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Form and content of attenuated psychotic symptoms in psychometrically assessed positive and negative schizotypy

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Aim: Greater attention is being paid to early detection and identification of individuals who are at high risk of developing psychosis. One area of interest is the particular content types of psychotic-like experiences (PLEs), which can be thought of as attenuated, non-clinical positive symptoms (eg, feeling perplexed by reality). Previous research has examined content of PLEs in clinical high-risk samples. The current study aimed to build upon these findings by analysing content in a psychometrically determined high-risk sample.

Methods: One hundred fifty-three undergraduates with scores greater than 1.96 SDs above the mean on a measure of schizotypy symptoms participated in a semistructured interview for the assessment of prodromal syndromes. Each interview was transcribed verbatim and content of PLEs was rated according to the Content of Attenuated Positive Symptoms scale.

Results: Frequencies of content items in the psychometric high-risk sample were similar to those found in a clinical high-risk sample. Multiple regression analyses revealed that certain content items were more predictive of decreased global functioning and increased positive symptom severity.

Conclusions: Content items that were associated with worse outcomes may be cause for greater concern if endorsed by individuals presenting for treatment. Future research should examine content of PLEs in a longitudinal design to determine whether particular items could predict subsequent conversion to a schizophrenia-spectrum disorder.

KEYWORDS
content analysis, prodromal symptoms, psychotic disorders, risk factors, young adults

1 | INTRODUCTION

Increasing attention has been paid in recent years to the early identification and management of attenuated psychotic symptoms (APSs; Malla et al., 2006; Simonsen et al., 2007; Tang et al., 2014). Psychotic symptoms are thought to exist on a continuum from subclinical psychotic-like experiences (PLEs) on one end, to clinically significant APS, to full-blown psychosis on the other end (Bolinskey et al., 2017; Linscott & van Os,

2010; Nelson, Seal, Pantelis, & Phillips, 2013). Previous research suggests that PLEs are relatively common in the general population (van Os, Linscott, Myin-Germeys, Delespaul, & Krabbendam, 2009; Yung et al., 2009), and APSs are the cardinal symptoms of the proposed attenuated psychosis syndrome (Carpenter & Van Os, 2011; Fusar-Poli et al., 2013; Woods, Walsh, Saksa, & McGlashan, 2010).

Determining increased risk for conversion to psychosis can proceed in several different ways, one of which involves psychometrically

assessed positive and negative schizotypy. This approach has a long history in schizotypy research, and has also been referred to as the "psychometric high-risk paradigm" (Lenzenweger, 1994). Participants are often non-help-seeking undergraduates who are identified by elevated scores on self-report measures of psychosis, such as the Wisconsin Schizotypy Scales (eg, Chapman, Chapman, Raulin, & Edell, 1978; Lenzenweger, 1994). Using this method, individuals are regarded to be at higher risk for psychosis if their scores are greater than 1.96 sex-normed standard deviations on a combination of the Revised Social Anhedonia Scale (SocAnh; Eckblad, Chapman, Chapman, & Mishlove, 1982), the Perceptual Aberration Scale (PerAb; Chapman, Chapman, & Raulin, 1978) and the Magical Ideation Scale (MagicId; Eckblad & Chapman, 1983). Previous research has demonstrated that individuals with psychometrically assessed schizotypy are more likely to have developed a schizophrenia-spectrum disorder after a follow-up period than controls (Chapman, Chapman, Kwapil, Eckblad, & Zinser, 1994; Kwapil, 1998; Kwapil, Miller, Zinser, Chapman, & Chapman, 1997), indicating that this method is useful for early detection of individuals in the premorbid phase who may go on to experience clinically significant psychosis symptoms. In addition to longitudinal studies, the psychometric high-risk paradigm has been used extensively in recent cross-sectional studies aiming to understand psychosis risk (see Kwapil & Barrantes-Vidal, 2015; Mason, 2015 for reviews).

