Personality and Social Sciences

Premorbid personality indicators of schizophrenia-related psychosis in a hypothetically psychosis-prone college sample

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Research into psychosis proneness has established the Chapman Psychosis Proneness Scales (CPPS), certain personality disorders, certain response patterns on the MMPI-2, and social withdrawal as being valid indicators of liability. The current study extends our understanding of premorbid indicators of schizophrenia-related psychosis (SRP) by examining whether individuals identified as hypothetically psychosis prone (HPP) by virtue of their CPPS scores also show differences on other premorbid indicators of SRP. Results indicate that HPP individuals evidence more deviancy in the schizophrenic direction. By providing additional construct validity for the CPPS and other endophenotypic indicators of premorbid processes, strategies for understanding the development of SRP are enhanced.

Key words: Schizotypy, MMPI-2, PDQ-4, endophenotypes, psychometric high risk, Chapman scales.

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INTRODUCTION

Results from decades of adoption, twin, and family studies have demonstrated that liability to schizophrenia is genetically mediated, although expression of the disorder is mediated by non-genetic factors. Among the key attributes of a multifactorial/threshold model of schizophrenia development is the assumption that the majority of individuals with increased liability to schizophrenia will not decompensate into psychosis, although they may experience schizotypal symptoms (Lenzenweger, 2006) or neurobehavioral deficits (Cornblatt, Obuchowski, Roberts, Pollack & Erlenmeyer-Kimling, 1999). This model also suggests that as risk factors for the disorder accumulate so too does psychiatric deviance. Thus, researchers consider the presence of endophenotypes, or intermediate markers of schizophrenia, as evidence of increased risk for the disorder (Braff, Freedman, Schork & Gottesman, 2007; Cannon & Keller, 2006). As suggested by the model, many of these endophenotypes are genetically influenced, but others result from prenatal factors (Geddes, Verdoux, Takei et al., 1999; McGrath, 1995; Takei, Os & Murray, 1995).

One endophenotype associated with the schizophrenia development is premorbid personality dysfunction. Among the measures suggested to assess personality dysfunction indicative of schizophrenia development are the Chapman Psychosis Proneness Scales (CPPS) and various subscales on the MMPI-2. Evidence for each of these measures as an indicator of liability to schizophrenia-related disorders is reviewed below.

Chapman Psychosis Proneness Scales

Among the measures found to be effective in identifying psychosis prone individuals are the CPPS, which include the Revised Physical Anhedonia Scale (PhysAnh; Chapman, Chapman & Raulin, 1976), the Perceptual Aberration Scale (PerAb; Chapman, Chapman & Raulin, 1978), the Magical Ideation Scale (MagIId; Eckblad & Chapman, 1983), and the Revised Social Anhedonia Scale (SocAnh; Eckblad, Chapman, Chapman & Mishlove, 1982). Studies have found higher incidence of schizophrenia-related psychosis among individuals identified as psychosis prone on the basis of CPPS scores relative to comparison groups at ten-year follow-up (Chapman, Chapman, Kwapiil, Eckblad & Zinser, 1994; Kwapiil, 1998), as well as more frequent and severe psychotic-like experiences at five-year follow-up (Gooding, Tallent & Mats, 2005). Likewise, a noted feature in the personalities of individuals in the prodromal phases of schizophrenia is social withdrawal; recently, Kwapiil, Barrantes-Vidal, and Silvia (2007) have found that individuals high in the negative dimension of schizotypy, as measured by the CPPS, are less likely to be involved in intimate relationships than individuals who do not score high on this dimension. Thus, the CPPS show promise in their abilities to identify hypothetically psychosis prone individuals well before the onset of a clinically significant disorder.

MMPI indicators of schizophrenia liability

Among the first efforts to delineate MMPI indicators of schizophrenia liability were those of Moldin and colleagues (Moldin,
Gottesman, Erlenmeyer-Kimling & Cornblatt, 1990a; Moldin, Rice, Gottesman & Erlenmeyer-Kimling, 1990b) who developed an index of 13 standard and supplementary MMPI scales. This index was initially found to be successful at discriminating behaviorally deviant individuals at high genetic risk to schizophrenia from non-deviant individuals also at increased genetic risk for the development of the disorder.

