that the sample size renders the interpretation of statistically

Table 2

Descriptive statistics for the Schizotypal Personality Questionnaire subscales in the Spanish ($n=1123$) and American ($n=1190$) samples.

Subscales	Spanish		American		t	d
	M	SD	M	SD		
Ideas of reference	3.37	2.26	3.81	2.56	−4.42	0.18
Magical thinking	1.12	1.41	1.50	1.70	−5.88	0.24
Unusual perceptual experiences	1.81	1.68	2.37	2.09	−7.14	0.29
Paranoid ideation	2.31	1.85	2.70	2.21	−4.53	0.19
Excessive social anxiety	3.86	2.29	3.34	2.43	5.34	0.22
No close friends	2.13	1.81	2.31	2.28	−2.11	0.08
Constricted affect	1.58	1.35	1.81	1.84	−3.36	0.14
Odd behavior	1.48	1.79	2.02	2.18	−6.43	0.27
Odd speech	2.56	1.96	3.17	2.46	−6.60	0.27

significant differences problematic, because even trivial differences can be statistically significant in comparisons of large groups. Therefore, effect sizes (Cohen's d) are reported. Following Cohen (1992), an effect size of 0.8 is considered large, 0.5 is considered medium, and 0.2 is considered small. As such, all differences between samples were in the small range, with the greatest being $d=0.29$ (Unusual Perceptual Experiences).

3.2. Confirmatory factor analyses of the SPQ subscales

The goodness-of-fit indices for the proposed models for both samples are shown in Table 3. As can be seen, the models that showed the best fit were the Raine et al. (1994) three-factor model and the Stefanis et al. (2004) four-factor model. In fact, Stefanis et al.'s (2004) model yielded better goodness-of-fit indices than did the rest of the proposed factorial models. For instance, the AIC and BIC values were smaller for the Stefanis et al. (2004)) model than for the competing models. This hypothesized model was used to test measurement invariance across the two samples.

3.3. Test for invariance of the SPQ four-factor model across the two samples

Measurement invariance was studied for the model hypothesized by Stefanis et al. (2004) across the Spanish and American samples. The results are presented in Table 4. The configural invariance model, in which no equality constraints were imposed, showed an adequate fit to the data. Next, a metric invariance model (equality constraints of regression weights) for the two groups was tested. The CFI values for the configural invariance model were similar to those for the metric invariance model, which indicated that the hypothesis of metric invariance was tenable. Subsequently, the effect of constraining the structural covariances to equality across groups was tested. When testing the

Table 3
Goodness-of-fit indices for the theoretical models proposed for both samples.

Model	S-Bχ²	d.f.	CFI	TLI	RMSEA (90% CI)	SRMR	AIC	BIC
Spanish sample								
One-factor	1016.14	27	0.56	0.41	0.18 (0.17/0.19)	0.10	39029.8	39165.4
Siever and Gunderson (1983)	405.62	26	0.83	0.77	0.11 (0.10/0.12)	0.07	38451.7	38592.4
Raine et al. (1994)	222.42	23	0.91	0.86	0.09 (0.08/0.10)	0.04	38254.8	38410.6
Stefanis et al. (2004)	95.70	19	0.97	0.94	0.06 (0.05/0.07)	0.03	38129.7	38305.6
American sample								
One-factor	984.57	27	0.77	0.69	0.17 (0.16/0.18)	0.08	43218.4	43355.6
Siever and Gunderson (1983)	560.15	26	0.87	0.82	0.13 (0.12/0.14)	0.06	42735.5	42877.8
Raine et al. (1994)	307.82	23	0.93	0.89	0.10 (0.09/0.11)	0.04	42445.4	42602.9
Stefanis et al. (2004)	89.67	19	0.98	0.97	0.05 (0.04/0.07)	0.02	42212.7	42390.5

Note: S-Bχ²=Satorra-Bentler Chi Square; d.f.=Degrees of freedom; CFI=Comparative Fit Index; TLI=Tucker-Lewis Index; RMSEA=Root Mean Square Error of Approximation; CI=Confidence Interval; SRMR=Standardized Root Mean Square Residual; AIC=Akaike Information Criterion; BIC=Bayesian Information Criterion.

Table 4
Goodness-of-fit indices of measurement invariance across groups.

