Personality Disorders: Theory, Research, and Treatment
2014, Vol. 5, No. 1, 32–38

1949-2715/14/$12.00 DOI: 10.1037/per0000041

BRIEF REPORT

Schizotypal Personality Questionnaire – Brief Revised: Psychometric Replication and Extension

Dallas A. Callaway and Alex S. Cohen
Louisiana State University

Russell A. Matthews
Bowling Green State University

Thomas Dinzeo
Rowan University

The psychometric screening and detection of schizotypy through the use of concise self-report assessment instruments such as the Schizotypal Personality Questionnaire – Brief Revised (SPQ- BR; Cohen, Matthews, Najolia, & Brown, 2010) enables an expeditious identification of individuals at putatively elevated risk to develop schizophrenia-spectrum disorders. Using 2 large, culturally diverse, independent samples, this study expanded the psychometric evaluation of this instrument by presenting a series of confirmatory factor analyses; reviewing internal consistency reliabilities; and evaluating the construct validity of the scale by way of examining group differences in SPQ-BR scores between individuals with and without self-reported family histories of schizophrenia. The results indicate a 2-tier factor solution of the measure and indicate strong internal reliability for the scale. Findings regarding construct validity of the SPQ-BR are more variable with the Cognitive-Perceptual Deficits superordinate factor receiving the strongest evidentiary support. Limitations of this study and directions for future research are discussed.

Keywords: schizotypal personality questionnaire, screening, schizotypy, reliability, validity

Schizotypy refers to the array of personality traits putatively resulting from a neurodevelopmental diathesis to schizophrenia and the cluster A personality disorders and is thought to occur within 10% of the population (Lenzenweger, 2006; Lenzenweger & Korfine, 1992; Meehl, 1962). Phenotypically, schizotypy is marked by the presence of attenuated psychotic, emotional, and cognitive symptoms seen in full-blown schizophrenia-spectrum disorders. To screen for these subclinical symptoms in a time- and cost-effective manner and thereby support the clinical monitoring and, if needed, early intervention, of those at risk to develop schizophrenia or one of the cluster A disorders, a host of psychometric instruments have been developed. Of note, the Schizotypal Personality Questionnaire (SPQ; Raine, 1991), and the abridged Schizotypal Personality Questionnaire – Brief (SPQ-B; Raine & Benishay, 1995) have been used extensively in both clinical and nonclinical samples. Although this latter instrument offers the pragmatic benefit of shortened assessments, evidence of instability in the factor structure as well as evidence of tenuous psychometric properties, possibly resulting from a poorly discriminating response format, have diluted enthusiasm for its use. These concerns impelled the construction of a broadband yet concise self-report scale of schizotypal traits: the Schizotypal Personality Questionnaire – Brief Revised (SPQ-BR; Cohen, Matthews, Najolia, & Brown, 2010). In the current research, we further the analysis of the psychometrics of the SPQ-BR by examining the internal consistency and structural and construct validities of the scale.

The original 74-item SPQ (Raine, 1991) was constructed to mirror the nine *Diagnostic and Statistical Manual of Mental Disorders*, third edition, text revision (*DSM-III-R*; American Psychiatric Association [APA], 1987) diagnostic criteria for schizotypal personality disorder. Despite matching *DSM* nosology, however, the organization of the SPQ has been contested as there is considerable debate regarding the underlying factor structure of the measure. For example, three- (e.g., Raine et al., 1994; Wuthrich & Bates, 2006), four- (e.g., Compton, Goulding, Bakeman, & McClure-Tone, 2009a), and five-factor models (Chmielewski & Watson, 2008) have all been reported in the literature. Notwithstanding this uncertainty, which emanates, at least in part, from differences in sample characteristics and factor extraction methods, the full-scale SPQ has exhibited good psychometric properties over several analyses (e.g., Calkins, Curtis, Grove, & Iacono,

This article was published Online First December 23, 2013.

Dallas A. Callaway and Alex S. Cohen, Department of Psychology, Louisiana State University, Baton Rouge, Louisiana; Russell A. Matthews, Department of Psychology, Bowling Green State University, Bowling Green, Ohio; Thomas Dinzeo, Department of Psychology, Rowan University, Glassboro, New Jersey.

This research was supported by grants from Louisiana State University and the Louisiana Board of Regents awarded to Alex S. Cohen.

Correspondence concerning this article should be addressed to Dallas A. Callaway, Department of Psychology, Louisiana State University, Baton Rouge, LA 70803. E-mail: dallascallaway@gmail.com

2004; Raine et al., 1994; Rossi & Daneluzzo, 2002). Still, it remains the case that the length of the SPQ renders it a time-consuming scale to administer and thus unsuitable for many assessment contexts.