Several following studies (e.g., Bolinskey, Gottesman, Nichols et al., 2001; Bolinskey, Gottesman & Nichols, 2003; Carter, Parmas, Cannon, Schulsinger & Mednick, 1999) have incorporated prospective designs to determine MMPI-determined personality characteristics predictive of future schizophrenia. Bolinskey et al. (2001) incorporated a prospective, high-risk paradigm to re-examine the predictive power of the indicators in the Moldin index using SADS-derived (Spitzer & Endicott, 1978) Axis I diagnoses as the basis for criterion group membership. Results suggested that eight MMPI scales (L, Lie Scale; K, Defensiveness/Correction Scale; 2780, a linear combination of the Depression, Psychasthenia, Schizophrenia, and Social Introversion scales, respectively (Golden & Meehl, 1979); SOC, PSY, PHO, Wiggins’ (1966) Social Maladjustment, Psychoticism, and Phobias Content Scales; Gilberstadt and Gottesman’s 8-6 scale (Minnesota Veterans Administration Hospital, 1975), and SzP, Schizophrenia Proneness (Bolinskey et al., 2003)) were the most effective indicators of future onset of schizophrenia-related psychosis. Likewise, Carter et al. (1999) found evidence for the power of five scales in the Moldin index (F, Infrequency Scale; L, 2780, P2, Rosen’s (1962) Paranoid Schizophrenia Scale; and PHO) to separate individuals who later developed schizophrenia from those who developed no psychopathology. More recent evidence of the ability of some of these scales to identify personality features associated with risk for schizophrenia has been offered by Siira, Wahlberg, Miettunen, Läkys, and Tienari (2004).

Each of the previous studies incorporated the original MMPI, rather than the current version of the instrument (MMPI-2; Butcher, Dahlstrom, Graham, Tellegen & Kaemmer, 1989). It is possible that the inclusion of newer MMPI-2 scales, such as the Fears (FRS) and Bizarre Mentation (BIZ) Content Scales, and the Psychoticism (PSYC; Harkness, McNulty & Ben-Porath, 1995) Personality-Psychopathology 5 scale, might increase predictive power. To date, no prospective high-risk-for-SRP designs have incorporated MMPI-2 assessment in their early stages.

**Personality disturbance**

Family studies of schizophrenia have indicated a relationship between schizophrenia and personality disorders, such as schizotypal personality disorder (Kendler, McGuire, Grueenberg, O’Hare, Spellman & Walsh, 1993). Certain personality disorders have also been found to be present in the prodromal phase of schizophrenia. Indeed, the “Cluster A” disorders (Schizotypal, Paranoid, and Schizoid) are viewed as being related to schizophrenia. Research, however, has suggested that avoidant personality disorder be included in this group of schizophrenia-related personality disorders. For example, Solano and de Chávez (2000) found that 85% of their sample of patients with schizophrenia had premorbid personality disorders. Of these disorders, avoidant (32.5%), schizoid (27.5%), paranoid (20%), dependent (20%), and schizotypal (12.5%) were the most common. More recently, Fogelson, Nuechterlein, and Asarnow (2007) have offered further evidence that avoidant personality disorder be considered as a schizophrenia spectrum disorder, by finding that avoidant personality disorder is an indicator of liability to schizophrenia even after statistically accounting for paranoid and schizotypal personality disorders. Gooding, Tallent, and Matts (2007) have concurred with that finding.