A second method, the clinical high risk (CHR) approach, aims to identify people in the schizophrenia prodrome who are already experiencing clinically significant APS (Addington et al., 2007; Addington & Heinssen, 2012; Cannon et al., 2008; Miller et al., 2003). Research with the CHR approach typically involves interview measures of APS, such as the Structured Interview for Prodromal Syndromes (SIPS; Miller et al., 2003), which is the most common psychosis risk interview used in North America. The SIPS enables clinicians and researchers to diagnose individuals with Attenuated Positive Symptoms Psychosis-Risk Syndrome, which requires an APS (rating between 3 and 5 on a positive symptom on the Scale of Prodromal Symptoms [SOPS]), an onset or increase in severity in the last 12 months, and a frequency of at least once a week in the past month. A second diagnosis is Brief Intermittent Psychosis-Risk Syndrome, which requires the presence of a fully psychotic symptom (rating of 6) in the last 3 months, and a frequency of at least several minutes per day at least once a month. Finally, participants may be diagnosed with Genetic Risk and Deterioration Syndrome (GRDS), in which the person either has a first-degree relative with a psychotic disorder or meets criteria for schizotypal personality disorder and has at least a 30% drop in Global Assessment of Functioning (GAF) scores over the past 12 months.

An important distinction between the two approaches to risk assessment is that CHR individuals are most often presenting for treatment in a psychological clinic, indicating the existence of functional impairment in one or more domains. Conversely, the primary aim of the psychometric approach is to identify people who have not yet reached this level of impairment. Some research has shown that psychometric high-risk scores are correlated with CHR assessments (Fluckiger et al., 2016), but it is unclear if the symptoms in the

psychometric approach represent earlier premorbid symptoms on the psychotic spectrum (Barrantes-Vidal et al., 2013; Cicero, Martin, Becker, Docherty, & Kerns, 2014).

Research that has focused on the "conversion" of APS to full blown psychosis in CHR samples has generated estimates suggesting that 5% to 35% of prodromal individuals convert to psychosis (Cannon et al., 2008; Fusar-Poli et al., 2013; Kaymaz et al., 2012). At the same time, many studies have examined PLEs in general population samples (Varghese, Scott, & McGrath, 2008; Yung et al., 2006, 2009), often including undergraduates (see Mason, 2015 for a review). Although the relation between APS and full-blown psychosis has been extensively studied, less is known about the relation between subclinical PLEs and APS. One major unanswered question is whether PLEs are the same phenomena as APS—but in a diminished form—or if they are distinct. If PLEs are diminished forms of APS, we would expect to find similar content in people with schizotypy and in people with CHR. However, if they are distinct phenomena that are not on the same spectrum, we would expect to find differences in content between people with different levels of severity. In the current research, we aimed to address this question by examining the content of PLEs in a sample of non-help-seeking undergraduates.

Historically, the content of positive symptoms across the spectrum has been overlooked (Marshall, Falukozi, Albertin, Zhu, & Addington, 2011). Foundational texts in psychopathology define "content" of general psychotic disturbance as the "subjective colouring of the experience" (Oyebode, 2015), differentiated from "form" which concerns the phenomenological structure by which the disturbance is manifested. For example, the content of a disturbance might be related to excessive somatic concern, which could take the form of a delusion or an intrusive thought (Stanghellini & Raballo, 2015). Previous work has addressed the form and content of PLEs by comparing associations between broad subtypes of PLEs (eg, "Perceptual Abnormalities") and other symptoms in samples of CHR individuals (Brandizzi et al., 2014; Yung et al., 2006) and community participants (Armando et al., 2010; Laurens, Hobbs, Sunderland, Green, & Mould, 2012; Yung et al., 2009). However, few studies have detailed the frequency of specific PLE forms such as visual distortions, which are part of a broader "Perceptual Abnormalities" subtype along with other auditory, tactile and gustatory hallucination-like experiences. One study of a large community sample found the most commonly experienced PLEs were auditory (5.4%) and visual (4.2%) hallucinations, followed by the suspicion of being monitored (1.7%; Zammit et al., 2013). Moreover, recent studies have demonstrated through retrospective "case-controlled" paradigms that the presence of particular types of symptoms in CHR participants significantly predicted conversion to psychosis (O'Connor et al., 2016; Thompson et al., 2013). Taken together, these results suggest that examining the content of psychotic disturbance across phases of the illness, including the premorbid phase, may further aid our understanding of psychosis risk.