To address the cumbersome nature of the SPQ, Raine and Benishay (1995) developed a truncated version of the scale. However, the SPQ-B, which contains 22 items from the original scale, has recently exhibited some undesirable psychometric qualities including, for example, low internal consistency coefficients (e.g., $\alpha < .68$) for the Cognitive-Perceptual and Disorganization subscales (Aycicegi, Dinn, & Harris, 2005; Compton, Chien, & Bollini, 2007). In addition, both exploratory and confirmatory factor analyses have yielded only mixed support for the measure's three-factor scoring structure (see Axelrod, Grilo, Sanislow, & McGlashan, 2001; Compton et al., 2007; Compton, Goulding, Bakeman, & McClure-Tone, 2009b; Mata et al., 2005). In evaluating the psychometric deficiencies of the SPQ-B to construct the SPQ-BR, Cohen et al. (2010) identified two salient sources of error variance. First, as detailed by Clark and Watson (1995), the internal consistency maximizing method of scale refinement, by which the SPQ-B was produced, exhibits a number of drawbacks including, most notably, its proclivity to retain largely redundant items at the expense of less homogenous yet content valid items. Hence, the SPQ-BR was developed by deemphasizing this approach and instead using both exploratory and confirmatory factor analytic approaches to streamline the full scale SPQ. In this way, the SPQ-BR offers a wider coverage of the schizotypy construct space than does the SPQ-B. The second source of psychometric enfeeblement pertains to the response format of the SPQ-B. Like other schizotypy scales, the SPQ-B presents items in a dichotomous true/false format which forces individuals to evaluate the presence or absence of these traits in a categorical manner. Not only does this format preclude reporting graded-levels of trait severity, but it has also been shown to weaken reliability estimates in the full SPQ (Wuthrich & Bates, 2005). As a means of bolstering the sensitivity of the instrument, then, Cohen and colleagues applied a five-point Likert-scale response format in distilling those items from the SPQ to form the SPQ-BR.

The SPQ-BR consists of 32 items organized into seven trait subscales: (1) Odd Beliefs or Magical Thinking, (2) Unusual Perceptual Experiences, (3) Excessive Social Anxiety, (4) Odd or Eccentric Behavior, (5) Odd Speech, (6) No Close Friends and Constricted Affect, and (7) Ideas of Reference and Suspiciousness. In addition to these subscales, which comprise the subordinate factor structure of the SPQ-BR, the original confirmatory factor analysis conducted by Cohen et al. could not adjudicate between either a superordinate three- (i.e., Cognitive-Perceptual Deficits, Interpersonal Deficits, and Disorganization) or four-factor (i.e., Cognitive-Perceptual Deficits, No Close Friends and Constricted Affect, and Excessive Social Anxiety, and Disorganization) structure of the measure. Hence, the present study seeks to address three aims. First, to confirm the superordinate structure of the SPQ-BR and evaluate the generalizability of these components, this study presents a series of confirmatory factor analyses within two large undergraduate samples drawn from two culturally and geographically distinct regions of the United States. Second, α coefficients are examined as a means of further evaluating the internal reliability of the SPQ-BR. Third, this study aims to provide an analysis of the construct validity of the scale by way of evaluating group differences in SPQ-BR factor and schizotypal trait subscale scores between those with and those without self-reported family histories of schizophrenia. Insofar as schizotypy is thought to comprise the phenotypic expression(s) of underlying genetic vulnerabilities to schizophrenia-spectrum disorders (Lenzenweger, 2006; Meehl, 1990), biological relatives of self-reported schizophrenia probands are hypothesized to endorse greater severity of schizotypal traits and thus elevated SPQ-BR scores.

Method

Participants

Undergraduate students enrolled at major universities in the southeastern (Site 1; $n = 6881$) or northeastern (Site 2; $n = 913$) United States were invited via email to participate in an online survey. As compensation, participants were offered entry into a lottery for one of 10 $25 USD cash prizes. The survey contained a consent form, demographic questionnaire, and all 32 items of the SPQ-BR. Within the Site 1 sample, of those invited to participate in the survey, 5989 (87%) were excluded because of incomplete questionnaires. The final Site 1 sample included 892 participants. Within the Site 2 sample, of those invited to participate in the survey, 508 (56%) were excluded because of incomplete questionnaires. The final Site 2 sample included 405 participants. Table 1 contains demographic details of the full intersite sample as well as those of the sample partitioned into Site 1 and Site 2 subsamples. This study was approved by the respective Institutional Review Boards, and all participants provided written informed consent before completing the survey.

Measures

Schizotypal Personality Questionnaire – Brief Revised. Schizotypal traits were assessed using the 32-item SPQ-BR. Participants responded to items using the 5-point Likert scale format ranging from 1 (*strongly disagree*) through 3 (*neutral*) to 5 (*strongly agree*). For each derivative score of the SPQ-BR, higher values reflect greater schizotypal trait severity.

