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# Three Prominent Self-Report Risk Measures Show Unique and Overlapping Utility in Characterizing Those at Clinical High-Risk for Psychosis

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## Abstract

Self-report questionnaires have been developed to efficiently assess psychosis risk and vulnerability. Despite this, the validity of these questionnaires for assessing specific positive symptoms in those at clinical high risk for psychosis (CHR) is unclear. Positive symptoms have largely been treated as a uniform construct in this critical population and there have been no reports on the construct validity of questionnaires for assessing specific symptoms. The present study examined the convergent, discriminant, and criterion validity of the Launay Slade Hallucination Scale-Revised (LSHS-R), Prodromal Questionnaire-Brief (PQB), and Community Assessment of Psychic Experiences positive scale (CAPE-P) using a multimethod approach. CHR individuals ($N = 71$) and healthy controls (HC; $N = 71$) completed structured clinical interviews, self-report questionnaires, and neuropsychological tests. Questionnaire intercorrelations indicated strong convergent validity (i.e., all $r$s > .50); however, evidence for discriminant validity was more

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variable. In examining relations to interviewer-assessed psychosis symptoms, all questionnaires demonstrated evidence of criterion validity, though the PQB showed the strongest convergent correlations (e.g., $r = .48$ with total symptoms). In terms of discriminant validity for specific positive symptoms, results were again more variable. PQB subscales demonstrated limited specificity with positive symptoms, whereas CAPE-P subscales showed some specificity and the LSHS-R showed high specificity. In addition, when correlations with internalizing and externalizing symptoms were examined, only the PQB showed consistent significant correlations. These results are interpreted in terms of the strengths and limitations of each measure, their value for screening, and their potential utility for clarifying differences between specific positive symptoms.

**Keywords**

clinical high risk; questionnaires; positive symptoms; construct validity

## 1. Introduction

Identifying psychotic disorders early in their course may improve prognosis and functional outcomes, as well as allow preventative interventions (Okuzawa et al., 2014; Valmaggia et al., 2009). Prior to developing a psychotic disorder, attenuated positive symptoms are often present (e.g., vague perceptual abnormalities), reflecting a prodromal state of the disorder (see Woods et al., 2009). Nonetheless, not all individuals with attenuated positive symptoms are prodromal; a continuum of positive symptoms exists and individuals vary in their vulnerability to developing a psychotic disorder (see Johns and van Os, 2001). Based primarily on the severity of positive symptoms, researchers have identified a subset of individuals as being at clinical high risk for psychosis (CHR), who are likely prodromal (Woods et al., 2009). The gold standard tools for identifying CHR individuals are structured interviews, such as the Structured Interview for Psychosis Risk Syndromes (SIPS; Miller et al., 2004; Salazar de Pablo et al., 2021); however, such instruments require considerable training to administer and are time-intensive to complete. Thus, there may be benefits to more efficient and flexible positive symptom assessments.

In contrast to structured interviews, self-report questionnaires can be efficiently administered with limited training. Assessing positive symptoms through questionnaires may allow large populations to be screened, psychosis vulnerability assessment to be included in more studies, frequent re-administration for tracking, and assessment in diverse clinical settings (Ellman et al., 2020; Schiffman et al., 2019). Nonetheless, these existing questionnaires vary considerably in their origins, emphasis, and structure. For instance, the Launay Slade Hallucinations Scale-Revised (LSHS-R; Launay and Slade, 1981) was developed to specifically assess a predisposition toward hallucinatory experiences in healthy participants, whereas the Community Assessment of Psychic Experiences positive scale (CAPE-P; Stefanis et al., 2002) measures a wider range of psychotic-like experiences (PLEs) in the general population and emphasizes subthreshold delusions relative to hallucinations (Capra et al., 2013). In further contrast, the Prodromal Questionnaire-Brief (PQB; Loewy et al.,

2011) was specifically developed in the context of prodromal research, using items from the Schizotypal Personality Questionnaire and the SIPS, and assesses a wide range of PLEs.

The differing emphasis on specific symptoms within these questionnaires deserves further consideration. The SIPS identifies five separate positive symptom items: unusual thought content/delusional ideas, suspiciousness/persecutory ideas, grandiose ideas, perceptual abnormalities/hallucinations, and disorganized communication. Notably, an individual only needs to score above threshold on one symptom item to be identified as CHR and it is often the case that progression entails the later emergence of other symptoms. Thus, the extent to which a questionnaire predicts each symptom may influence who is identified as being vulnerable to psychosis. Furthermore, there is evidence to suggest that there may be distinct etiological processes underlying specific symptoms. For instance, perceptual anomalies may be caused by overweighted prior beliefs, perhaps due to compensation for reduced sensory input (Reichert et al., 2013; Silverstein et al., 2017), whereas alterations to the process of learning from prediction errors may be related to delusions (Corlett and Fletcher, 2021).

Consistent with the potential utility of assessing attenuated positive symptoms separately in CHR individuals, factor analyses have identified potential subscales for the PQB (Azis et al., 2021) and CAPE-P (Capra et al., 2013; Cowan and Mittal, 2021). For the CAPE-P, there is a persecutory ideation scale (5 items), bizarre experiences (e.g., first rank symptoms; 7 items), and perceptual abnormalities (3 items). The PQB has perceptual abnormalities (6 items), grandiose/unusual delusions (3 items), and persecutory/thought delusions scales (4 items). Notably, in addition to assessing the presence/frequency of these symptoms, both of these measures also assess distress related to these symptoms as an additional question for each item. Distress may be a useful indicator of symptom severity and as such it is considered during structured clinical interviews (e.g., SIPS; Miller et al., 2004).

As the preceding paragraphs suggest, there are considerable differences in the specific positive symptoms emphasized in psychosis vulnerability questionnaires and this results in diverging subscales. Nonetheless, most research has focused on the predictive value of these measures' total scores for predicting CHR syndromes (e.g., Kline & Schiffman, 2014), not the construct validity of subscales, nor their ability to predict specific CHR symptoms. It is unclear whether these questionnaires measure similar phenomena and the extent to which the scales are specific to their purported constructs.

Although the construct validity of these scales involves examining their intercorrelations (i.e., with each other) and correlations with structured clinical interviews of positive symptoms, examining their relations with measures of other psychopathology may also be important. Individuals identified as CHR frequently present with comorbid internalizing and externalizing disorders (e.g., substance use), to an extent that understanding the effects of this comorbidity is an important area of ongoing research (Addington et al., 2017). This high level of comorbidity may also affect the validity of questionnaires in complex ways. In the context of screening, questionnaires that are correlated with psychopathology and distress may be more effective in identifying CHR individuals in the general population, as they may represent a more ecologically-valid reflection of CHR participants (Kline and Schiffman, 2014). In contrast, scales that are not correlated with internalizing or externalizing symptoms

may have greater utility in clinical settings (e.g., differentiating clinical groups) and studies that aim to understand specific etiological processes (e.g., Mittal et al., 2021). In sum, such correlations speak to the clinical and research utility of these measures in unique and informative ways.

