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Self-Reported Psychotic-Like Experiences Are a Poor Estimate of Clinician-Rated Attenuated and Frank Delusions and Hallucinations

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Key Words
Attenuated psychotic symptoms · Psychotic-like experiences · Self-rating · Clinician rating · Criterion validity · Attenuated psychosis syndrome

Abstract
Background: One reason for the decision to delay the introduction of an Attenuated Psychosis Syndrome in the main text of the fifth edition of the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders was the concern that attenuated psychotic symptoms (APS) might in fact be common features in adolescents and young adults from the general population of no psychopathological significance in themselves. This concern was based on reports of high prevalence rates of psychotic-like experiences (PLEs) in the general population and the assumption that PLEs are a good estimate of APS. Although the criterion validity of self-reported PLEs had already been studied with respect to clinician-rated psychotic symptoms and found insufficient, it had been argued that PLEs might in fact be more comparable with mild, subclinical expressions of psychotic symptoms and, therefore, with APS. The present paper is the first to specifically study this assumption. ***Sampling and Methods:*** The sample consisted of 123 persons seeking help at a service for the early detection of psychosis, of whom 54 had an at-risk mental state or psychosis, 55 had a nonpsychotic mental disorder and 14 had no full-blown mental disorder. PLEs were assessed with the Peters Delusion Inventory and the revised Launay-Slade Hallucination Scale, and psychotic symptoms and APS were assessed with the Structured Interview for Prodromal Syndromes. ***Results:*** At a level of agreement between the presence of any PLE (in 98.4% of patients) and any APS (in 40.7%) just exceeding chance ($\kappa = 0.022$), the criterion validity of PLEs for APS was insufficient. Even if additional qualifiers (high agreement or distress, preoccupation and conviction) were considered, PLEs (in 52.8%) still tended to significantly overestimate APS, and agreement was only fair ($\kappa = 0.340$). Furthermore, the group effect on PLE prevalence was, at most, moderate (Cramer's $V \leq 0.382$). ***Conclusions:*** The prevalence of APS cannot be deduced from studies of PLEs. Thus, the high population prevalence rate of PLEs does not allow the conclusion that APS are common features of no pathological significance and would lack clinical validity as an Attenuated Psychosis Syndrome in the Diagnostic and Statistical Manual of Mental Disorders, 5th edition. Rather, the population prevalence rate of APS has to be assumed to be largely unknown at present but is likely lower than indicated by epidemiological studies of PLEs. Therefore, dedicated studies are warranted, in which APS are assessed in a way that equates to their clinical evaluation.

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Introduction

Studies of the general population and nonpsychotic clinical samples [1–11] have reported a high prevalence of psychotic-like experiences (PLEs), which are an assumed measure of psychotic symptoms or at least of attenuated psychotic symptoms (APS) [1]. In the discussion about inclusion of an Attenuated Psychosis Syndrome based on APS in the fifth edition of the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders [12, 13], it was, therefore, cautioned that APS might, in fact, be a common feature in adolescents and young adults from the general population and of no psychopathological significance by themselves [14, 15].

Hearkening back to Strauss' continuums hypothesis [16], the term 'psychotic-like experiences' was originally proposed for 'subschizophrenic' or 'psychotic-like' symptoms, which have to be carefully assessed by clinicians and represent points on a continuum between normal experiences and true, severe hallucinations and delusions [17, 18]. In this original definition, psychotic-like phenomena are highly similar to APS [19] in the definition of the two main instruments for their assessment in a clinical interview [20], namely the Structured Interview for Prodromal Syndromes (SIPS) [21] and the Comprehensive Assessment of At-Risk Mental States [22].

In recent epidemiological studies, however, PLEs have generally been assessed with self-rating questionnaires and/or by fully standardized interviews by laypersons, which essentially make the interview equal to a self-report instrument [2]. Consequently, their psychotic-*like* character has ceased to refer to distinct clinical features but, instead, refers to the absence of a psychotic disorder [3] and/or doubts about their psychotic nature due to an uncertainty about the validity of their assessment [2]. Mainly due to problems related to the differences in the assessment mode, the criterion validity of self-reported PLEs has already been questioned with regard to psychotic symptoms [2, 23, 24]. Further doubts about their validity have arisen from their repeatedly reported association with nonpsychotic disorders and common mental problems such as sleep disturbances [1, 10, 25, 26]. The criterion validity of self-reported PLEs seems to be even more difficult for APS, since self-rating instruments employed for the assessment of PLEs were generally designed for the assessment of psychotic symptoms [e.g. the Peters et al. Delusion Inventory (PDI) [27], the revised Launay-Slade Hallucination Scale (LSHS-R) [28], the Community Assessment of Psychic Experiences (CAPE) [29] or the psychosis section of the Composite International Diagnostic Interview [30]]. Yet, it has been argued that the validity of self-report instruments for psychotic symptoms could be improved by raising the threshold or considering additional qualifiers (e.g. the frequency of the experience, distress or functional decline associated with them and/or help-seeking) [2, 23, 27, 31–33].

Therefore, the aims here were to investigate (1) the criterion validity of self-reported PLEs for clinician-rated psychotic symptoms and APS in relation to additional qualifiers and (2) their association with subclinical mental problems and nonpsychotic mental disorders in a help-seeking sample from the Cologne Early Recognition and Intervention Centre for Mental Crises (FETZ) [34].