In an effort to better understand PLE content, the Content of Attenuated Psychotic Symptoms (CAPS) rating scale was developed (Marshall et al., 2011) using vignettes based on the SIPS (Miller et al., 2003) with CHR individuals. Mirroring the SIPS, the CAPS has four

content domains: Unusual Thought Content, Suspiciousness/Persecutory Ideas, Grandiose Ideas and Perceptual Abnormalities/Hallucinations. To date, research using the CAPS has focused exclusively on CHR samples (Falukozi & Addington, 2012; Marshall et al., 2011, 2014, 2016).

Thus, the first goal of the current research is to examine the frequencies of the content of PLEs in a sample of undergraduates identified as at-risk for psychosis with the psychometric schizotypy approach. In line with the theory that PLEs represent diminished forms of APS, we expected to find that the most prevalent PLEs would be the same as the most prevalent symptoms from samples of people identified as at-risk with the clinical high-risk approach (Marshall et al., 2014). The second goal of the current research was to determine which content items explained the most variance in overall ratings of global functioning and psychosis spectrum severity. These analyses may help to understand if specific PLE content confers an increased risk for psychosis.

2 | METHODS

2.1 | Participants

Participants were 160 undergraduates at a large Midwestern university who were enrolled in an introductory psychology course and participated in this study in exchange for course credit. Participants were informed of this research opportunity through their course instructor and they were able to access the initial pre-screen for this study online at their leisure. The mean age of the sample was 18.65 years (SD = 1.28). Fifty-four percent of the sample was female, and 81.7% identified as White, 11.1% as African American, 1.3% as Asian American, 3.9% as biracial and 2% as other. Demographic information of the university students (University of Missouri, 2018) and of the surrounding area (United States Census Bureau, 2017) suggests that this sample is representative of the larger population from which the sample was derived, in terms of gender and ethnicity.

2.2 | Procedure

This study was approved by the appropriate Institutional Review Board and all participants provided written, informed consent prior to participating. Participants were identified by the psychometric high-risk approach, which proceeded in two phases. In order to screen for appropriate participants, participants first completed abbreviated versions of three commonly used measures of schizotypy, accessed through the university's online research platform. Those scoring greater than 1.96 sex-normed standard deviations above the mean on the scales were invited to participate in a second phase where they completed the full versions of the three scales. Participants were then assigned to the positive group (n = 49) if they scored greater than 1.96 SDs above the mean on either—or a combined 3.00 SDs above the mean on both—the MagicId (Eckblad & Chapman, 1983) and/or the PerAb (Chapman, Chapman, & Raulin, 1978). Participants were assigned to the negative group (n = 63) if they scored greater than

1.96 SDs above the mean on the SocAnh (Eckblad et al., 1982). Those who scored less than 0.5 SDs above the mean on all three scales were assigned to the control group (n = 41). All group assignments were made based on the full versions of the scales.

In the second phase of the study, all participants were interviewed using the SIPS (Miller et al., 2003) and all interviews were videotaped. Participation in this phase of the study took approximately 2 hours. The fifth author, who completed a workshop on the administration and scoring of the SIPS and met standards for certification in the administration of the instrument, conducted all interviews and provided ratings. This workshop has been shown to adequately train interviewers to independently conduct the SIPS (Miller et al., 2003). To assess inter-rater reliability, two other trained interviewers who attended the same workshop watched 15 of the recorded interviews and provided ratings. In terms of SIPS diagnoses, no participants met criteria for a Brief Intermittent Psychotic Syndrome and GRDS was not assessed. Two participants met criteria for Attenuated Positive Symptom Syndrome (APSS).

Each video was transcribed verbatim and double-checked by research assistants. Seven participants were dropped from the study due to technical malfunctions during their videotaped interviews, resulting in a final sample of 153 participants. The final versions of the transcripts were rated by the authors using the CAPS rating scale. Raters were blind to the participants' group status.