The present study aimed to address these issues by examining three questionnaires (LSHS-R, PQB, and CAPE) with scales that measure specific attenuated positive symptoms in a CHR sample. We hypothesized that scales measuring specific psychosis risk symptoms would correlate most strongly with other self-report and interview measures of the same symptom (convergent validity) and correlate more weakly with other symptoms (discriminant validity). As a first step, we established the internal consistency of questionnaire scales and their ability to differentiate CHR participants from healthy controls. Secondly, we examined correlations between questionnaire scales for evidence of convergent and discriminant validity. Thirdly, we tested the criterion validity of these scales for predicting specific attenuated positive symptoms, as assessed by the SIPS interview and conversion likelihood calculators. Finally, we examined whether these questionnaires demonstrated similar patterns of correlations with internalizing and externalizing symptoms.

## 2. Material and methods

### 2.1 Participants and procedures

CHR ($N$ = 71) and healthy control (HC; N = 71) participants were recruited via email, newspaper advertisements, and Craigslist advertisements. CHR participants were also recruited using techniques that targeted clinical populations, specifically through contacting psychologists, psychiatrists, high school counselors, college counseling centers, psychiatric hospitals, and community-mental health centers. Participants completed questionnaires and interviews in a laboratory environment, under the supervision of trained research assistants, and could ask questions and takes breaks as needed. CHR participants were included based on: (a) recent onset or escalation of moderate attenuated positive symptoms (score of 3–5 on at least one SIPS item); (b) the presence of a first-degree relative with a psychotic disorder such as schizophrenia, coupled with a decline in global functioning over the last 12 months; or a decline in global functioning with the presence of schizotypal personality disorder. HC were included if they did not meet criteria for a psychosis risk syndrome, and if they did not endorse the presence of a psychotic disorder in a first degree relative. Exclusion criteria for both groups included the presence of a neurological disorder, lifetime substance dependence, or a head injury. Additional exclusion criteria were the presence of a current or lifetime *DSM-IV* Axis I psychotic disorder (e.g., schizophrenia, schizoaffective disorder, schizophreniform) for the CHR participants, and the presence of any current Axis I disorder as determined by the SCID (e.g., depression, social phobia, alcohol or substance abuse or dependence) for the healthy controls. The protocol and informed consent procedures were approved by the University of Colorado at Boulder Institutional Review Board (#10–0398). Participant demographic data and diagnostic information are reported in Table 1.

## 2.2 Measures

**2.2.1 Structured Interview for Psychosis Risk Syndromes (SIPS).—**The SIPS is a semi-structured interview used to identify CHR syndromes (McGlashan et al., 2010). Although the SIPS contains assessments of negative, disorganized, and general symptoms, the present study focused on positive symptoms. The positive symptom items include: unusual/delusional thoughts, suspiciousness/persecutory ideas, grandiosity, perceptual abnormalities, and disorganized communication. These symptom items are rated on a 0-to-6 scale, where 0 represents absence of the symptom, 3–5 represent attenuated positive symptoms consistent with a CHR syndrome, and 6 represents presence of psychosis. These positive items can be summed to score a positive symptoms total score. In the present study, the SIPS was used to diagnose CHR syndromes and as a detailed assessment of individual attenuated positive symptoms.

**2.2.2 Structured Clinical Interview for DSM-IV (SCID).—**The SCID is a semi-structured diagnostic interview used to identify the presence or absence of varied mental disorders (First, 2015). Modules for psychotic, bipolar, depressive, anxiety, obsessive-compulsive, trauma-related, eating, and substance use disorders were administered to all participants. Based on previous research, disorders were categorized as internalizing or externalizing and dichotomous variables were created to indicate whether participants had at least one such disorder (Kotov et al., 2017). Specifically, depressive, anxiety, trauma-related, and eating disorders were used to identify participants who met criteria for any current internalizing disorder, whereas the presence of an externalizing disorder could be indicated by attention-deficit hyperactivity disorder, oppositional defiant disorder, or any substance use disorder.

**2.2.3 Community Assessment of Psychic Experiences (CAPE).—**The CAPE is a 42-item questionnaire measuring psychotic-like experiences, including positive, negative, and depressive symptoms (Stefanis et al., 2002). The present study only uses the 20 positive symptom items (CAPE-P) each of which is rated for frequency (1 = “Never” to 4 = “Nearly always”) and distress (1 = “Not distressed” to 4 = “Very distressed”). The present study used both a total frequency and distress scale, as well as three subscales based on previous research (Capra et al., 2013; Cowan and Mittal, 2021): persecutory ideation scale (5 items), bizarre experiences (e.g., first rank symptoms; 7 items), and perceptual abnormalities (3 items).

**2.2.4 Prodromal Questionnaire-Brief (PQB).—**The PQB is 21-item questionnaire that is an abbreviated version of the full Prodromal Questionnaire (Loewy et al., 2011, 2005). Items were selected based on being strongly aligned with the SIPS and not over-endorsed by a general undergraduate sample. Participants are asked to rate each item based on the past month and to exclude the influence of alcohol, drugs, or medications. The presence of each symptom is responded to in a Yes/No format and, if present, participants rated the distress related to this symptom on a 5-point Likert-type scale. Azis and colleagues (2021) conducted a factor analysis identifying three factors that were used to score the following scales in the present study: perceptual abnormalities (6 items), grandiose/unusual ability delusions (3 items), and a suspicious/thought delusions scale (4 items).

**2.2.5 Launay-Slade Hallucination Scale-Revised (LSHS-R).—**The LSHS-R is a 12-item scale that was developed specifically to assess a predisposition toward hallucinatory experiences relevant to healthy participants. Participants respond to the LSHS-R on a 0 ("certainly does not apply to me") to 4 ("certainly applies to me") Likert scale (Bentall and Slade, 1985; Launay and Slade, 1981).

**2.2.5 Social Interaction Anxiety Scale (SIAS).—**The SIAS is a self-report measure of social anxiety that consists of 20 items, responded to on a 5-point Likert scale (Mattick and Clarke, 1998).