**Current study**

For the present study, hypothetically psychosis prone (HPP) participants were compared to a matched comparison (MC) sample to determine if there are group differences in several measures associated with psychosis proneness. Specifically, we hypothesized the following: (a) there would be group differences on specific MMPI-2 scores, with the HPP group scoring in the more deviant direction; (b) there would be higher endorsement of symptoms of personality disorders within the schizophrenia-related spectrum (i.e., paranoid personality disorder, schizotypal personality disorder, schizoid personality disorder, avoidant personality disorder) among members of HPP group as compared to the MC group; (c) the HPP group would more frequently endorse history of treatment for mental illness than would the MC group; and (d) the HPP group would be less likely than the MC group to have ever been involved in an intimate romantic relationship.

**METHODS**

**Participants**

*Initial participant pool.* Participants were drawn from a sample of 322 (120 males, 202 females) college students between the ages of 18 and 24 years who received course credits for their participation. For inclusion in the final sample, participants’ responses had to meet several validity criteria for the MMPI-2, the CPPS, and the PDQ-IV. Validity criteria for the CPPS and PDQ-IV were taken from the respective manuals for each instrument and consisted of endorsement of less than three items on each of the PPQ Infrequency scale, less than two items on the Too Good scale of the PDQ-IV, and a score of zero on the Suspect Questionnaire scale of the PDQ-IV; these criteria excluded 31 participants. Use of MMPI-2 validity criteria for such a study presents somewhat of a dilemma, as a common problem when examining MMPI-2 profiles is that of separating those profiles that reflect true psychiatric deviance from those that reflect psychometric “noise.” The use of a strict set of exclusion criteria may allow enough noise into the analyses to mask genuine signals. In an effort to maintain consistency with prior, similar studies (cf. Bolinskey et al., 2001; Moldin et al., 1990a), we adopted a moderate set of exclusion criteria to examine the profile validity of the MMPI-2 profiles in the current study; these criteria consisted of TRIN ≤ 13, TRIN > 5 and < 13, F ≤ 30, Fb < 20, Fp T score < 120, Cannot

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Table 1. Normative data (means, standard deviations, and reliability estimates) for Chapman Psychosis Proneness Scales by gender

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSS Scale</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>PhyAnh</td>
<td>13.71 (6.80)</td>
<td>9.26 (5.24)</td>
</tr>
<tr>
<td>PerAb</td>
<td>6.87 (6.06)</td>
<td>3.86 (3.49)</td>
</tr>
<tr>
<td>MagId</td>
<td>9.73 (5.83)</td>
<td>11.43 (3.52)</td>
</tr>
<tr>
<td>SocAnh</td>
<td>8.91 (5.12)</td>
<td>18.49 (8.68)</td>
</tr>
</tbody>
</table>

Note: PhyAnh = Revised Physical Anhedonia Scale (Chapman et al., 1976); PerAb = Perceptual Aberration Scale (Chapman et al., 1978); MagId = Magical Ideation Scale (Eckblad & Chapman, 1983); and SocAnh = Revised Social Anhedonia Scale (Eckblad et al., 1982). The norms are based upon Caucasian undergraduate students at the University of Wisconsin-Madison and the table provides separate norms for males and females. Cutoff scores are 1.96 standard deviations above the mean. Subjects are considered deviant on a particular measure if their score is equal to or greater than the cutoff score.

PDQ-4. The PDQ-4 (Hyler, 1994) is a 99-item questionnaire that screens for the presence of DSM-IV personality disorders. The questionnaire consists of first-person statements referring to emotions/behaviors that the examinee may have experienced/evidenced consistently over the past several years to which an examinee responds "True" or "False." The PDQ-4 has been shown to be both reliable and valid (Dubre, Wetzler & Kahn, 1988; Hyler, Skodol, Kellman, Oldham & Rosnick, 1990), although there is evidence (Whyte, Fox & Coxell, 2006) that respondents may over-report personality disorder symptomology. Given the possibility of over-reporting on the PDQ-4, diagnostic suggestions from the measure were not included in our analyses. Rather, scores from each PD subscale of the PDQ-4 served as proxies for the experience of symptoms similar to those an individual with particular personality disorders might experience. Scales included in the present study assessed paranoid, schizoid, schizotypal, and avoidant symptomology. PDQ-4 data were not available for two members of the MC group.