2.3 | Materials

2.3.1 | Screening measures

Three commonly used schizotypy questionnaires were used to identify participants at psychometric high-risk for psychosis: MagicId, PerAb and SocAnh. The MagicId and PerAb scales are self-report measures of positive schizotypy, composed of 30 and 35 true-false items, respectively. MagicId measures the degree to which an individual ascribes to beliefs that are generally regarded as unconventional and PerAb measures perceptual distortions of one's own body. The SocAnh scale is a 40-item true-false self-report scale that measures inability to derive pleasure from social interactions and relationships.

2.3.2 | Measures of psychotic-like experiences

The SIPS (Miller et al., 2003) was used to assess PLEs. The SIPS is a semi-structured interview assessing positive, negative, disorganized and general symptoms associated with attenuated psychosis, and can be used to facilitate diagnosis of different subclinical risk syndromes, such as APSS. This interview is designed to broadly assess different types of PLEs, in a similar manner as clinical interviews for schizophrenia symptoms, such as the Positive and Negative Syndrome Scale (Kay, Fiszbein, & Opler, 1987). Symptoms are rated on the SOPS, which includes subscales for each symptom domain. Five items comprise the positive scale (delusional ideation, paranoia, grandiosity, perceptual abnormalities and disorganized communication), and these items were the focus of the current research. Items are rated on a

scale from 0 (*Absent*) to 6 (*Severe and Psychotic*), and ratings of 3 (*Moderate*) or higher represent clinically significant APS. In the current study, the intraclass correlation coefficients (ICCs) for the positive symptom ratings ranged from .92 to .97.

2.3.3 | Global Assessment of Functioning

The GAF (Hall, 1995) is an interviewer-rated scale incorporated within the SIPS that measures the degree of impairment in occupational, psychological and social functioning. Scoring is broken into nine intervals of 10 points with 1 to 10 representing the most severe impairment of functioning and 81 to 90 representing absent or minimal impairment in functioning.

2.3.4 | Content of Attenuated Positive Symptoms

The Content of Attenuated Positive Symptoms (CAPS; Marshall et al., 2011) is a rating scale designed to identify the presence of specific PLE content. This codebook was developed through identification of relevant content domains in the literature and distillation of themes from symptom vignettes of 121 individuals who met criteria for APSS as measured by the SIPS/SOPS. The CAPS is divided into the same domains as the SOPS. Each domain is then divided into specific content items which are rated as 0 (*absent*) or 1 (*present*). See Tables 1–4

for a list of domains. In the current research, ICCs ranged from .88 to .92, indicating good to excellent inter-rater reliability, which is consistent with previous work (Marshall et al., 2011).

3 | RESULTS

3.1 | Frequency of PLEs

The first goal of the current research was to examine the frequencies of PLEs across the groups. As can be seen in Table 1, a pattern emerged in which the positive schizotypy group had the highest levels of unusual thought content, followed by the negative schizotypy group, which had higher frequencies than the control group. The most common unusual thought content items across groups were perplexed by reality, overvalued beliefs and somatic concerns. A similar pattern emerged for suspiciousness/persecutory ideas (see Table 2). The most frequent items were guardedness towards people and ideas of being thought about in a negative way. Grandiose items followed the same pattern, although most items had lower frequencies than the unusual thought content and suspiciousness/persecutory ideas items. The most common in the positive schizotypy group was a belief of having unusual skills, abilities or talents (see Table 3). Finally, the perceptual abnormalities/hallucinations items displayed the same pattern among