Family history of schizophrenia. As part of the demographic questionnaire, the online survey included a series of family psychiatric and treatment history items. Pertinent to the present study, to identify those with and those without self-reported family histories of schizophrenia, participants responded to the item "[h]as a family member of yours ever been diagnosed or treated for schizophrenia, a serious mental illness characterized by hallucinations and delusions?" using a true/false format. Of the full intersite sample, 841 participants provided responses to this item,[1] 49 of which affirmed a family history of schizophrenia.

Analyses

After a review of sample descriptive statistics and SPQ-BR score ranges, analyses were done in three steps consistent with the three

[1] The remainder 456 participants of the full intersite sample provided otherwise complete questionnaires, however were missing responses to the family history of schizophrenia item of the demographic questionnaire and were therefore excluded from all analyses based on this item.

Table 1
Participant Characteristics and Means and Standard Deviations for SPQ-BR Scores

	Full sample (N = 1297)	Site 1 (n = 892)	Site 2 (n = 405)
Age[a]	20.23 (3.99)	19.69 (4.05)	20.91 (3.82)
% Female	66.80	68.10	64.00
Ethnicity			
% Caucasian	79.13	77.65	80.99
% African American	7.87	7.06	8.89
% Hispanic	5.25	4.31	6.42
% Other	7.75	10.98	3.70
SPQ-BR factors[b,c]			
Total score	53.18 (30.16)	39.03 (22.28)	84.34 (20.16)
Cognitive Perceptual deficits	19.63 (13.94)	13.12 (9.96)	33.96 (10.25)
No close friends/Constricted affect	9.43 (6.20)	7.21 (5.34)	14.31 (5.09)
Excessive social anxiety	7.80 (4.83)	6.19 (4.24)	11.37 (4.07)
Disorganization	16.32 (9.23)	12.52 (7.34)	24.70 (7.21)
Schizotypal trait subscales			
Ideas of reference and suspiciousness	10.27 (6.67)	7.56 (5.41)	16.23 (5.13)
Odd beliefs or magical thinking	4.56 (4.59)	2.61 (3.27)	8.86 (4.14)
Unusual perceptual experiences	4.80 (4.22)	2.95 (3.08)	8.88 (3.47)
No close friends/Constricted affect	9.43 (6.20)	7.21 (5.34)	14.31 (5.09)
Excessive social anxiety	7.80 (4.83)	6.19 (4.24)	11.37 (4.07)
Odd or eccentric behavior	7.22 (5.28)	5.22 (4.33)	11.64 (4.42)
Odd speech	9.10 (4.84)	7.30 (4.12)	13.06 (3.88)

[a] Age reported in years (all associated standard deviations in parentheses). [b] SPQ-BR score means and standard deviations for Family History Positive group (n = 49): Total Score = 45.50 (23.31); Cognitive Perceptual Deficits = 16.61 (10.85); No Close Friends/Constricted Affect = 8.43 (5.19); Excessive Social Anxiety = 7.12 (3.96); Disorganization = 13.31 (7.98); Ideas of Reference and Suspiciousness = 9.33 (4.97); Odd Beliefs or Magical Thinking = 3.86 (4.11); Unusual Perceptual Experiences = 3.43 (3.35); Odd or Eccentric Behavior = 6.06 (4.88); Odd Speech = 7.24 (4.33). [c] SPQ-BR score means and standard deviations for Family History Negative group (n = 792): Total Score = 38.68 (22.05); Cognitive Perceptual Deficits = 12.90 (9.80); No Close Friends/Constricted Affect = 7.16 (5.34); Excessive Social Anxiety = 6.13 (4.26); Disorganization = 12.49 (7.33); Ideas of Reference and Suspiciousness = 7.47 (5.41); Odd Beliefs or Magical Thinking = 2.53 (3.16); Unusual Perceptual Experiences = 2.90 (3.04); Odd or Eccentric Behavior = 5.16 (4.33); Odd Speech = 7.32 (4.11).

aims of this study. First, confirmatory factor analyses were conducted within the full intersite sample as well as within each of the Site 1 and Site 2 subsamples using the structural equation modeling software AMOS 17 (Arbuckle, 2008). Second, based on the resultant factor structure supported in step one, α coefficients were computed for SPQ-BR factor and schizotypal trait subscale scores. Third, given the disparate sample sizes and the fact that the respective distributions of the SPQ-BR factor and schizotypy trait subscale scores within the full sample violated normality—an issue that could not be corrected via data transformation—Mann–Whitney U tests were used to contrast SPQ-BR scores between those with and those without self-reported family histories of schizophrenia.