Questionnaire. Participants also completed a questionnaire that asked for demographic information, information regarding personal relationships, mental health history of the respondent, and mental health history of the respondent's family. Variables included in the present study were personal romantic relationships history and personal mental health history.

Data collection. All data was gathered in a single assessment session. Completion times ranged from 1.5 hours to 2.75 hours. All participants were allowed to take breaks as necessary, with the caveat that they were not to discuss the assessment procedures with their fellow participants.

Statistical analyses

MMPI-2 analyses. MANOVA incorporated the 15 MMPI-2 scales as the dependent variables and group (HPP vs. MC) as the dependent variable. This multivariate test was followed by ANOVA for each MMPI-2 subscale with group (HPP vs. MC) as the dependent variable and group (HPP vs. MC) as the independent variable. The Bonferroni adjustment of \( p = 0.0033 \) was incorporated into significance estimations to account for the 15 separate analyses and effect sizes (\( \eta^2 \)) were calculated for each comparison.

PDQ-4 analyses. Differences on the PDQ-4 were analyzed through MANOVA, incorporating the four personality disorder scales as the dependent variables and group (HPP vs. MC) as the independent variable. The multivariate test was followed by ANOVA for each PDQ-4 subscale, incorporating a Bonferroni adjustment of \( p = 0.0125 \).

Additional analyses. We also examined group differences in history of romantic relationship as well as history of treatment for mental illness. These analyses were carried out using a \( \chi^2 \) test of independence. Odds ratios and effect sizes (Cramer's \( \phi \)) were calculated for each comparison.
of the 51 HPP participants, 14 accounted for by group membership. Table 3 displays mean scores on endor-
ses of personality disorder-related scale scores can be 0.80, indicating that 20% of the combined variance in the MMPI-2 Scale HPP (individuals. The MANOVA for the number of schizophrenia-related psychosis was significant, \( \chi^2(1) = 3.980, p = 0.046 \), Cramer’s \( \phi = 0.20 \). The observed odds ratio for lack of significant relationship by group was 2.84 (95% CI = 0.99 to 8.12).

Participants were also asked if they or anyone in their family had received treatment for various forms of mental illness (e.g., SRP, depression, mania, AD/HD, etc.). Given the relatively low endorsement rates for the individual questions, data for each of these questions was combined into a single variable of treatment for any form of mental illness. Of the 51 HPP participants, 8 reported that they had received mental health treatment, whereas only 2 of 51 MC participants reported that they had received such treatment. This difference in the likelihood to have received treatment for mental illness was significant, \( \chi^2(1) = 3.991, p = 0.046 \), Cramer’s \( \phi = 0.20 \). The observed odds ratio for treatment by group was 4.56 (95% CI = 0.92 to 22.64). Although rates of mental health treatment for family members was not specifically addressed in the current study, it bears noting that no participant endorsed any family history of SRP.

### Table 2. Means and standard deviations for selected MMPI-2 scale raw scores with associated F values and effect sizes