**2.2.6 Beck Depression Inventory-II (BDI-II).—**The BDI-II is a 21-item self-report measure of depression, in which each item is rated on a 4-point Likert scale (Beck et al., 1996).

**2.2.7 Risk Calculators.—**The North American Prodrome Longitudinal Study (NAPLS) consortium and Shanghai At-Risk for Psychosis (SHARP) program have both developed risk calculators (RC) to estimate an individual's probabilistic risk for developing a psychosis spectrum disorder over a two-year span (Cannon et al., 2016; Zhang et al., 2019). The NAPLS-RC can be scored through an online calculator (http://riskcalc.org/napls/) and uses SIPS ratings and participant age, as well as several other measures that were administered: the Brief Assessment of Cognition in Schizophrenia (Keefe et al., 2004), the Hopkins Verbal Learning Test-Revised (Brandt and Benedict, 2001), negative life events scores from the Research Interview Life Events Scales (Dohrenwend et al., 1978), and social functioning decline as measured by the Global Functioning Scale (Carrión et al., 2016). In contrast, the SHARP-RC is based solely on SIPS variables, including a range of symptoms and the Global Assessment of Functioning (GAF).

### 2.3 Statistical Analyses

All analyses were performed in RStudio 4.0.2 (RStudio Team, 2020). Overall, missing data were rare (i.e., *M* across variables = 1%) and there was no evidence of outliers on study variables. First, descriptive statistics, internal consistency, and group differences (i.e., *t*-tests and Cohen's *d*) were calculated. Following this, Pearson's *r* was calculated with 95% confidence intervals for correlations between questionnaires, as well as between questionnaires and SIPS ratings, risk calculators, and internalizing and externalizing symptoms (i.e., SCID, SIAS, and BDI-II).

## 3. Results

### 3.1 Descriptive Statistics and Group Differences

As shown in Table 2, total scores showed good internal consistency in CHR participants; however, subscales were more variable, with some brief scales showing poorer internal consistency (e.g., CAPE bizarre experiences). Similarly, all scales were significantly elevated in the CHR group. All scales generally produced CHR-HC discrepancies of a similar magnitude, with the possible exceptions of the PQB grandiose/unusual and CAPE perceptual scales.

### 3.2 Validity Correlations

First, correlations among questionnaires were examined (see Table 3). All convergent correlations between scales measuring similar constructs were significant and, in general, they were strong ($r \geq .50$). The weakest convergent correlations were between CAPE and PQB subscales. The CAPE and PQB scales measuring symptom distress also converged ($r = .67$), but were similarly correlated with the other measure's total score ($r$s = .60 and .68), indicating limited discriminant validity (i.e., frequency and distress were not clearly separable). Similarly, the evidence for discriminant validity at the subscale level was mixed. The LSHS-R had the strongest discriminant validity, with its two strongest subscale-level correlations being the PQB and CAPE perceptual abnormalities scales. The CAPE and PQB perceptual abnormalities scales also showed evidence of discriminant validity, whereas the remaining scales from these measures presented a more complicated picture. The PQB suspiciousness/thought, PQB grandiose/unusual, CAPE suspiciousness, and CAPE bizarre scales were, in general, more strongly correlated with each other than any of the perceptual abnormalities scales, but within this cluster there was not clear evidence of discriminant validity (e.g., suspiciousness scales correlating more strongly with one another).

Second, correlations between questionnaire scales and the SIPS positive items and total scale were examined to assess criterion validity, using the framework of convergent and discriminant validity (see Table 3). Again, the LSHS-R showed some of the strongest evidence of validity, in that it was significantly correlated with SIPS P4 ($r = .36$; perceptual abnormalities) and no other SIPS item. The PQB scores had the strongest overall correlations with the SIPS scores (e.g., PQB total $r = .48$ with SIPS positive total), though, with the exception of the PQB perceptual scale, the discriminant validity of the PQB subscales was generally poor. For instance, the PQB suspicious/thought delusions scale correlated most strongly with the SIPS perceptual abnormalities rating (P4; $r = .46$). The CAPE had somewhat weaker convergent validity correlations with the SIPS (e.g., CAPE total $r = .31$ with SIPS positive total), though the CAPE perceptual scale showed good discriminant validity (i.e., only correlated with SIPS P4). No scale had significant correlations with either the SHARP or NAPLS risk calculators; however, the PQB demonstrated the largest and most consistently positive correlations with the SHAPR-RC (e.g., PQB total score $r = .22$, 95% CI [−.02, .43]).

Finally, to further explore clinical and research utility, questionnaire scores were correlated with both self-report and interview-based indicators of internalizing and externalizing psychopathology (Table 4). The LSHS-R was not significantly correlated with internalizing or externalizing symptoms and the CAPE had only one significant correlation (i.e., suspiciousness and depression, $r = .43$). In contrast, the PQB total, distress, and the suspicious/thought subscales each had several significant correlations with internalizing psychopathology indicators, with at least one correlation above .40.

## 4. Discussion

The present study examined whether self-report questionnaires are capable of measuring specific psychosis risk symptoms (e.g., perceptual abnormalities), beyond simply measuring overall psychosis risk. In comparing three questionnaires, two multi-symptom measures

(CAPE-P and PQB) and one specific to perceptual abnormalities (LSHS-R), strong evidence of convergent validity emerged. In contrast, there was mixed evidence of discriminant and criterion validity. As will be discussed further below, questionnaires and constructs varied in their relative degrees of convergent, discriminant, and criterion validity. In addition, the measures varied in the extent to which they correlated with measures of other psychopathology, with two measures (LSHS-R, CAPE-P) showing limited relations and the PQB showing notable correlations with internalizing symptoms. Below, we consider the relative strengths and weaknesses of the questionnaires along a number of dimensions.

### 4.1 Predicting general psychosis risk and positive symptoms

Developing a psychotic disorder is considered the primary outcome in the psychosis risk literature, thus there is considerable focus on overall risk (Woods et al., 2009). In regard to overall psychosis risk, the PQB showed the largest differences between HC and CHR groups and, within CHR participants, showed the strongest correlations with the SIPS and risk calculator scores. This is consistent with a previous study, which found that PQB total score change was related to SIPS total score change over time, to a greater extent than other questionnaires (Kline et al., 2016). This is perhaps not surprising, as the SIPS was used to generate the PQB item pool and the final PQB items were selected partly based on their ability to identify CHR individuals (Loewy et al., 2011). The SIPS-PQB association may also be strengthened by both measures focusing on the past month. Beyond identifying individuals with CHR syndromes, correlations within the CHR group suggested that the PQB assesses positive symptom severity. Although the PQB showed the strongest effects, it is noteworthy that the CAPE total score was also significantly correlated with the SIPS total score and showed large HC-CHR differences. In contrast, while the LSHS-R showed large group differences, it was not significantly correlated with the SIPS total score in the CHR group. Overall, these results indicate that self-report questionnaires can efficiently provide information on general psychosis risk, which may make them useful for identifying and tracking CHR individuals.