Results

Structural Validity

The first step in ascertaining the superordinate factor structure of the SPQ-BR was to test the proposed model based on the full intersite sample.[2] Four measures of model fit were calculated: χ^2, CFI, RMSEA, and SRMR. A nonsignificant χ^2 indicates good model fit; however, χ^2 is notably affected by sample size. The CFI and RMSEA are less sensitive to sampling characteristics and take degrees of freedom into account, whereas SRMR is less affected by model complexity. A CFI value of .90 or higher and a RMSEA value of .06 or lower are indicative of good model fit as is an SRMR value of .08 or lower (Medsker, Williams, & Holahan, 1994; Hu & Bentler, 1999). The four-factor superordinate structure of the SPQ-BR provided a good fit with the data, $\chi^2(453) = 2736.02$, CFI = .93, RMSEA = .06, SRMR = .06, as did the three-factor superordinate structure, $\chi^2(454) = 2742.15$, CFI = .93, RMSEA = .06, SRMR = .06. Specifically, with both models, although the χ^2 values were significant, the other fit statistics were within desired ranges and it should be noted that significant χ^2 values are not surprising in light of our sample size and model complexities (Kline, 2005). Because models containing more factors tend to

[2] The factor analyses included all participants for which complete SPQ-BR data were available and were thus run using a sample of 1301. Four individuals, all of whom were recruited through Site 1, were missing demographic information despite complete SPQ-BR questionnaires and were therefore excluded from all other analyses.

provide better fit as well as the fact that the two structures tested herein are nested, BIC statistics were used to compare the two superordinate factor structures. Models with lower BIC values generally indicate better fitting factor structures. The near equivalence in BIC values between the three- (BIC = 3272.80) and four-factor (BIC = 3273.83) structures suggest that the two models are empirically equal (see Cohen et al., 2010, for elaboration of this issue). Still, given that including the fourth superordinate factor (i.e., an thus including an additional degree of freedom) did indeed significantly improve model fit as compared with the three-factor superordinate structure, $\Delta\chi^2(1) = 6.13$, $p < .05$, the former is reported here. Standardized factor loadings for the four-factor superordinate structure of the SPQ-BR are reported in Figure 1.

To cross-validate the four-factor superordinate structure of the SPQ-BR, we sought to establish that the structure was invariant across testing sites. A multiple-groups analysis was conducted using AMOS 17 (Arbuckle, 2008). The unconstrained model demonstrated acceptable fit, $\chi^2(906) = 2946.89$, CFI = .91, RMSEA = .04, SRMR = .06. We next constrained the measurement weight for each observed variable (i.e., factor loadings for the observed variables). These constrained models indeed demonstrated significantly worse fit, $\Delta\chi^2(25) = 57.98$, $p < .05$. Upon review, there appeared to be five measurement weights (corresponding with items 6, 8, 10, 18, and 21 of the original SPQ; Raine, 1991) that varied across the two sites. These five weights were set free to be estimated, however this revised model did not significantly differ from the fully unconstrained model, $\Delta\chi^2(20) = 26.74$, $p > .05$. We then tested whether the latent factor loadings were invariant across testing sites. This model did not significantly differ from the partially constrained measurement weight model, $\Delta\chi^2(3) = 6.35$, $p > .05$. Accordingly, overall, these results suggest that, with a few minor exceptions, the measurement structure of the four-factor superordinate structure of the SPQ-BR was invariant across testing sites.

Internal Consistency Reliabilities

Internal consistency coefficients are reported in Table 2. Each of the SPQ-BR factor and trait subscale scores showed good or excellent internal consistencies within the full intersite sample. That is, α coefficients ranged from .87 to .94 with a mean of .91 for the SPQ-BR factor scores and ranged from .83 to .93 with a mean of .89 for the schizotypal trait subscale scores.

Construct Validity

Results of all pairwise nonparametric tests along with effect sizes are reported in Table 3. These tests revealed that only the Cognitive-Perceptual Deficits factor score delineated between groups such that relatives of schizophrenia probands tended to report higher (*Mdn* = 16.00) scores than those without a family history schizophrenic illness (*Mdn* = 11.00), $U = 15465.50$, $z = -2.39$, $p = .02$, $\hat{p} = .40$.[3] Conversely, only at a trend level did the No Close Friends and Constricted Affect ($U = 16419.50$, $z = -1.81$, $p = .07$, $\hat{p} = .42$) and Excessive Social Anxiety ($U = 16584.00$, $z = -1.71$, $p = .09$, $\hat{p} = .43$) factor scores differentiate those with and those without family histories of schizophrenia in the predicted direction. Further, the Disorganization factor score did not reliably discriminate those with (*Mdn* = 15.00) and those without (*Mdn* = 13.00) self-reported family histories of schizophrenia, $U = 18158.00$, $z = -0.76$, $p = .45$, $\hat{p} = .47$. With the exception of Unusual Perceptual Experiences ($U = 16534.00$, $z = -1.69$, $p = .28$, $\hat{p} = .45$), the pairwise contrasts examining the schizotypal trait subscales, which comprise the superordinate factors of the SPQ-BR, largely mirrored the above pattern of results.