<table>
<thead>
<tr>
<th>MMPI-2 Scale</th>
<th>HPP (SD)</th>
<th>MC (SD)</th>
<th>F</th>
<th>( \eta^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>9.14 (5.67)</td>
<td>6.10 (4.37)</td>
<td>9.18***</td>
<td>0.08</td>
</tr>
<tr>
<td>Fb</td>
<td>6.04 (5.11)</td>
<td>3.86 (3.49)</td>
<td>6.31*</td>
<td>0.06</td>
</tr>
<tr>
<td>Scale 6</td>
<td>12.35 (4.54)</td>
<td>11.43 (3.52)</td>
<td>1.31</td>
<td>0.01</td>
</tr>
<tr>
<td>Scale 8</td>
<td>23.73 (12.32)</td>
<td>18.49 (8.68)</td>
<td>6.15*</td>
<td>0.06</td>
</tr>
<tr>
<td>2780</td>
<td>123.80 (25.23)</td>
<td>106.61 (20.58)</td>
<td>14.23***</td>
<td>0.12</td>
</tr>
<tr>
<td>FRS</td>
<td>7.06 (4.08)</td>
<td>5.63 (3.46)</td>
<td>3.65</td>
<td>0.04</td>
</tr>
<tr>
<td>Biz</td>
<td>5.29 (4.58)</td>
<td>4.76 (3.65)</td>
<td>0.42</td>
<td>0.00</td>
</tr>
<tr>
<td>Cyn</td>
<td>15.08 (4.10)</td>
<td>12.63 (4.64)</td>
<td>7.99**</td>
<td>0.07</td>
</tr>
<tr>
<td>PsyC</td>
<td>7.41 (4.36)</td>
<td>5.71 (3.05)</td>
<td>5.23*</td>
<td>0.05</td>
</tr>
<tr>
<td>Sp</td>
<td>11.12 (3.80)</td>
<td>9.49 (2.91)</td>
<td>5.89*</td>
<td>0.06</td>
</tr>
<tr>
<td>Par</td>
<td>5.65 (2.77)</td>
<td>4.65 (2.27)</td>
<td>3.98*</td>
<td>0.04</td>
</tr>
<tr>
<td>Sty</td>
<td>5.37 (2.86)</td>
<td>3.80 (2.03)</td>
<td>10.19**</td>
<td>0.09</td>
</tr>
<tr>
<td>Avd</td>
<td>7.29 (3.13)</td>
<td>5.55 (2.77)</td>
<td>8.87**</td>
<td>0.08</td>
</tr>
<tr>
<td>Sdz</td>
<td>3.73 (2.45)</td>
<td>2.10 (1.81)</td>
<td>14.53***</td>
<td>0.13</td>
</tr>
<tr>
<td>Rc8</td>
<td>4.73 (4.34)</td>
<td>4.00 (3.54)</td>
<td>0.86</td>
<td>0.01</td>
</tr>
</tbody>
</table>

**Note:** Scores for MMPI-2 scales 7 and 8 are non-K corrected. HPP = hypothetically psychosis prone sample; MC = matched comparison sample. 2780 is a linear combination of MMPI-2 scales 2, 7, 8, and 0. * \( p < 0.05, \) ** \( p < 0.01, \) *** \( p < 0.003. \) N for each group = 51.

### Table 3. Means and standard deviations for item endorsement on selected PDQ-4 scales with associated F values and effect sizes

<table>
<thead>
<tr>
<th>PDQ-4 Scale</th>
<th>HPP (SD)</th>
<th>MC (SD)</th>
<th>F</th>
<th>( \eta^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paranoid PD</td>
<td>4.00 (1.66)</td>
<td>2.96 (1.67)</td>
<td>9.76**</td>
<td>0.09</td>
</tr>
<tr>
<td>Schizoid PD</td>
<td>1.76 (1.72)</td>
<td>1.06 (0.94)</td>
<td>6.38**</td>
<td>0.06</td>
</tr>
<tr>
<td>Avoidant PD</td>
<td>3.96 (1.90)</td>
<td>2.47 (1.99)</td>
<td>14.72***</td>
<td>0.13</td>
</tr>
<tr>
<td>Schizotypal PD</td>
<td>2.76 (1.97)</td>
<td>2.16 (1.66)</td>
<td>2.72</td>
<td>0.03</td>
</tr>
</tbody>
</table>

**Note:** HPP = hypothetically psychosis prone sample (\( N = 51 \)); MC = matched comparison sample (\( N = 49 \)). * \( p < 0.05, \) ** \( p < 0.01, \) *** \( p < 0.001. \)

### RESULTS

The MANOVA for the selected MMPI-2 scales was significant, \( F(15, 86) = 2.957, p = 0.001 \). Wilks’ lambda was 0.66, indicating that 34% of the variance in the combination of these MMPI-2 scale scores can be accounted for by group membership. Table 2 displays mean scores by group with associated univariate results and effect sizes.