### 4.2 Assessing specific psychosis risk symptoms

Recognizing that psychosis risk symptoms are heterogeneous and may represent distinct neurobiological processes (Alderson-Day et al., 2017; Corlett and Fletcher, 2012), the present study examined the extent to which questionnaires measure specific psychosis risk symptoms. Discriminant validity, or whether a scale correlates weakly with dissimilar scales, was examined closely in this regard. Arguably, the LSHS-R showed the strongest evidence of measuring a specific risk symptom, in that it did not correlate significantly with the SIPS total score, only showed a significant correlation with the SIPS perceptual abnormalities rating (P4), and correlated strongly with other perceptual abnormality questionnaire scales. This finding for the LSHS-R was part of a general trend, in that CAPE and PQB perceptual abnormalities scales also correlated most strongly with the SIPS perceptual abnormalities rating. Interestingly, recent work indicates underlying mechanisms specific to perceptual abnormalities and that these experiences may predict conversion to psychosis, though further work is needed to replicate and clarify such findings (Klosterkötter et al., 2001; Powers, 2019). For the remaining PQB and CAPE scales, evidence of discriminant validity was more mixed. These scales, which all measure forms of delusional thinking, did not show

a clear pattern of intercorrelations and showed substantial correlations with perceptual abnormalities (e.g., SIPS P4). The best-performing of these scales was the PQB grandiose-unusual scale, which correlated most strongly with the SIPS grandiose ideas item (P3; $r$ = .39) and correlated most strongly with CAPE scales measuring delusional content; however, this scale still had significant correlations with SIPS perceptual abnormalities ($r$ = .25) and the LSHS-R ($r$ = .33).

Aside from the implications for individual measures, these findings suggest difficulties in measuring specific delusions. Indeed, (Azis et al., 2021) a factor analysis of the PQB found dimensions that mixed specific delusions and, in general, factor analytic research indicates that differentiating delusion subtypes may be more difficult than differentiating delusions from hallucinations (Brandizzi et al., 2014; Kimhy et al., 2005; Toomey et al., 1997). Nonetheless, the success of the LSHS-R and the relatively shorter length of the CAPE and PQB delusion scales suggest further attempts should be made to assess specific delusions. Indeed, individual delusions may vary in their prevalence, functional impact, underlying mechanisms, and potentially in relations to conversion to a psychotic disorder (Pinkham et al., 2016; Veling et al., 2007; Zhang et al., 2019). Thus, future work should examine the validity of longer and more specific measures of delusions in a CHR sample (e.g., Green Paranoid Thoughts Scale; Freeman et al., 2021).

### 4.3 Relations to internalizing and externalizing symptoms

The present study additionally found that measures varied in their relations to internalizing and externalizing symptoms, with the PQB showing the strongest and most consistent correlations with internalizing symptoms. In contrast, the CAPE total score was unrelated to internalizing or externalizing symptoms, and only the significant correlation for the measure was between the CAPE suspicious scale and BDI-II. Similarly, the LSHS-R was unrelated to internalizing or externalizing symptoms. This is consistent with the CAPE and LSHS-R being originally developed for use in non-clinical samples, which contrasts with the PQB's development involving differentiating a CHR sample (with comorbid disorders) from healthy controls (Loewy et al., 2011). The PQB's relation to internalizing symptoms correctly reflects the fact that CHR individuals frequently have comorbid disorders or distress, which may enhance its ability as a screener in the general population (Kline and Schiffman, 2014). In contrast, the CAPE may be of particular use within clinical samples, as its frequency-count scales appear to be less confounded by distress than the PQB's symptom presence scales. Additionally, the CAPE and LSHS-R may hold greater promise for measuring processes that are specific to psychosis risk, which differentiate it from other clinical presentations that present with similar symptoms (e.g., depression). Overall, it seems likely that the value of these individual measures will depend on the purpose and context of their use.

### 4.4 Limitations and future directions

The present study benefited from a multimethod assessment of validity in an adequately-sized clinical sample; however, there are several limitations that should be addressed in future work. First, several scales had relatively few items and lower internal consistency (e.g., 4 items, $\alpha$ = .60), potentially attenuating correlations. Given the success of the

LSHS-R, future work should consider longer measures dedicated to individual positive symptoms (e.g., Freeman et al., 2021) and potentially other symptom domains (e.g., negative). Second, the present study only examined cross-sectional data and it will be important for future studies to examine the relative predictive validity of such questionnaires in predicting conversion to a psychotic disorder in large samples, potentially identifying cut-off scores if relevant. Third, although adequate for detecting convergent correlations, the present sample size was underpowered for detecting correlations with risk calculator variables. Finally, although the present study included both self-report and interviewer assessments, future work should consider measures of underlying mechanisms that may differentiate positive symptom dimensions (Corlett and Fletcher, 2012). For example, using neurobehavioral and computational measures may show that delusions and hallucinations align with specific changes in belief strength, prediction error, precision-weighting and intermodality compensation, which may deepen our ability to distinguish symptoms and have differential prognostic indications (Corlett and Fletcher, 2014).

## 5. Conclusion

Commonly used self-report measures of psychosis risk all demonstrate some degree of validity; however, they diverge in their relative strengths and weaknesses. The PQB showed the strongest associations with a gold-standard interview measure of psychosis risk, but also may overlap with internalizing symptoms to a greater degree than other measures. The LSHS-R, in contrast, demonstrated excellent convergent and discriminant validity as a measure of perceptual abnormalities/hallucination-proneness, but is limited to this single psychosis risk symptom. The CAPE positive scales cover a broad range of symptoms and overlap less with internalizing symptoms, though show somewhat weaker convergent and discriminant validity. Overall, perceptual abnormalities/hallucination scales and delusion scales were distinct from one another; however, delusion scales did not clearly assess specific delusion subtypes. Future work will do well to examine additional measures, conduct longitudinal analyses, and incorporate measures of relevant mechanisms to further understand the extent to which psychosis risk questionnaires can assess specific positive symptoms, relative to general psychosis risk.

