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Convergent and discriminant validity of attenuated psychosis screening tools

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ABSTRACT

Brief self-report questionnaires that assess attenuated psychotic symptoms have the potential to screen many people who may benefit from clinical monitoring, further evaluation, or early intervention. The extent to which recently developed screening instruments demonstrate sound psychometric properties is an important issue toward the implementation of these measures in clinical practice. This study examines the convergent validity, discriminant validity, and test–retest reliability of four recently developed screening instruments. Screening instruments were included in an assessment battery and administered to a sample of 355 college students. Screening scores support the convergent and discriminant validity and the test–retest reliability of these measures.

1. Introduction

Brief screening instruments for the 'Attenuated Psychosis Syndrome' (APS) have the potential to be an important piece of more comprehensive psychosis risk identification efforts. Researchers have developed several self-report screening instruments for assessing psychosis risk states (e.g., Heinimaa et al., 2003; Miller et al., 2003; Ord et al., 2004; Loewy and Cannon, 2010). Items contained in these measures represent attenuated symptom constructs associated with psychosis risk such as unusual perceptions and sensations, ideas of reference, affective changes, superstitious beliefs, or abnormally suspicious thoughts.

The extent to which these screening instruments specifically tap APS symptoms relative to general psychopathology is an important issue in the validation of these instruments for clinical use. APS may share many clinical characteristics with non-psychotic mental disorders. Relatively non-specific constructs associated with APS such as social disengagement, constricted or dysthymic mood, anxiety, or attention problems may be less useful for screening purposes, as these symptoms also characterize non-psychotic mental health problems.

This study aims to demonstrate the convergent and discriminant validity and the test–retest reliability of four recently developed screening instruments for APS symptoms (Prime Screen—Revised, Prodromal Questionnaire—Brief, Youth Psychosis At-Risk Questionnaire—Brief, and PROD Screen). We hypothesize that correlations among screening tools designed to assess APS will be higher than correlations of screening scores with established measures of less related constructs.

2. Method

2.1. Materials

All participants completed a demographics form and 11 questionnaires (see Tables 1 and 2). Measures were numbered and entered into an algorithm (Bradley, 1958) to generate a balanced Latin square design to assess for ordering effects.

2.2. Procedure

This study was approved by the University of Maryland, Baltimore County (UMBC) Institutional Review Board. Participants (N = 355) were recruited from UMBC introductory psychology courses from November 2010 to May 2011. Participants who consented to follow-up (n = 88) re-completed the battery two weeks after initial participation. Participants were excluded from the final analysis pool if they endorsed three or more responses in the unexpected direction on the Chapman Infrequency Scale[1] (n = 27).

[1] CIS item 3 was not used toward exclusion due to high rates (32%) of endorsement in the current sample.

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Table 1
APS screening instruments.

Prodromal Questionnaire—Brief (PQ-B)	21-item questionnaire examining attenuated positive symptoms and associated distress. Items are answered true/false and also contain 'distress scores' which rate a respondent's level of concern with regard to each item on a scale of one ('strongly disagree') to five ('strongly agree'). In a clinical validation sample, the authors found sensitivity of 0.88, specificity of 0.68, positive predictive value of 0.95, and negative predictive value of 0.65 with regard to SIPS (Miller et al., 2003) diagnosis (Loewy et al., 2011).
Youth Psychosis At-Risk Questionnaire—Brief (YPARQ-B)	28-item self-report questionnaire examining primarily attenuated positive symptoms associated with psychosis risk. Response options for each item are "yes," "no," and "undecided." Authors (Ord et al., 2004) reported sensitivity of 0.98 and a positive predictive value of 0.82 with regard to CAARMS diagnosis in a validation sample of high-risk youth.
Prime Screen—Revised	12-item questionnaire similar in content and structure to positive symptom items within the SIPS. Items provide examples of attenuated positive symptoms, and participants select from seven Likert-style responses (e.g., "definitely disagree," "definitely agree"). Authors reported sensitivity of 0.90 and perfect specificity in a small validation sample with regard to SIPS diagnosis (Miller et al., 2004).
PROD Screen	21-item questionnaire assessing symptoms present over the past year, with responses indicated with a "yes" or "no" answer. Items reflect several areas of functioning (positive, negative, disorganized, general, specific, and basic symptoms). The PROD demonstrated acceptable sensitivity and specificity and a positive predictive value of 0.57 in a validation sample (Heinimaa et al., 2003).

2.3. Statistical analyses

Descriptive statistics for all measures were obtained to ensure acceptable normality of score distribution. To examine convergent and divergent validity of the screening tools, we generated a Pearson correlation matrix that included the time 1 scores of participants on all measures. This matrix allows for the observation of general patterns of relations between all measures. Pearson product moment correlations were used as the data were found to have acceptable distributional properties.