TABLE 1 Frequencies of unusual thought content items by group

Unusual thought content item[a]	Positive schizotypy group (n = 49)		Negative schizotypy group (n = 63)		Control group (n = 41)		Chi-square test df = 2	Cramer's V
	n	%	n	%	n	%		
Perplexed by reality***	38	77.6	30	47.6	8	19.5	30.259	0.45
Overvalued beliefs***	33	67.3	24	38.1	9	22.0	19.864	0.36
Somatic concerns	22	44.9	19	30.2	9	22.0	5.562	0.19
Reading of thoughts***	20	40.8	12	19.0	2	4.9	17.305	0.34
Altered familiar people or surroundings*	14	28.6	11	17.5	2	4.9	8.625	0.24
Special attention from others*	13	26.5	10	15.9	2	4.9	7.673	0.22
Sense of time	10	20.4	12	19.0	4	9.8	2.116	0.12
Religious content**	10	20.4	1	1.6	3	7.3	11.971	0.28
Loss of control of content of thoughts**	9	18.4	2	3.2	1	2.4	11.065	0.27
Electronic communication***	9	18.4	1	1.6	0	0.0	16.621	0.33
Thought interference**	8	16.3	3	4.8	0	0.0	9.863	0.25
Nihilistic ideas	7	14.3	5	7.9	1	2.4	4.073	0.16
Interference by a god	6	12.2	3	4.8	1	2.4	4.065	0.16
Supernatural content*	5	10.2	3	4.8	1	2.4	2.674	0.13
Guilt*	3	6.1	9	14.3	0	0.0	7.308	0.22
Negative thoughts regarding self	2	4.1	0	0.0	1	2.4	2.455	0.13
Interference by a devil	1	2.0	0	0.0	0	0.0	2.136	0.12

[a]Certain items were not rated as present in any transcript and were dropped from subsequent analyses. In the Unusual Thought Content domain, these items were: sexual content, thoughts regarding sexual identity, thoughts regarding the size and/or shape of genitals, false belief of being watched in the shower or bathroom, false belief of being watched undressing, false belief of being watched in sexual act, non-specific sexual thoughts and non-specific religious thoughts.

*$P < .05$.; **$P < .01$.; ***$P < .001$.

TABLE 2 Frequencies of suspiciousness/persecutory ideas items by group

Suspiciousness/persecutory ideas item[a]	Positive schizotypy group (n = 49)		Negative schizotypy group (n = 63)		Control group (n = 41)		Chi-square test df = 2	Cramer's V
	n	%	n	%	n	%		
Guardedness towards people**	38	77.6	36	57.1	17	41.5	12.304	0.28
Ideas of being thought about in a negative way	36	73.5	39	61.9	21	51.2	4.760	0.18
Hypervigilance of surroundings*	21	42.9	15	23.8	8	19.5	7.218	0.22
Ideas regarding an unfaithful partner	12	24.5	10	15.9	3	7.3	4.833	0.18
Ideas of being watched	6	12.2	7	11.1	2	4.9	1.577	0.10
Ideas of being harmed emotionally	4	8.2	5	7.9	3	7.3	0.023	0.01
Ideas of being harmed physically	3	6.1	3	4.8	2	4.9	0.117	0.03
Ideas of being followed	1	2.0	3	4.8	0	0.0	2.305	0.12
Ideas related to the misuse of personal information	0	0.0	1	1.6	0	0.0	1.438	0.10

[a]Certain items were not rated as present in any transcript and were dropped from subsequent analyses. In the suspiciousness/persecutory ideas domain, these items were: ideas of being possessed and characters-animals.
*$P < .05$.; **$P < .01$.

TABLE 3 Frequencies of grandiose ideas items by group

Grandiose ideas item	Positive schizotypy group (n = 49)		Negative schizotypy group (n = 63)		Control group (n = 41)		Chi-square test df = 2	Cramer's V
	n	%	n	%	n	%		
Skills or abilities or talent***	17	34.7	4	6.3	6	14.6	15.587	0.32
Status**	9	18.4	3	4.8	0	0.0	11.825	0.28
Religious content	5	10.2	1	1.6	2	4.9	4.144	0.17
Unrealistic goals or plans	5	10.2	2	3.2	0	0.0	5.805	0.20
Ability to influence or control others or the world	1	2.0	0	0.0	0	0.0	2.136	0.12
Intelligence	0	0.0	2	3.2	1	2.4	1.512	0.10

**$P < .01$.; ***$P < .001$.

groups, with hearing indistinct noises and seeing vague figures or shadows being the most common (see Table 4).