Discussion

The present study sought to further document the psychometric properties of the SPQ-BR, including an evaluation of the scale's structural validity, internal consistency, and construct validity. The results of the confirmatory factor analyses both cross-validated the four-part superordinate structure of the SPQ-BR. That is, the analyses indicated that the seven schizotypy trait subscales, which serve as the subordinate structure of the SPQ-BR, are subsumed under four overarching factors: Cognitive-Perceptual Deficits, No Close Friends and Constricted Affect, Excessive Social Anxiety, and Disorganization. It is interesting to note that, although deviating from prior factor solutions of both the SPQ and SPQ-B (e.g., Raine et al., 1994; Wuthrich & Bates, 2006), the present findings largely map on to previous models of the schizophrenia-spectrum pathology. Specifically, much like the tripartite model of schizophrenic psychopathology (Arndt, Alliger, & Andreasen, 1991), positive, negative, and disorganized schizotypy are frequently documented factors reported in the literature. Here, the Cognitive-Perceptual Deficits, No Close Friends and Constricted Affect, and Disorganization factors of the SPQ-BR largely correspond with each of these components, respectively.

The present study also supports the inclusion of Excessive Social Anxiety as a component of the SPQ-BR. Although social anxiety is indeed a nonspecific manifestation of psychopathology, this finding fits with those of Lewandowski et al. (2006) and Brown, Silvia, Myin-Germeys, Lewandowski, and Kwapil (2008), wherein anxious symptomatology, including social anxiety, comprised a distinct factor within schizotypal samples. Specifically, both studies found evidence of social anxiety as a discrete factor and one that was strongly associated with the positive but not negative dimension of schizotypy. Interestingly, our data do not show this differential association between the Excessive Social Anxiety and the Cognitive-Perceptual Deficits and No Close Friends and Constricted Affect factors as social anxiety was equally associated with the positive and negative schizotypy components. It is not immediately clear as to what accounts for these discrepant findings and the present study provides limited insight into this issue, which therefore leaves open this topic for future investigation.

Consistent with the factor analytic strategy used in constructing the SPQ-BR, the reliability analyses indicated that each of the constituent scores of the SPQ-BR demonstrated robust internal reliability. The results of the schizophrenia family history group comparisons, however, provide more variable and limited support

[3] Although there is no consensus effect size statistic for nonparametric pairwise tests, Grissom and Kim (2012) recommend the use of $\hat{p}$. This statistic estimates the probability that a score randomly selected from one population (Family History Negative) will be greater than a score randomly selected from a second population (Family History Positive) with regards to a given dependent measure (SPQ-BR scores). Thus, as a basis of comparison, $\hat{p} = 0.50$ indicates a negligible effect size as this represents chance-level probability that a score selected from one population would be greater than a score selected from a second population.

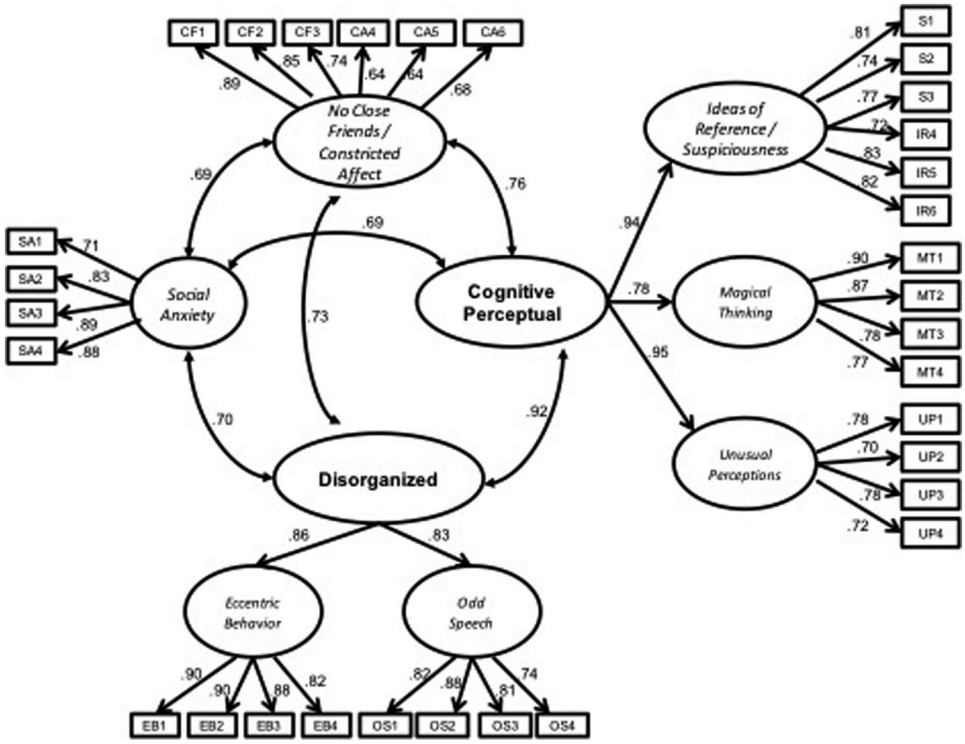

Figure 1. SPQ-BR factor structure with standardized factor loadings. See Cohen et al. (2010) for verbatim SPQ-BR items corresponding with item-level codes in the figure (e.g., S1, IR4, OS2).