To examine the strength of the relationship between each screening tool with other screeners assessing the same construct, we obtained the 'average' correlation of each screener with the class of APS screening tools. This 'average' correlation was calculated by transforming each inter-screener correlation using Fisher's z transformation (Cohen et al., 2003). Z scores representing each screener's correlation with the other three screeners were summed to obtain the mean score, then back-transformed to a value representing the 'average r' for that screening tool (Silver and Dunlap, 1987; Corey et al., 1998). Differences between average correlations were tested using a modification of Fisher's z for dependent samples (Dunn and Clark, 1969; Meng et al., 1992). This process was repeated to examine the strength of each screener's relation with other screeners as a class relative to non-APS measures.

Test–retest reliability coefficients were computed by calculating Pearson correlations between time 1 and time 2 scores on all measures. The same procedures described above were used to obtain an 'average' test–retest correlation for all measures and to test for significant differences between each screener's test–retest coefficient and the 'average.' Missing data accounted for less than 5% of data and was excluded list-wise per analysis. Correlation analyses were conducted using SPSS 19.0.

3. Results

The average age of participants was 20.5 years (SD = 2.9 years); 52.5% was female. The sample was ethnically diverse (39.0% Caucasian, 17.4% Black/African American, 29.9% Asian, 13.7% Mixed or 'Other'). All measures including APS screeners demonstrated acceptable normality (Curran et al., 1996). Means, medians, standard deviations, skewness, and kurtosis of APS screeners are displayed in Table 3.

Table 4 displays the Pearson correlations between all measures at time 1 (N = 328). APS screeners correlated highly with one another (r = .51–.77). Correlations between APS screeners and measures of other constructs ranged from non-significant to large, showing a pattern of convergent and discriminant validity. APS screeners also correlated highly with the SPQ-B. Among the SPQ-B subscales, APS screeners as a group were statistically more related to the cognitive–perceptual (r = .53) and disorganization (r = .50) subscales than to the interpersonal subscale (r = .29) (APS screeners with SPQ-cog vs. APS screeners with SPQ-disorg., z = .566, p = NS; APS screeners with SPQ-cog. vs. APS screeners with SPQ-interpers., z = 4.242, p < .001; APS screeners with SPQ-disorg. vs. APS screeners with SPQ-interpers., z = 3.876, p < .001).

Table 5 displays the 'average' correlations representing each screener's degree of relatedness to the other three screeners as a group, as well as to non-APS measures of psychopathology including the BAI, BDI, CAARS, and EDE. Comparisons of each APS measure's average correlation with other APS screeners relative to it's average correlation with non-APS measures of psychopathology yielded significant test results for all four APS measures (see Table 4). The average correlations of the YPARQ-B (.65), PQ-B (.64), and Prime (.62) with the other APS screeners all significantly differed from the average correlation of the PROD with the other APS screeners (.55) (z = 3.225, p = .001; z = 2.954, p = .002; z = 2.209, p = .01 respectively). Differences between the YPARQ-B, PQ-B, and Prime average correlations with other APS screeners were non-significant.

Test–retest coefficients for all measures are displayed in Table 6. All test–retest coefficients were large and significant. The PROD reliability coefficient was the lowest of the group and was significantly lower than the average reliability coefficient across all measures (r_{avg} = .81) (z = −2.26, p = .043).

Table 2
Non-APS measures.

Schizotypal Personality Questionnaire—Brief Version (SPQ-B, 22 items; Raine and Benishay, 1995)
Beck Depression Inventory, second edition (BDI, 21 items; Beck et al., 1996)
Beck Anxiety Inventory (BAI, 21 items; Beck et al., 1988)
Conners Adult ADHD Rating Scale—Self Report, Short Version (CAARS, 26 items; Conners et al., 1999)
Eating Disorder Examination Questionnaire (EDE, 28 items; Fairburn and Beglin, 2008)
Behavioral Regulation in Exercise Questionnaire, second edition (BREQ, 19 items; Markland and Tobin, 2004)
Chapman Infrequency scale (Chapman and Chapman, 1983)

See cited articles for more detailed information about each measure.

4. Discussion

4.1. Convergent and discriminant validity

The pattern of correlations displayed in Table 4 demonstrates evidence of convergent and discriminant validity for the APS screening

Table 3
Distribution of APS screeners.

Screener	Mean	Median	Standard deviation	Range	Skewness	Kurtosis
PQ-B	13.26	9.00	13.83	0–71	1.42	2.08
YPARQ-B	3.87	3.00	4.11	0–20	1.41	1.76
Prime	12.25	8.00	13.01	0–59	1.03	0.12
PROD	3.29	3.00	2.61	0–12	0.76	0.09

PQ-B = Prodromal Questionnaire—Brief; YPARQ-B = Youth Psychosis At Risk Questionnaire—Brief; Prime = Prime Screen—Revised; PROD = PROD Screen.