3.2 | Relations among PLE content and global functioning

The second goal of this study was to determine the content of PLEs that would explain the most variance in global functioning scores. We examined this in the total sample to avoid a restriction of range in scores by including only positive, negative or control participants. As shown in Table 5, a stepwise regression wherein all CAPS items (excluding sub-items) were entered as potential predictors of GAF at α = .01 was statistically significant, R = .59, R^2 = .34, adjusted R^2 = .32, $F(4, 145) = 18.84$, $P < .001$, with four predictor items: vague figures or shadows, perplexed by reality, guilt and supernatural beliefs. These items accounted for approximately 34% of the total variance in global functioning. Vague figures or shadows produced an R^2 of .203, $F(1, 148) = 37.64$, $P < .001$; perplexed by reality accounted for a

further R^2 of .064, $F(1, 147) = 12.81$, $P < .001$; guilt accounted for a further R^2 of .04, $F(1, 146) = 8.83$, $P = .003$; and supernatural beliefs accounted for a further R^2 of .03, $F(1, 145) = 7.39$, $P = .007$.

3.3 | SOPS-CAPS regression results

To determine whether any CAPS items were significant predictors of psychosis spectrum severity as measured by the SOPS positive total score (ie, the average score of the five positive symptom ratings), we conducted a stepwise multiple regression with all CAPS items entered as potential predictors of SOPS total at α = .01 with all participants included. The overall regression was significant (see Table 6), R = .84, R^2 = .70, adjusted R^2 = .68, $F(9, 141) = 36.54$, $P < .001$. Seven predictor items were significant at $P < .001$: vague figures or shadows (R^2 = .29), skills or abilities or talents (ΔR^2 = .12), perplexed by reality (ΔR^2 = .09), voices (ΔR^2 = .05), supernatural content (ΔR^2 = .04), guilt (ΔR^2 = .04) and altered familiar people or surroundings (ΔR^2 = .03).

TABLE 4 Frequencies of perceptual abnormalities/hallucinations items and descriptive items by groups

Perceptual abnormalities content item[a]	Positive schizotypy group (n = 49)		Negative schizotypy group (n = 63)		Control group (n = 41)		Chi-square test df = 2	Cramer's V
	n	%	n	%	n	%		
Auditory: indistinct noises***	33	67.3	25	39.7	13	31.7	13.346	0.30
Visual: vague figures or shadows***	27	55.1	17	27.0	3	7.3	24.652	0.40
Tactile: aches or pain*	13	26.5	6	9.5	4	9.8	7.462	0.22
Tactile: numbness or tingling***	12	24.5	4	6.3	1	2.4	13.448	0.30
Auditory: thoughts being said out loud***	12	24.5	0	0.0	2	4.9	21.115	0.37
Visual: distortions	11	22.4	6	9.5	1	2.4	9.128	0.24
Visual: animals***	11	22.4	3	4.8	0	0.0	16.013	0.32
Auditory: distinct noises	9	18.4	11	17.5	3	7.3	2.628	0.13
Visual: faces or people*	9	18.4	4	6.3	0	0.0	10.321	0.26
Auditory: name being called	7	14.3	2	3.2	2	4.9	5.548	0.19
Visual: sensitivity	6	12.2	10	15.9	4	9.8	0.861	0.08
Auditory: sensitivity	4	8.2	3	4.8	1	2.4	1.523	0.10
Olfactory: unpleasant smells	4	8.2	2	3.2	1	2.4	2.157	0.12
Visual: flashes of light	3	6.1	3	4.8	1	2.4	0.702	0.07
Tactile: electricity or vibrations	3	6.1	3	4.8	0	0.0	2.421	0.13
Auditory: mumbling	2	4.1	1	1.6	1	2.4	0.680	0.07
Visual: spots or floaters	2	4.1	1	1.6	0	0.0	2.012	0.12
Olfactory: pleasant smells	2	4.1	0	0.0	0	0.0	4.301	0.17
Tactile: burning or coldness	1	2.0	2	3.2	0	0.0	1.304	0.09
Tactile: something touching the individual	1	2.0	1	1.6	0	0.0	0.786	0.07
Auditory: distortions	0	0.0	2	3.2	1	2.4	1.512	0.10
Tactile: physical alterations	0	0.0	1	1.6	0	0.0	1.438	0.10
Neutral content*	5	62.5	—	—	1	100	7.944	0.23
Character: the individual*	3	37.5	—	—	0	—	6.495	0.21
Positive content	1	12.5	—	—	0	—	2.136	0.12
Negative content	1	12.5	—	—	0	—	2.136	0.12
Character: strangers	1	12.5	—	—	0	—	2.136	0.12
Voices	n = 8	% (of 8)	—	—	n = 1	% (of 1)		