for the construct validity of the SPQ-BR. Because of space constraints, we limit our discussion of SPQ-BR construct validity to the four superordinate factors. Self-reported biological relatives of schizophrenia probands indeed tended to endorse higher scores than did individuals without family history of illness on the Cognitive- Perceptual Deficits factor and, at trend levels, on the No Close Friends and Constricted Affect and Excessive Social Anxiety factors. Conversely, this same family group did not tend to endorse higher scores than controls on the Disorganization factor. In addition, negligible effect sizes across the body of pairwise comparisons suggest that, as measured by the SPQ-BR, any differences between those with and those without apparent family histories of schizophrenia are more likely to be observed at the aggregate data level rather than at an idiographic case level. For example, most of the $\hat{p}$ values indicate that there is only a near chance probability that randomly selected individuals with and without self-reported family histories of schizophrenia would score appreciably different on the subscales of the SPQ-BR.

It is noteworthy that Excessive Social Anxiety factor scores delineated those with and those without family histories of schizophrenic illness at a trend level whereas the contrast examining group differences in Disorganization factor scores was not statistically significant. This is surprising given that the former factor putatively taps symptomatology nonspecific to the schizophrenia-spectrum (Pallanti, Quercioli, & Hollander, 2004; Torgersen, Skre, Onstad, Edvardsen, & Kringlen, 1993) whereas the latter factor is thought to measure core schizotypal processes—that is, attenuated schizophrenia-spectrum pathology such as subtle thought disturbance and odd mannerisms and behaviors.

To the extent that biological kin of schizophrenia probands with presumptive genetic diathesis to schizophrenia-spectrum disorders should evince more severe schizotypal traits and, at least at the aggregate data level, report elevations on each of the SPQ-BR factor and trait subscale scores, our data enable the following conclusions. First, only the Cognitive-Perceptual Deficits factor

Table 2
SPQ-BR Factor and Schizotypy Trait Subscale Score Internal Consistency Reliabilities and Mean Inter-Item Correlations

	α (n = 1297)	# of items	Mean inter-item correlations
SPQ-BR factors			
Cognitive-perceptual deficits	.94	14	.53
No close friends/Constricted affect	.87	6	.54
Excessive social anxiety	.90	4	.68
Disorganization	.92	8	.60
Schizotypy trait subscales			
Ideas of reference and suspiciousness	.90	6	.61
Odd beliefs of magical thinking	.90	4	.69
Unusual perceptual experiences	.83	4	.55
No close friends/Constricted affect	.87	6	.54
Excessive social anxiety	.90	4	.68
Odd or eccentric behavior	.93	4	.77
Odd speech	.88	4	.65

Table 3
Mann–Whitney U Contrasts Evaluating Median SPQ-BR Factor and Schizotypal Trait Subscale Scores Between Individuals With and Without Self-Reported Family Histories of Schizophrenia

	Family history positive (n = 49)	Family history negative (n = 792)	p	Effect size ($\hat{p}$)
SPQ-BR factors				
Cognitive-perceptual deficits	16.00	11.00	.02	.40
No close friends/Constricted affect	8.00	6.00	.07	.42
Excessive social anxiety	7.00	6.00	.09	.43
Disorganization	15.00	13.00	.45	.47
Schizotypy trait subscales				
Ideas of reference and suspiciousness	9.00	7.00	.01	.39
Odd beliefs or magical thinking	3.00	1.00	.02	.41
Unusual perceptual experiences	3.00	2.00	.28	.45
No close friends/Constricted affect	8.00	6.00	.07	.42
Excessive social anxiety	7.00	6.00	.09	.43
Odd or eccentric behavior	5.00	5.00	.21	.45
Odd speech	7.00	7.00	.92	.50

Note. Family history positive and Family history negative groups refer to individuals with and without self-reported family histories of schizophrenia, respectively.

score, and possibly the No Close Friends and Constricted Affect domain score, have present evidence of construct validity whereas the Disorganization factor score does not correspond with the proxy measure of schizotypy (i.e., family history of schizophrenia) used in this study. Second, the Excessive Social Anxiety factor score, however reflective of general psychopathology, is a replicable component within the schizotypy factor structure (e.g., Brown et al., 2008) and was tentatively supported as a construct valid component in that these scores were elevated, at a statistical trend level, among those with family histories of schizophrenia. Finally, future works, especially studies in which the convergent and divergent validities of the SPQ-BR are examined, are clearly required to further elucidate the construct validity of the SPQ-BR.