## Declaration of Interest

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## References

Addington J, Piskulic D, Liu L, Lockwood J, Cadenhead KS, Cannon TD, Cornblatt BA, McGlashan TH, Perkins DO, Seidman LJ, Tsuang MT, Walker EF, Bearden CE, Mathalon DH, Woods SW, 2017. Comorbid diagnoses for youth at clinical high risk of psychosis. Schizophr. Res 190, 90–95. 10.1016/j.schres.2017.03.043 [PubMed: 28372906]

Alderson-Day B, Lima CF, Evans S, Krishnan S, Shanmugalingam P, Fernyhough C, Scott SK, 2017. Distinct processing of ambiguous speech in people with non-clinical auditory verbal hallucinations. Brain 140, 2475–2489. 10.1093/brain/awx206 [PubMed: 29050393]

Azis M, Rouhakhtar PR, Schiffman JE, Ellman LM, Strauss GP, Mittal VA, 2021. Structure of positive psychotic symptoms in individuals at clinical high risk for psychosis. Early Interv. Psychiatry 15, 505–512. 10.1111/eip.12969 [PubMed: 32337849]

Beck AT, Steer RA, Brown GK, 1996. Beck Depression Inventory, 2nd ed. Psychological Corporation, San Antonio, TX.

Bentall RP, Slade PD, 1985. Reliability of a scale measuring disposition towards hallucination: a brief report. Personal. Individ. Differ 6, 527–529. 10.1016/0191-8869(85)90151-5

Brandizzi M, Schultze-Lutter F, Masillo A, Lanna A, Curto M, Lindau JF, Solfanelli A, Listanti G, Patanè M, Kotzalidis G, Gebhardt E, Meyer N, Di Pietro D, Leccisi D, Girardi P, Fiori Nastro P, 2014. Self-reported attenuated psychotic-like experiences in help-seeking adolescents and their association with age, functioning and psychopathology. Schizophr. Res 160, 110–117. 10.1016/j.schres.2014.10.005 [PubMed: 25458860]

Brandt J, Benedict RH, 2001. Hopkins verbal learning test–revised: professional manual. Psychological Assessment Resources.

Cannon TD, Yu C, Addington J, Bearden CE, Cadenhead KS, Cornblatt BA, Heinssen R, Jeffries CD, Mathalon DH, McGlashan TH, Perkins DO, Seidman LJ, Tsuang MT, Walker EF, Woods SW, Kattan MW, 2016. An Individualized Risk Calculator for Research in Prodromal Psychosis. Am. J. Psychiatry 173, 980–988. 10.1176/appi.ajp.2016.15070890 [PubMed: 27363508]

Capra C, Kavanagh DJ, Hides L, Scott J, 2013. Brief screening for psychosis-like experiences. Schizophr. Res 149, 104–107. 10.1016/j.schres.2013.05.020 [PubMed: 23830544]

Carrión RE, Cornblatt BA, Burton CZ, Tso IF, Auther AM, Adelsheim S, Calkins R, Carter CS, Niendam T, Sale TG, Taylor SF, McFarlane WR, 2016. Personalized Prediction of Psychosis: External Validation of the NAPLS-2 Psychosis Risk Calculator With the EDIPPP Project. Am. J. Psychiatry 173, 989–996. 10.1176/appi.ajp.2016.15121565 [PubMed: 27363511]

Corlett PR, Fletcher P, 2021. Modelling delusions as temporally-evolving beliefs. Cognit. Neuropsychiatry 26, 231–241. 10.1080/13546805.2021.1938984 [PubMed: 34102951]

Corlett PR, Fletcher PC, 2014. Computational psychiatry: a Rosetta Stone linking the brain to mental illness. Lancet Psychiatry 1, 399–402. 10.1016/S2215-0366(14)70298-6 [PubMed: 26361002]

Corlett PR, Fletcher PC, 2012. The neurobiology of schizotypy: Fronto-striatal prediction error signal correlates with delusion-like beliefs in healthy people. Neuropsychologia 50, 3612–3620. 10.1016/j.neuropsychologia.2012.09.045 [PubMed: 23079501]

Cowan HR, Mittal VA, 2021. Three types of psychotic-like experiences in youth at clinical high risk for psychosis. Eur. Arch. Psychiatry Clin. Neurosci 271, 733–744. 10.1007/s00406-020-01143-w [PubMed: 32458109]

Dohrenwend BS, Askenasy AR, Krasnoff L, Dohrenwend BP, 1978. Exemplification of a Method for Scaling Life Events: The PERI Life Events Scale. J. Health Soc. Behav 19, 205–229. 10.2307/2136536 [PubMed: 681735]

Ellman LM, Schiffman J, Mittal VA, 2020. Community Psychosis Risk Screening: An Instrument Development Investigation. J. Psychiatry Brain Sci 5. 10.20900/jpbs.20200019

First MB, 2015. Structured Clinical Interview for the DSM (SCID), in: The Encyclopedia of Clinical Psychology. American Cancer Society, pp. 1–6. 10.1002/9781118625392.wbecp351

Freeman D, Loe BS, Kingdon D, Startup H, Molodynski A, Rosebrock L, Brown P, Sheaves B, Waite F, Bird JC, 2021. The revised Green et al., Paranoid Thoughts Scale (R-GPTS): Psychometric properties, severity ranges, and clinical cut-offs. Psychol. Med 51, 244–253. 10.1017/S0033291719003155 [PubMed: 31744588]

Fusar-Poli P, Sullivan SA, Shah JL, Uhlhaas PJ, 2019. Improving the Detection of Individuals at Clinical Risk for Psychosis in the Community, Primary and Secondary Care: An Integrated Evidence-Based Approach. Front. Psychiatry 10, 774. 10.3389/fpsyt.2019.00774 [PubMed: 31708822]

Keefe RSE, Goldberg TE, Harvey PD, Gold JM, Poe MP, Coughenour L, 2004. The Brief Assessment of Cognition in Schizophrenia: reliability, sensitivity, and comparison with a standard neurocognitive battery. Schizophr. Res 68, 283–297. 10.1016/j.schres.2003.09.011 [PubMed: 15099610]

Kimhy D, Goetz R, Yale S, Corcoran C, Malaspina D, 2005. Delusions in Individuals with Schizophrenia: Factor Structure, Clinical Correlates, and Putative Neurobiology. Psychopathology 38, 338–344. 10.1159/000089455 [PubMed: 16269869]

Kline E, Schiffman J, 2014. Psychosis risk screening: A systematic review. Schizophr. Res 158, 11–18. 10.1016/j.schres.2014.06.036 [PubMed: 25034762]

Kline E, Thompson E, Demro C, Bussell K, Reeves G, Schiffman J, 2016. Self-Report Instruments for Clinical Monitoring of Psychosis Risk States. Psychiatr. Serv 67, 456–459. 10.1176/appi.ps.201500063 [PubMed: 26567937]