Model	S-Bχ²	d.f.	CFI	TLI	RMSEA (90% CI)	SRMR	AIC	BIC	ΔCFI
Configural (unconstrained)	185.23	38	0.977	0.957	0.06 (0.05/0.07)	0.03	80342.4	80744.7	
Regression weights constrained	199.45	45	0.976	0.962	0.05 (0.05/0.06)	0.03	80343.6	80705.7	
Structural covariances constrained	339.24	51	0.955	0.937	0.07 (0.06/0.08)	0.11	80486.5	80814.1	+0.01
Partial structural covariances constrained (FI–FII and FII–FIV)	254.47	47	0.968	0.951	0.06 (0.05/0.07)	0.06	80397.7	80742.5	−0.01

Note: S-Bχ²=Satorra-Bentler Chi Square; d.f.=Degrees of freedom; CFI=Comparative Fit Index; TLI=Tucker-Lewis Index; RMSEA=Root Mean Square Error of Approximation; CI=Confidence Interval; SRMR=Standardized Root Mean Square Residual; AIC=Akaike Information Criterion; BIC=Bayesian Information Criterion.

hypothesis of equal structural variances and covariances across groups, we observed values of ΔCFI that exceeded 0.01. The ΔCFI between the constrained and the unconstrained models was > 0.01, indicating that this invariance model was not supported. We performed a series of CFAs to locate the covariances that rendered this model a poor fit. For the four-factor model, partial measurement invariance across the two samples was found, after equality constraints were relaxed for two structural covariances (FI–FII, and FII–FIV). In this case, the ΔCFI was below 0.01, so that, according to the recommendations that Cheung and Rensvold (2002) put forward, partial measurement invariance could be accepted for this model. Hence, the results support configural, metric, and partial measurement invariance of the structural covariances of the SPQ four-factor model across the two samples.

4. Discussion

The main goal of this research was to compare the measurement invariance of the Schizotypal Personality Questionnaire (SPQ) (Raine, 1991) across large samples of young adults from two countries. The results indicate that schizotypy, as measured with the SPQ, is a multidimensional construct. Also, the results are consistent with configural, metric, and partial measurement invariance of the covariances of the SPQ across the two samples. They thus provide preliminary evidence of the factorial equivalence of schizotypy across the two cultures. These results have important implications, discussed below, not only for the study of the construct validity of the SPQ, but also for the application and utility of this widely-used instrument in cross-cultural research and for improving understanding of the phenotypic expressions of schizotypy and the extended psychosis phenotype across cultures.

First, the Stefanis et al. (2004) model showed a better fit to the data than did the rest of the hypothesized models tested; however, it is necessary to interpret this finding cautiously because of a

limitation of the Stefanis et al. (2004) model. Specifically, the dimensional model that Stefanis et al. (2004) put forward includes two subscales on both the Negative and Paranoid dimensions. Such cross-loading of subscales renders interpretation of what each dimension measures problematic. This limitation has to be taken into account when interpreting the significance of the results in a CFA framework (Marsh et al., 2013). Previous studies using the SPQ have found that this model could provide a better representation of the dimensional structure underlying SPQ scores than other models do (Wuthrich and Bates, 2006; Bora and Arabaci, 2009b; Compton et al., 2009a; Fonseca-Pedrero et al., 2014). The present findings also converge with those obtained in studies that focus on the abbreviated/brief version of the SPQ – the SPQ-B (Compton et al., 2009b; Fonseca-Pedrero et al., 2011). Recently, Fonseca-Pedrero, Paíno et al. (2011) conducted a factorial study of the SPQ-B scores in a representative sample of adolescents and young adults. Their findings indicated that the Raine et al. (1994) and Stefanis et al. (2004) models yielded better goodness-of-fit indices than did other hypothesized schizotypy models. Also, Stefanis et al.'s (2004) factorial model is similar to the structure of symptoms found in patients with schizophrenia (Liddle, 1987), even when the positive dimension is split into Paranoid and Perceptual factors. It thus indicates phenotypic parallels between clinical and non-clinical populations.