There are several noteworthy limitations of this study. First, although the merits and restrictions of online data collection methods have been expounded more generally elsewhere (Skitka & Sargis, 2006), the high rates of participant exclusion resulting from incomplete questionnaires clearly limit the extent to which our results generalize to the broader schizotypy population. To this end, it is notable that the measures of this study were included as part of a larger online battery and therefore it is probable that participant response fatigue elevated the rate of incomplete questionnaires. Second, there are shortcomings inherent to our use of procuring family psychiatric histories via self-report without the use of external medical record review or other diagnostic confirmation to establish the groups used in the construct validity evaluation. Most notably, difficulties with ascertaining the veracity of reported psychiatric pedigrees and determining degrees of familial relatedness or genetic affinity were palpable concerns including issues regarding the validity of assignment to the family history of schizophrenia groups. These inadequacies may, at least in part, explain the somewhat tenuous support for construct validity reported in this analysis. In any case, it appears likely that these shortcomings had a suppressing, rather than augmenting, effect on our estimations of SPQ-BR construct validity. Third, the participants in our study were college students. The use of student samples is common in this line of research, however there remain well-known limitations with regards to the generalizability of findings to the general schizotypy population. Lastly, the cross-sectional nature of our study prevented examination of the test–retest reliability of the SPQ-BR, which is a significant yet heretofore unexamined psychometric property of the scale. Taken together, future research should use nonstudent samples and look to further examine the psychometric properties of the SPQ-BR, preferably using multiple assessment intervals to determine temporal stability and the multitrait-multimethod approach (Campbell & Fiske, 1959) to more robustly determine construct validity.

References

American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., revised). Washington, DC: American Psychiatric Association.

Arbuckle, J. L. (2008). *AMOS 17.0 user's guide*. Chicago, IL: SPSS.

Arndt, S., Alliger, R. J., & Andreasen, N. C. (1991). The distinction of positive and negative symptoms: The failure of a two-dimensional model. *British Journal of Psychiatry, 158,* 317–322. doi:10.1192/bjp.158.3.317

Axelrod, S. R., Grilo, C. M., Sanislow, C., & McGlashan, T. H. (2001). Schizotypal Personality Questionnaire-Brief: Factor structure and convergent validity in inpatient adolescents. *Journal of Personality Disorders, 15,* 168–179. doi:10.1521/pedi.15.2.168.19219

Aycicegi, A., Dinn, W. M., & Harris, C. L. (2005). Validation of Turkish and English versions of the Schizotypal Personality Questionnaire – B. *European Journal of Psychological Assessment, 21,* 34–43. doi:10.1027/1015-5759.21.1.34

Brown, L. H., Silvia, P. J., Myin-Germeys, I., Lewandowski, K. E., & Kwapil, T. R. (2008). The relationship of social anxiety and social anhedonia to psychometrically identified schizotypy. *Journal of Social & Clinical Psychology, 27,* 127–149. doi:10.1521/jscp.2008.27.2.127

Calkins, M. E., Curtis, C. E., Grove, W. M., & Iacono, W. G. (2004). Multiple dimensions of schizotypy in first degree biological relatives of schizophrenia patients. *Schizophrenia Bulletin, 30,* 317–325. doi:10.1093/oxfordjournals.schbul.a007081

Campbell, D. T., & & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin, 56,* 81–105. doi:10.1037/h0046016

Chmielewski, M., & Watson, D. (2008). The heterogeneous structure of schizotypal personality disorder: Item-level factors of the Schizotypal Personality Questionnaire and their associations with obsessive-compulsive disorder symptoms, dissociative tendencies, and normal personality. *Journal of Abnormal Psychology, 117,* 364–376. doi:10.1037/0021-843X.117.2.364

Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment, 7,* 309–319. doi:10.1037/1040-3590.7.3.309

Cohen, A. S., Matthews, R. A., Najolia, G. M., & Brown, L. A. (2010). Toward a more psychometrically sound brief measure of schizotypal traits: Introducing the SPQ-Brief Revised. *Journal of Personality Disorders, 24,* 516–537. doi:10.1521/pedi.2010.24.4.516

Compton, M. T., Chien, V. H., & Bollini, A. M. (2007). Psychometric properties of the Brief Version of the Schizotypal Personality Questionnaire in relatives of patients with schizophrenia-spectrum disorders and non-psychiatric controls. *Schizophrenia Research, 91,* 122–131. doi:10.1016/j.schres.2006.12.005