Klosterkötter J, Hellmich M, Steinmeyer EM, Schultze-Lutter F, 2001. Diagnosing schizophrenia in the initial prodromal phase. Arch. Gen. Psychiatry 58, 158–164. 10.1001/archpsyc.58.2.158 [PubMed: 11177117]

Kotov R, Krueger RF, Watson D, Achenbach TM, Althoff RR, Bagby RM, Brown TA, Carpenter WT, Caspi A, Clark LA, Eaton NR, Forbes MK, Forbush KT, Goldberg D, Hasin D, Hyman SE, Ivanova MY, Lynam DR, Markon K, Miller JD, Moffitt TE, Morey LC, Mullins-Sweatt SN, Ormel J, Patrick CJ, Regier DA, Rescorla L, Ruggero CJ, Samuel DB, Sellbom M, Simms LJ, Skodol AE, Slade T, South SC, Tackett JL, Waldman ID, Waszczuk MA, Widiger TA, Wright AGC, Zimmerman M, 2017. The Hierarchical Taxonomy of Psychopathology (HiTOP): A dimensional alternative to traditional nosologies. J. Abnorm. Psychol 126, 454–477. 10.1037/abn0000258 [PubMed: 28333488]

Launay G, Slade P, 1981. The measurement of hallucinatory predisposition in male and female prisoners. Personal. Individ. Differ 2, 221–234. 10.1016/0191-8869(81)90027-1

Loewy RL, Bearden CE, Johnson JK, Raine A, Cannon TD, 2005. The prodromal questionnaire (PQ): Preliminary validation of a self-report screening measure for prodromal and psychotic syndromes. Schizophr. Res., 4th International Conference on Early Psychosis 79, 117–125. 10.1016/j.schres.2005.03.007

Loewy RL, Pearson R, Vinogradov S, Bearden CE, Cannon TD, 2011. Psychosis risk screening with the Prodromal Questionnaire — Brief Version (PQ-B). Schizophr. Res 129, 42–46. 10.1016/j.schres.2011.03.029 [PubMed: 21511440]

Mattick RP, Clarke JC, 1998. Development and validation of measures of social phobia scrutiny fear and social interaction anxiety11Editor's note: This article was written before the development of some contemporary measures of social phobia, such as the Social Phobia and Anxiety Inventory (Turner et al., 1989). We have invited this article for publication because of the growing interest in the scales described therein. S.T. Behav. Res. Ther 36, 455–470. 10.1016/S0005-7967(97)10031-6

McGlashan T, Walsh B, Woods S, 2010. The Psychosis-Risk Syndrome: Handbook for Diagnosis and Follow-Up. Oxford University Press, USA.

Miller TJ, Cicchetti D, Markovich PJ, McGlashan TH, Woods SW, 2004. The SIPS screen: A brief self-report screen to detect the schizophrenia prodrome. Schizophr. Res 70, 78.

Mittal VA, Ellman LM, Strauss GP, Walker EF, Corlett PR, Schiffman J, Woods SW, Powers AR, Silverstein SM, Waltz JA, Zinbarg R, Chen S, Williams T, Kenney J, Gold JM, 2021. Computerized Assessment of Psychosis Risk. J. Psychiatry Brain Sci 6, e210011. 10.20900/jpbs.20210011

Okuzawa N, Kline E, Fuertes J, Negi S, Reeves G, Himelhoch S, Schiffman J, 2014. Psychotherapy for adolescents and young adults at high risk for psychosis: a systematic review. Early Interv. Psychiatry 8, 307–322. 10.1111/eip.12129 [PubMed: 24576077]

Pinkham AE, Harvey PD, Penn DL, 2016. Paranoid individuals with schizophrenia show greater social cognitive bias and worse social functioning than non-paranoid individuals with schizophrenia. Schizophr. Res. Cogn 3, 33–38. 10.1016/j.scog.2015.11.002 [PubMed: 27990352]

Powers AR, III, 2019. Psychotic Experiences in the General Population: Symptom Specificity and the Role of Distress and Dysfunction. JAMA Psychiatry 76, 1228–1229. 10.1001/jamapsychiatry.2019.2391 [PubMed: 31553416]

Reichert DP, Seriès P, Storkey AJ, 2013. Charles Bonnet syndrome: evidence for a generative model in the cortex? PLoS Comput. Biol 9, e1003134. 10.1371/journal.pcbi.1003134 [PubMed: 23874177]

Salazar de Pablo G, Woods SW, Drymonitou G, de Diego H, Fusar-Poli P, 2021. Prevalence of Individuals at Clinical High-Risk of Psychosis in the General Population and Clinical Samples: Systematic Review and Meta-Analysis. Brain Sci 11, 1544. 10.3390/brainsci11111544 [PubMed: 34827543]

Schiffman J, Ellman LM, Mittal VA, 2019. Individual Differences and Psychosis-Risk Screening: Practical Suggestions to Improve the Scope and Quality of Early Identification. Front. Psychiatry 10, 6. 10.3389/fpsyt.2019.00006 [PubMed: 30837898]

Silverstein SM, Demmin DL, Bednar JA, 2017. Computational Modeling of Contrast Sensitivity and Orientation Tuning in First-Episode and Chronic Schizophrenia. Comput. Psychiatry Camb. Mass 1, 102–131. 10.1162/CPSY_a_00005

Stefanis NC, Hanssen M, Smirnis NK, Avramopoulos DA, Evdokimidis IK, Stefanis CN, Verdoux H, Os JV, 2002. Evidence that three dimensions of psychosis have a distribution in the general population. Psychol. Med 32, 347–358. 10.1017/S0033291701005141 [PubMed: 11866327]

Toomey R, Kremen WS, Simpson JC, Samson JA, Seidman LJ, Lyons MJ, Faraone SV, Tsuang MT, 1997. Revisiting the factor structure for positive and negative symptoms: Evidence from a large heterogeneous group of psychiatric patients. Am. J. Psychiatry 154, 371–377. 10.1176/ajp.154.3.371 [PubMed: 9054785]

Valmaggia LR, McCrone P, Knapp M, Woolley JB, Broome MR, Tabraham P, Johns LC, Prescott C, Bramon E, Lappin J, Power P, McGuire PK, 2009. Economic impact of early intervention in people at high risk of psychosis. Psychol. Med 39, 1617. 10.1017/S0033291709005613 [PubMed: 19356258]