[a]Certain items were not rated as present in any transcript and were dropped from subsequent analyses. In the perceptual abnormalities/hallucinations domain, these items were: voices character-friends or acquaintances, voices character-family member or significant other, voices character-defined group, voices character-non-specific people, tactile-bugs crawling, tactile-choked or strangled, visual-flames or fire, visual-geometric shapes.
*P < .05.; ***P < .001.

4 | DISCUSSION

The first goal of the current research was to examine the frequency of item content in schizotypy and control samples. The item frequency was similar to previous work with CHR samples. Specifically, the two most frequently rated items for the positive schizotypy group in each domain matched those of Marshall et al. (2014). The similarity in symptom content between psychometric and clinical high-risk

Two items were significant at P < .01: reading of thoughts (ΔR^2 = .02) and thoughts being said out loud (ΔR^2 = .02).

participants may provide further evidence for the continuity of PLEs in non-help-seeking samples and APS in CHR samples. The second goal was to examine whether specific content was predictive of functioning and symptom severity. The regression analyses identified several items that were predictive of decreased functioning and increased PLEs. Notably, the four items that were associated with decreased functioning (seeing vague figures or shadows, being perplexed by reality, guilt and supernatural beliefs) were also associated with increased PLE ratings, along with altered familiar people or surroundings, hearing voices, reading thoughts, thoughts being said out loud and grandiose skills beliefs. This pattern is also similar to previous findings that bizarre experiences, as measured by the Community

TABLE 5 Results of stepwise multiple regression to predict Global Assessment of Functioning scores from Content of Attenuated Psychotic Symptoms (CAPS) items

Step	CAPS item	b	β	ΔR^2
1	Vague figures or shadows	−2.95***	−.27	.203
2	Perplexed by reality	−2.81***	−.28	.064
3	Guilt	−3.84**	−.21	.042
4	Supernatural beliefs	−4.05**	−.19	.034
		Intercept = 66.90***		
Final model				
R^2	.342			
R^2_{adj}	.324			
R	.585**			

**P < .01.; ***P < .001.

TABLE 6 Results of stepwise multiple regression to predict Scale of Prodromal Symptoms total scores from Content of Attenuated Psychotic Symptoms (CAPS) items

Step	CAPS item	b	β	ΔR^2
1	Vague figures or shadows	.21***	.534	.286
2	Skills	.35***	.354	.123
3	Perplexed by reality	.20***	.334	.094
4	Auditory: voices	.36**	.247	.053
5	Supernatural content	.34**	.211	.041
6	Guilt	.37***	.200	.039
7	Altered familiar people or surroundings	.28***	.189	.029
8	Reading of thoughts	.20**	.147	.018
9	Thoughts being said out loud	.29**	.157	.017
		Intercept = 2.961***		
Final model				
R^2	.700			
R^2_{adj}	.681			
R	.837**			

**P < .01.; ***P < .001.

Assessment of Psychiatric Experiences (CAPE; Stefanis et al., 2002), are significantly associated with poorer functioning and distress in community samples of adolescents and young adults (Armando et al., 2010; Yung et al., 2009) and non-psychotic help-seeking participants (Yung et al., 2006). In contrast, these studies found that increased persecutory ideas were also indicative of distress and functional impairment, whereas we found no content items within the suspiciousness/persecutory ideas domain to be significant predictors of global functioning. This discrepancy could be related to the level of PLEs used as predictors in our study compared to previous research. Although our study assessed for the presence of discrete content types and the relationship of these variables to functioning, studies utilizing the CAPE examine PLEs according to broader subtypes.