Compton, M. T., Goulding, S. M., Bakeman, R., & McClure-Tone, E. B. (2009a). Confirmation of a four-factor structure of the Schizotypal Personality Questionnaire among undergraduate students. *Schizophrenia Research, 111,* 46–52. doi:10.1016/j.schres.2009.02.012

Compton, M. T., Goulding, S. M., Bakeman, R., & McClure-Tone, E. B. (2009b). An examination of the factorial structure of the Schizotypal Personality Questionnaire – Brief (SPQ-B) among undergraduate students. *Schizophrenia Research, 115,* 286–289. doi:10.1016/j.schres.2009.04.012

Grissom, R. J., & Kim, J. J. (2012). *Effect sizes for research: Univariate and multivariate applications* (2nd ed.). New York, NY: Taylor & Francis.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6,* 1–55. doi:10.1080/10705519909540118

Kline, R. B. (2005). *Principles and practices of structural equation modeling* (2nd ed.). New York, NY: The Guilford Press.

Lenzenweger, M. F. (2006). Schizotypy: An organizing framework for schizophrenia research. *Current Directions in Psychological Science, 15,* 162–166. doi:10.1111/j.1467-8721.2006.00428.x

Lenzenweger, M. F., & Korfine, L. (1992). Confirming the latent structure and base rate of schizotypy: A taxometric analysis. *Journal of Abnormal Psychology, 101,* 567–571. doi:10.1037/0021-843X.101.3.567

Lewandowski, K. E., Barrantes-Vidal, N., Nelson-Gray, R. O., Clancy, C., Kepley, H. O., & Kwapil, T. R. (2006). Anxiety and depression symptoms in psychometrically identified schizotypy. *Schizophrenia Research, 83,* 225–235. doi:10.1016/j.schres.2005.11.024

Mata, I., Mataix-Cols, D., & Peralta, V. (2005). Schizotypal Personality Questionnaire – Brief: Factor structure and influence of sex and age in a nonclinical population. *Personality and Individual Differences, 38,* 1183–1192. doi:10.1016/j.paid.2004.08.001

Medsker, G. J., Williams, L. J., & Holahan, P. J. (1994). A review of current practices for evaluating causal models in organizational behavior and human resources management research. *Journal of Management, 20,* 439–464.

Meehl, P. E. (1962). Schizotaxia, schizotypy, schizophrenia. *American Psychologist, 17,* 827–838. doi:10.1037/h0041029

Meehl, P. E. (1990). Toward an integrated theory of schizotaxia, schizotypy, and schizophrenia. *Journal of Personality Disorders, 4,* 1–99. doi:10.1521/pedi.1990.4.1.1

Pallanti, S., Quercioli, L., & Hollander, E. (2004). Social anxiety in outpatients with schizophrenia: A relevant cause of disability. *The American Journal of Psychiatry, 161,* 53–58. doi:10.1176/appi.ajp.161.1.53

Raine, A. (1991). The SPQ: A scale for the assessment of schizotypal personality based on *DSM-III-R* criteria. *Schizophrenia Bulletin, 17,* 555–564. doi:10.1093/schbul/17.4.555

Raine, A., & Benishay, D. (1995). The SPQ-B: A brief screening instrument for schizotypal personality disorder. *Journal of Personality Disorders, 9,* 346–355. doi:10.1521/pedi.1995.9.4.346

Raine, A., Reynolds, C. A., Lencz, T., Scerbo, A., Triphon, N., & Kim, D. (1994). Cognitive-perceptual, interpersonal, and disorganized features of schizotypal personality. *Schizophrenia Bulletin, 20,* 191–201. doi:10.1093/schbul/20.1.191

Rossi, A., & Daneluzzo, E. (2002). Schizotypal dimensions in normals and schizophrenic patients: A comparison with other clinical samples. *Schizophrenia Research, 54,* 67–75. doi:10.1016/S0920-9964(01)00353-X

Skitka, L. J., & Sargis, E. G. (2006). The internet as a psychological laboratory. *Annual Review of Psychology, 57,* 529–555. doi:10.1146/annurev.psych.57.102904.190048

Torgersen, S., Skre, I., Onstad, S., Edvardsen, J., & Kringlen, E. (1993). "True" schizotypal personality disorder: A twin study. *The American Journal of Psychiatry, 150,* 1661–1667.

Wuthrich, V. M., & Bates, T. C. (2005). Reliability and validity of two Likert versions of the Schizotypal Personality Questionnaire (SPQ). *Personality and Individual Differences, 38,* 1543–1548. doi:10.1016/j.paid.2004.09.017

Wuthrich, V. M., & Bates, T. C. (2006). Confirmatory factor analysis of the three-factor structure of the Schizotypal Personality Questionnaire and Chapman Schizotypy Scales. *Journal of Personality Assessment, 87,* 292–304. doi:10.1207/s15327752jpa8703_10