Veling W, Selten J-P, Mackenbach JP, Hoek HW, 2007. Symptoms at first contact for psychotic disorder: Comparison between native Dutch and ethnic minorities. Schizophr. Res 95, 30–38. 10.1016/j.schres.2007.06.024 [PubMed: 17669627]

Woods SW, Addington J, Cadenhead KS, Cannon TD, Cornblatt BA, Heinssen R, Perkins DO, Seidman LJ, Tsuang MT, Walker EF, McGlashan TH, 2009. Validity of the Prodromal Risk Syndrome for First Psychosis: Findings From the North American Prodrome Longitudinal Study. Schizophr. Bull 35, 894–908. 10.1093/schbul/sbp027 [PubMed: 19386578]

Zhang T, Xu L, Tang Y, Li H, Tang X, Cui H, Wei Y, Wang Y, Hu Q, Liu X, Li C, Lu Z, McCarley RW, Seidman LJ, Wang J, Group, on behalf of the S. (ShangHai A.R. for P.S., 2019. Prediction of psychosis in prodrome: development and validation of a simple, personalized risk calculator. Psychol. Med 49, 1990–1998. 10.1017/S0033291718002738 [PubMed: 30213278]

**Table 1.**

Demographic and descriptive data.

| | CHR (*N* = 71) | HC (*N* = 71) |
|---|---|---|
| Age, *M* (*SD*) | 18.63 (1.76) | 18.20 (2.67) |
| Sex, % Female | 41% | 56% |
| Race, % | | |
| First Nations | 4% | 0% |
| East Asian | 4% | 7% |
| Southeast Asian | 0% | 3% |
| Black | 1% | 3% |
| Central/South American | 15% | 20% |
| West/Central Asia & Middle East | 1% | 3% |
| White | 69% | 62% |
| Interracial | 4% | 3% |
| Hispanic, % | 21% | 23% |
| Household Income | | |
| < $10,000 | 7% | 16% |
| $10,000–19,999 | 3% | 1% |
| $20,000–39,999 | 19% | 17% |
| $40,000–59,999 | 1% | 3% |
| $60,000–99,999 | 16% | 14% |
| $100,000 and above | 35% | 34% |
| Unsure/Refused to answer | 19% | 14% |
| SIPS Positive Total, *M* (*SD*) | 11.93 (4.54) | 0.46 (1.05) |
| P1: Unusual Thought Content | 3.31 (1.20) | 0.08 (0.33) |
| P2: Suspiciousness | 2.61 (1.66) | 0.15 (0.36) |
| P3: Grandiose Ideas | 1.55 (1.54) | 0.08 (0.33) |
| P4: Perceptual Abnormalities | 2.69 (1.41) | 0.08 (0.33) |
| P5: Disorganized Communication | 1.77 (1.48) | 0.06 (0.23) |
| Internalizing Disorder | 49% | 0% |
| Externalizing Disorder | 28% | 1% |

*Note*. CHR = Clinical high risk for psychosis. HC = Healthy control. Internalizing and externalizing disorder percentages reflect the presence of any disorder in that category.

**Table 2.**

Positive symptom interview and questionnaire data

| | CHR | | | HC | | | |
|---|---|---|---|---|---|---|---|
| **Measure** | **M** | **SD** | **α** | **M** | **SD** | **α** | ***d* [95% CI]** |
| LSHS-R total | 21.05 | 10.22 | .86 | 6.23 | 6.43 | .84 | −1.75 [−2.18, −1.31] |
| PQB total | 10.35 | 5.29 | .86 | 1.80 | 2.27 | .69 | −2.11 [−2.59, −1.63] |
| PQB distress | 34.39 | 20.61 | .89 | 3.70 | 6.24 | .79 | −2.02 [−2.51, −1.53] |
| PQB perceptual | 2.56 | 1.86 | .71 | 0.36 | 0.71 | .48 | −1.57 [−1.98, −1.14] |
| PQB suspicious/thought | 2.66 | 1.38 | .73 | 0.52 | 0.85 | .57 | −1.87 [−2.32, −1.41] |
| PQB grandiose/unusual | 0.90 | 1.15 | .60 | 0.17 | 0.38 | .09 | −0.85 [−1.21, −0.49] |
| CAPE total | 13.76 | 7.86 | .89 | 4.43 | 3.59 | .87 | −1.54 [−1.96, −1.11] |
| CAPE distress | 18.88 | 12.06 | .92 | 5.51 | 5.12 | .91 | −1.45 [−1.86, −1.04] |
| CAPE perceptual | 1.49 | 1.92 | .83 | 0.07 | 0.31 | .56 | −1.05 [−1.42, −0.67] |
| CAPE suspicious | 4.72 | 2.44 | .68 | 1.82 | 1.73 | .70 | −1.38 [−1.78, −0.98] |
| CAPE bizarre | 3.39 | 2.92 | .67 | 0.73 | 1.04 | .47 | −1.22 [−1.61, −0.83] |

*Note*. Cronbach's alpha is affected by low variability for scale items (e.g., CAPE perceptual in HC).

**Table 3.**

Questionnaire intercorrelations in CHR participants

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. LSHS-R total | | | | | | | | | | |
| 2. PQB total | .65** | | | | | | | | | |
| | [.49, .77] | | | | | | | | | |
| 3. PQB distress | .63** | .91** | | | | | | | | |
| | [.45, .76] | [.86, .95] | | | | | | | | |
| 4. PQB perceptual | .62** | .77** | .71** | | | | | | | |
| | [.45, .75] | [.65, .85] | [.57, .81] | | | | | | | |
| 5. PQB suspicious/thought | .35** | .73** | .71** | .37** | | | | | | |
| | [.13, .54] | [.60, .83] | [.56, .81] | [.15, .56] | | | | | | |
| 6. PQB grandiose/unusual | .33** | .64** | .53** | .42** | .22 | | | | | |
| | [.10, .52] | [.47, .76] | [.33, .69] | [.21, .60] | [−.01, .43] | | | | | |
| 7. CAPE total | .59** | .68** | .68** | .47** | .40** | .57** | | | | |
| | [.42, .73] | [.52, .79] | [.52, .79] | [.27, .64] | [.18, .59] | [.39, .71] | | | | |
| 8. CAPE distress | .53** | .60** | .67** | .42** | .38** | .51** | .85** | | | |
| | [.33, .68] | [.42, .73] | [.51, .79] | [.21, .60] | [.16, .57] | [.32, .67] | [.76, .90] | | | |
| 9. CAPE perceptual | .64** | .41** | .40** | .49** | .23 | .20 | .48** | .43** | | |
| | [.48, .76] | [.19, .59] | [.17, .58] | [.29, .65] | [−.01, .44] | [−.03, .42] | [.27, .64] | [.22, .61] | | |
| 10. CAPE suspicious | .35** | .59** | .63** | .27* | .49** | .49** | .74** | .70** | .26* | |
| | [.13, .54] | [.41, .72] | [.46, .76] | [.04, .47] | [.29, .65] | [.29, .65] | [.61, .83] | [.56, .81] | [.02, .46] | |
| 11. CAPE bizarre | .52** | .55** | .54** | .43** | .27* | .37** | .84** | .70** | .32** | .47** |
| | [.32, .67] | [.36, .69] | [.34, .69] | [.22, .61] | [.03, .47] | [.15, .56] | [.75, .90] | [.55, .80] | [.09, .52] | [.26, .63] |

*Note*. Correlations between scales measuring similar constructs are underlined. Values in brackets indicate 95% CIs for each correlation.