Although the content of symptoms in the positive schizotypy group was very similar to previous work (Marshall et al., 2014), a few notable differences emerged. For example, loss of control of content of thoughts and supernatural content were more common in previous work. Ideas of being watched, and ideas of being harmed physically and emotionally were also more common in prior samples, whereas ideas regarding an unfaithful partner were more common in our sample. These differences may be accounted for by the differences between the two samples. Marshall et al.'s CHR samples are composed of help-seeking people who are distressed by their symptoms (Addington & Heinssen, 2012). The current sample was composed of college students who were not seeking treatment for psychological symptoms. Thus, a CHR sample might have more content related to distress, such as hearing voices and experiencing unusual tactile sensations. However, the finding that the top two items in each domain in CHR samples were identical to the positive schizotypy group in our sample suggests that the content of APSs extends from the CHR into general population samples, which is consistent with a continuum model of psychosis symptoms (van Os et al., 2009).

One interpretation of the stepwise regressions is that the identified predictors may be among the most important for understanding the severity of risk for psychosis. For example, since "perplexed by reality" explained the most variance in overall symptom severity, it may be especially likely to indicate an increased risk for psychosis. The presence (vs absence) of each individual item represented an increase between .20 and .37 on the average SOPS-positive rating. Since the SOPS has a 0-to-6-point scale, and 3 or higher represents clinically significant symptoms, these content items, whether present alone or in tandem, may represent the difference between mild PLEs and clinically significant APS. As this study was correlational, these results alone do not allow for conclusions to be drawn about whether and which PLEs are associated with increased risk of conversion. Future research could assess psychometric at-risk and CHR individuals longitudinally to examine whether the specific symptom content items identified in the current study are better predictors of conversion to psychosis than content not identified as statistically significant.

There has been recent longitudinal work to suggest that the content of APS "progresses" from being vague and lacking intensity in CHR individuals to specific, concrete, and severe in individuals during their first episode of psychosis (Marshall et al., 2017). Although some individuals reported new symptom content following conversion to psychosis, the finding of a progression suggests that there is a continuity between APS and full-blown psychosis, at least in terms of content. Future research could build upon this work by incorporating PLE content into a longitudinal design, which could take the form of identifying psychometrically high-risk individuals and examining PLEs in those who are subsequently determined to be at clinical high-risk and/or convert to a schizophrenia-spectrum disorder. This research could determine whether there is continuity between the content of PLEs in psychometric high-risk individuals who go on to develop more severe psychotic-spectrum psychopathology.

One of the predominant strengths of this study is the use of original, direct expression of content transcribed verbatim from interviews

with individuals experiencing PLEs. Previous research has examined PLE content through the use of case vignettes derived from interviews of people with a high clinical risk for the development of psychosis (Marshall et al., 2014, 2017). Although case vignettes have been the convention in this research, by transcribing each interview directly we were able to rate PLE content as it was expressed in the participant's own language and were able to consider the responses in their original context.

However, the results of this study are subject to limitations. First, the assessment of global functioning in this sample relied primarily on the GAF found in the SOPS, which takes into account the influence of symptom severity. Future research could address this by including different and varied measures of social, occupational and emotional functioning such as the GAF-Social and Role scales (Cornblatt et al., 2007). Second, the current sample was composed of college students who were not at CHR and not matched to a community sample on other relevant demographics. Undergraduates may have higher SES, IQ and education than age-matched peers. However, some research suggests that they have similar levels of psychopathology to their non-college attending peers (Blanco et al., 2008), including APS (Loewy, Johnson, & Cannon, 2007). Nevertheless, it is unclear whether the current results would generalize to community samples of young adults. Future research could replicate this work in people identified as at increased psychometric risk for psychosis from general population samples.

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