Second, the hypothesized dimensional model of psychometric schizotypy, based on the Stefanis et al. (2004) four-factor model, was shown to be partially equivalent across the two samples. It is noteworthy that partial factorial equivalence of the structural covariances was found; however, when testing the hypothesis of equal covariances across groups, we observed values of ΔCFI above 0.01, indicating that the equivalence of factor covariances across groups was not tenable. This could be due to several factors. For instance, the magnitude of correlations between latent factors may differ across samples. Another possibility is that differences are rooted in the complexity of the tested factor model, the

psychometric properties of the SPQ, the method of assessment (e.g., self-report instruments), or sampling bias. Alternatively, it is also possible that the latent constructs that the SPQ taps, as well as the four-factor model tested, may differ across cultures. To clarify the present findings, it is thus important that our results be replicated in further studies.

Previous research has found the schizotypy dimensions to be invariant across sex, age, and other sociodemographic variables with both the SPQ and SPQ-B (Reynolds et al., 2000; Fossati et al., 2003; Badcock and Dragovic, 2006; Wuthrich and Bates, 2006; Fonseca-Pedrero et al., 2011; Ortuño-Sierra et al., 2013), as well as the Chapman Scales (Kwapil et al., 2008; Fonseca-Pedrero et al., 2010; Kwapil et al., 2012). In a recent study, Kwapil et al. (2012), using the Chapman Scales in Spanish and American samples, found the hypothesized bidimensional (positive and negative schizotypy) model to be invariant across the groups of interest. In another work comparing the factorial equivalence of the SPQ-B between Spanish and Swiss adolescents, Ortuño-Sierra et al. (2013) found that the Raine et al. (1994) three-factor model was equivalent (configural and partial strong invariance) across the two samples. These preliminary results appear to support the cross-cultural validity of two different schizotypy measurement instruments and to do so across different samples (adolescents and young adults).

Third, in the present work, American participants had higher SPQ scores on average across all schizotypy dimensions than did the Spaniards. Kwapil et al. (2012) obtained similar results using the Chapman Scales; American students scored higher than Spaniards on both positive and negative dimensions of schizotypy. Studies comparing mean schizotypy dimension scores between members of different racial/ethnic groups have also yielded similar results. Chmielewski et al. (1995) found that African-American students had significantly higher scores on all four of the Chapman Scales than did Caucasian students; Kwapil et al. (2008), found similar results, but with small effect sizes, in a different sample of African-American and Caucasian college students. Results are also comparable in studies that examine psychotic-like symptoms in multi-ethnic samples drawn from the general population. For example, Johns et al. (2002) found reports of hallucinations to vary significantly across ethnic groups, with the highest rates in Caribbean individuals and the lowest in individuals who identify as South Asian. Moreover, when clinical samples of patients with psychosis were analyzed, several differences between countries and culture emerged. For example, prognosis, diagnosis, time of hospitalization, onset, intervention, and risk for psychosis varied across groups (Susser and Wanderling, 1994; Sartorius et al., 1996; Dutta et al., 2010; Moriwaki et al., 2013). These cross-cultural findings could be of crucial relevance in psychosis research; for instance, they could be of value for determining cut-off points for detecting participants at risk for psychosis in the context of a given culture.

Our findings have clear implications for efforts to integrate studies on schizotypal dimensions into current models of psychosis and for research on the construct validity of schizotypy across cultures. However, the results of the present study should be interpreted in light of the following limitations. First, the SPQ is a measurement instrument designed for the assessment of schizotypy and schizotypal personality, in which multiple and complex factorial models (e.g., cross loadings) can be tested. Thus, caution is necessary with regard to generalizing the data to other populations and measurement instruments. Second, the data used in this work came from previously published studies. Third, having participants from several racial/ethnic groups in the American sample could complicate the interpretation of the results. Fourth, we did not use a response infrequency scale to eliminate data from participants who may have responded dishonestly or randomly to the self-report instrument. Fifth, the present study used country as a proxy for culture.

Further studies investigating cultural differences would benefit from including measures of cultural values and beliefs in their assessments. Also, future research should continue to advance the study of measurement invariance of schizotypal dimensions and the (extended) psychosis phenotype across other cultures (i.e., non-Western cultures) and to examine other measurement instruments, for instance, the Peters et al. (2004) Delusions Inventory-21 or the Structured Interview for Psychosis-Risk Syndromes (Miller et al., 2003), and samples (e.g., ultra high-risk or genetic high-risk), with a view to thoroughly characterizing the comparability and cross-cultural equivalence of such instruments and the latent constructs that they tap.

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