PDQ-4 data for two members of the MC group was not available; thus the MC group for these analyses consisted of 49 individuals. The MANOVA for the number of schizophrenia-related personality disorder symptoms endorsed was also significant, \( F(4, 95) = 5.745, p < 0.001 \). Wilks’ lambda was 0.80, indicating that 20% of the combined variance in the endorsement of personality disorder-related scale scores can be accounted for by group membership. Table 3 displays mean scores by group with associated univariate results and effect sizes.

Participants were asked if they had ever been involved in a close romantic relationship. Of the 51 HPP participants, 14 reported that they had not, whereas only 6 of 51 MC participants reported that they had not. This difference in the likelihood to have not been involved in a serious relationship was significant, \( \chi^2(1) = 3.980, p = 0.046 \), Cramer’s \( \phi = 0.20 \). The observed odds ratio for lack of significant relationship by group was 2.84 (95% CI = 0.99 to 8.12).

### DISCUSSION

The current study examined whether individuals identified as being hypothetically psychosis prone on the basis of their CPPS scores also evidenced increased deviancy on other indicators of schizophrenia-related psychosis and life difficulties. The results support an affirmative answer. A secondary goal of the current study was to examine the ability of currently available MMPI-2 scales to serve as markers of psychosis proneness. The results for these comparisons are mixed, although not entirely unexpected.

The multivariate test of the selected MMPI-2 scales was significant, which suggests that the linear combination of the selected scales is related to psychosis proneness as assessed by the CPPS. With regard to the univariate tests, only scales F, 2780, and Sdz met criteria for significance after Bonferroni correction (\( p < 0.0033 \)).

The finding of significant differences by group on scale F is consistent with the results of past research (e.g., Carter et al., 1999; Moldin et al., 1990b). Although the F scale was initially created as a measure of validity, it has consistently been demonstrated to be associated with odd experiences and mentations (Friedman, Lewak, Nichols & Webb, 2001) at levels that are elevated but below the invalidity threshold. The results of the current study reinforce the notion, long before any symptoms of psychosis may appear, some individuals are already experiencing ways of thinking beyond the ordinary.

Differences on 2780 were also found to be significant at the most stringent alpha level, a finding that is consistent with previous studies (Bolinskey et al., 2001; Carter et al., 1999; Moldin et al., 1990b). This combination of scales was first suggested by Golden and Meehl (1979) who attempted to delineate
a group of MMPI items that would discriminate individuals possessing traits in line with Meehl’s (1962) concept of schizotypy. Among the behavioral correlates associated with high scores on 2780 are anhedonia, cognitive slippage, withdrawal, schizoid traits, avolition, over-sensitivity, flat affect, emotional instability, overt psychotic symptoms, anxiety, and fearfulness.

We also found significant differences in scores on Morey and colleagues’ (Colligan et al., 1994; Morey et al., 1985) SZD personality disorder scale at the most stringent alpha level. Social withdrawal and disinterest were described by Colligan et al. as being the key personality features associated with high scores on this scale.

With an alpha level of 0.01, scales CYN, STY, and AVD met significance criteria. This group of scales assesses constructs such as mild distrust of others’ motives, eccentricity and social withdrawal, and social anxiety and low self-esteem, respectively. Each of these traits has previously been described as a feature associated with the prodromal personalities of individuals with schizophrenia.

With alpha levels relaxed even further (i.e., to < 0.05), Fb, Scale 8, PSYC, SzP, and PAR would meet criteria for significance. The findings of small effect sizes (r² = 0.06 for each scale) are consistent with previous findings for both scale 8 (Moldin et al., 1990b) and SzP (Bolinskey et al., 2003). The findings for Fb, PSYC, and PAR, however, have not previously been reported in the literature. Like scale F, scale Fb was initially created as a validity scale; however, Friedman et al. (2001) have noted that mild elevations on this scale are suggestive of an ego-syntonic disturbance, rather than acute disorder. Interestingly, Harkness et al. (1995) noted that the PSYC construct was based somewhat on the MagId and PerAb scales of the CPPS, so its inclusion in this group of variables is not surprising; that it did not show stronger effect is suggestive of the scale also measures additional constructs beyond those included in the CPPS. PAR was noted by Colligan et al. (1994) to measure interpersonal suspiciousness.