* $p < .05$.

** $p < .01$.

**Table 4.**

Correlations with SIPS Positive Symptoms in CHR participants

| Variable | P Total | P1 | P2 | P3 | P4 | P5 | NAPLS-RC | SHARP-RC |
|---|---|---|---|---|---|---|---|---|
| LSHS-R total | .23 | .15 | .18 | .07 | .36** | −.03 | −.15 | .17 |
| | [−.01, .44] | [−.08, .37] | [−.06, .39] | [−.17, .30] | [.13, .54] | [−.26, .20] | [−.37, .09] | [−.07, .39] |
| PQB total | .48** | .39** | .20 | .15 | .50** | .28* | .01 | .22 |
| | [.27, .64] | [.17, .57] | [−.03, .42] | [−.08, .37] | [.31, .66] | [.05, .48] | [−.23, .24] | [−.02, .43] |
| PQB distress | .46** | .43** | .18 | .16 | .45** | .26* | .11 | .24 |
| | [.25, .64] | [.21, .61] | [−.06, .41] | [−.09, .39] | [.24, .63] | [.02, .47] | [−.14, .35] | [−.01, .46] |
| PQB perceptual | .35** | .27* | .10 | .05 | .49** | .21 | −.12 | .18 |
| | [.13, .54] | [.03, .47] | [−.13, .33] | [−.19, .28] | [.29, .65] | [−.02, .43] | [−.35, .13] | [−.06, .40] |
| PQB suspicious/thought | .39** | .33** | .33** | −.05 | .46** | .14 | .17 | .11 |
| | [.17, .57] | [.10, .53] | [.10, .52] | [−.28, .18] | [.25, .63] | [−.10, .37] | [−.08, .39] | [−.13, .34] |
| PQB grandiose/unusual | .36** | .23 | .04 | .39** | .25* | .21 | −.12 | .20 |
| | [.13, .54] | [−.00, .44] | [−.20, .27] | [.17, .57] | [.02, .46] | [−.02, .43] | [−.35, .12] | [−.04, .42] |
| CAPE total | .31** | .32** | .05 | .25* | .29* | .10 | −.15 | .13 |
| | [.08, .51] | [.09, .52] | [−.19, .28] | [.01, .46] | [.06, .50] | [−.14, .33] | [−.38, .09] | [−.11, .36] |
| CAPE distress | .31** | .34** | .13 | .18 | .22 | .15 | −.08 | .05 |
| | [.08, .51] | [.11, .53] | [−.11, .36] | [−.06, .40] | [−.02, .43] | [−.08, .38] | [−.31, .17] | [−.19, .29] |
| CAPE perceptual | .21 | .09 | .13 | .02 | .42** | .02 | −.09 | .01 |
| | [−.02, .43] | [−.15, .32] | [−.11, .35] | [−.22, .25] | [.21, .60] | [−.22, .25] | [−.32, .15] | [−.23, .25] |
| CAPE suspicious | .48** | .42** | .22 | .33** | .32** | .23 | .13 | .03 |
| | [.27, .64] | [.21, .60] | [−.02, .43] | [.11, .52] | [.09, .51] | [−.01, .44] | [−.11, .36] | [−.21, .27] |
| CAPE bizarre | .10 | .13 | −.13 | .12 | .13 | .10 | −.23 | .08 |
| | [−.14, .33] | [−.11, .35] | [−.35, .11] | [−.12, .34] | [−.11, .36] | [−.14, .33] | [−.45, .01] | [−.17, .31] |

*Note*. Underlined correlations indicate similar constructs. Values in brackets indicate 95% CIs.

* $p < .05$.

** $p < .01$.

**Table 5.**

Correlations with internalizing and externalizing psychopathology

| Variable | SIAS | BDI-II | INT | EXT |
|---|---|---|---|---|
| LSHS-R total | .18 | .24 | .20 | .14 |
| | [−.06, .40] | [−.00, .45] | [−.04, .42] | [−.10, .36] |
| PQB total | .30* | .41** | .25* | .08 |
| | [.07, .50] | [.19, .59] | [.02, .46] | [−.16, .31] |
| PQB distress | .42** | .52** | .31* | .09 |
| | [.19, .60] | [.31, .68] | [.07, .51] | [−.16, .33] |
| PQB perceptual | .10 | .12 | .23 | −.09 |
| | [−.14, .33] | [−.12, .35] | [−.00, .45] | [−.32, .15] |
| PQB suspicious/thought | .45** | .50** | .21 | −.04 |
| | [.23, .62] | [.30, .66] | [−.03, .42] | [−.28, .19] |
| PQB grandiose/unusual | −.05 | .07 | −.11 | .17 |
| | [−.28, .19] | [−.17, .30] | [−.33, .13] | [−.07, .39] |
| CAPE total | .04 | .09 | .10 | .13 |
| | [−.20, .28] | [−.15, .32] | [−.15, .33] | [−.11, .36] |
| CAPE distress | .10 | .17 | .06 | .04 |
| | [−.14, .33] | [−.07, .39] | [−.18, .30] | [−.20, .27] |
| CAPE perceptual | .02 | .14 | .22 | −.02 |
| | [−.22, .26] | [−.10, .36] | [−.02, .44] | [−.26, .22] |
| CAPE suspicious | .23 | .43** | .17 | .10 |
| | [−.01, .44] | [.22, .61] | [−.07, .39] | [−.14, .33] |
| CAPE bizarre | .03 | .03 | .08 | .15 |
| | [−.21, .27] | [−.21, .27] | [−.16, .31] | [−.09, .37] |

*Note*. INT = internalizing diagnosis present (0–1). EXT = externalizing diagnosis present (0–1). Values in brackets indicate 95% CIs for each correlation.

* indicates $p < .05$.

** indicates $p < .01$.