Note that the only scales that would fail to meet criteria by the most relaxed standards would be FRS, Scale 6, BIZ, and RC8. FRS was included in the study as a substitute for the obsolete MMPI content scale PHO (Wiggins, 1966). Early examinations (e.g., Bolinskey et al., 2001; Carter et al., 1999; Moldin et al., 1990b) of the MMPIs of individuals who later developed schizophrenia suggested that the PHO scale was an effective indicator of schizophrenia liability; more recent examinations (e.g., Siira et al., 2004) have failed to replicate these findings. The current result is in line with these more recent findings. That scales 6, BIZ, and RC8 failed to show significant group differences is not necessarily surprising, as these scales tend to measure more active symptomology of schizophrenia-related psychosis, as opposed to characterological dysfunction. Nichols (2006), for example, suggested that RC8 is unique on in its capacity to measure Schneider’s first-rank symptoms of schizophrenia. As the current study searched for differences among individuals who may be psychosis prone (but not currently manifesting symptoms of psychosis) it might be expected that this group of scales failed to distinguish the two groups.

We hypothesized, however, that the individuals identified as HPP would endorse more items from the paranoid, schizoid, schizotypal, and avoidant scales of the PDQ-IV than would their comparison participants. The multivariate test was significant, as were three of the four univariate tests. The significant differences on the paranoid, schizoid, and avoidant scales are in agreement with previous findings (e.g., Fogelson et al., 2007; Gooding et al., 2007). The lack of a significant difference on the schizotypal scale is surprising, though it may reflect that scale’s focus on more “bizarre” symptoms, rather than the symptoms of mistrust and withdrawal measured by the other scales.

Our final two analyses assess behavioral outcomes, rather than “personality.” Our first analysis examined whether HPP individuals had a higher incidence of treatment for mental illness (regardless of diagnosis) than MC individuals. We hypothesized that there would be a significant difference as the odd behaviors and/or social withdrawal of the HPP participants might make them more likely to be referred for treatment. The results supported this hypothesis. Likewise, we hypothesized that HPP participants would be less likely than MC participants to have ever been involved in a close romantic relationship, given that one of the defining features of the prodromal phase of SRP is social withdrawal. This hypothesis, too, was supported, and the results are in agreement with Kwapil et al. (2007).

There are a few areas of caution that stand out in the interpretation of our results. First, our sample was predominantly Caucasian and female; this sample is reflective of the population from which it was drawn, but the lack of diversity within our sample may limit generalizability of our results.

Second, it is possible that we measured a response set suggestive of psychosis proneness, rather than an underlying construct of psychosis proneness. This possibility is unlikely, however, as the HPP participants did not endorse the more extreme symptoms of psychosis (e.g., first-rank symptoms or overt schizotypal behavior).

Third, our reliance on a self-report measure (PDQ-IV) as a proxy for personality disorder-related experiences leads us to be less confident in the findings than if we had been able to incorporate a semi-structured diagnostic interview for personality disorders. For this reason, we plan to incorporate a semi-structured interview in follow-up studies to compensate for possible item over-endorsement on the PDQ.

Fourth, the current study fails to distinguish between the positive and negative aspects of schizotypy that are associated with SRP. Additional data that would help to distinguish between these aspects would enhance follow-up studies.

Finally, we do not know if any of our HPP participants will actually develop SRP. To ascertain this, a longitudinal study is needed. Such a longitudinal study could incorporate each of the measures from the current study, as well as other endophenotypes.
for SRP, such as executive functioning and working memory deficits, and would follow participants throughout the period of highest risk to developing SRP. We are planning such a study.

REFERENCES


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