Methods

Sample

The sample consisted of 123 young adults (mean age 24 years, SD 5 years; 68% male; 90% single) who consulted the FETZ within a 10-month period who had no somatic condition that could account for their mental problems. The mean number of years of schooling was 11 (SD 1); the mean Global Assessment of Functioning score was 50 (SD 12), and 16% reported a positive family history of psychosis in a first-degree biological relative.

Fifty-four patients (43.9%) were either diagnosed with a psychotic disorder or fulfilled criteria for an at-risk state for psychosis according to basic symptoms or ultra-high-risk criteria [20, 34] (fig. 1). The remaining 69 patients (56.1%) met the criteria for a nonpsychotic mental disorder or complained about only subthreshold nonpsychotic mental problems according to the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (fig. 1). Three of them had reported APS phenomena but also APS exclusion criteria according to the SIPS (i.e. substance induced, completely explained by another axis I disorder or present for more than a year in its current severity); yet, for the question of criterion validity, these phenomena were, nevertheless, accounted for as APS/psychotic symptoms.

Instruments

APS and psychotic symptoms were assessed with the SIPS 3.0 [21], a semistructured clinical interview for the assessment of ultra-high-risk criteria [19–21]. Delusional or hallucinatory psychotic symptoms were rated with a score of 6 on the first 4 SIPS positive (P) items, i.e. P1 'Unusual Thought Content/Delusional Ideas', P2 'Suspiciousness/Persecutory Ideas', P3 'Grandiosity' and P4 'Perceptual Abnormalities/Hallucinations'; delusional or hallucinatory APS were rated by a score between 3 and 5 on the same 4 SIPS P items.

PLEs were assessed with the German versions of the PDI and the LSHS-R [6, 27, 28]; both possess good psychometric properties [6, 27, 35]. The PDI comprises 40 binary items rating the presence of a broad variety of delusion-like experiences. Whenever an item

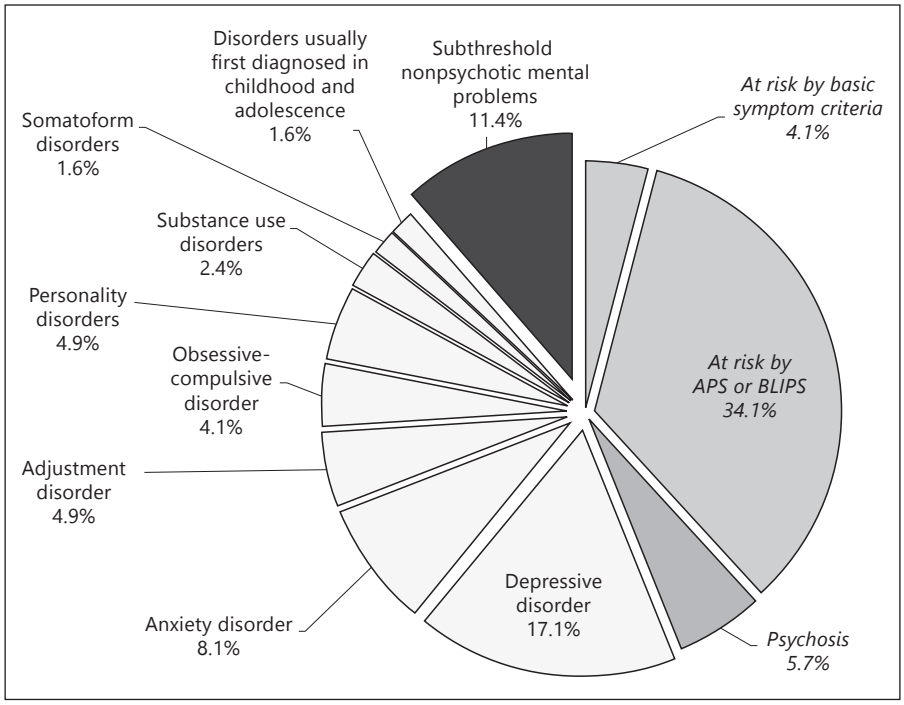

Fig. 1. Distribution of psychotic, at-risk and nonpsychotic clinical diagnoses (n = 123). BLIPS = Brief limited intermittent psychotic symptoms.

is affirmed, the participant is asked to rate the additional dimensions of distress, preoccupation and conviction on a 5-point Likert scale. The LSHS-R is a 12-item self-report instrument for the assessment of hallucination-like experiences on a 5-point Likert scale indicating the extent to which different hallucination-like experiences apply to the patient.

In the following, the term 'simple rating' refers to the sole binary rating of the presence of PLEs according to the PDI and the LSHS-R (a score of at least 1; i.e. not definitely ruled out as nonapplicable) independent of additional qualifiers.

The term 'compound rating' refers to PDI items that were rated as present and, additionally, were at least moderately distressing (minimum score of 3), at least moderately preoccupying (minimum score of 3) and very possibly or absolutely true (score of at least 4).

The term 'high rating' refers to LSHS-R items with a score of 4 or 5 (i.e. hallucinatory experience rated as rather or certainly applying to the patient's experiences).

Procedure

As part of the routine clinical diagnostic protocol of the FETZ [34], patients were assessed for ultra-high-risk criteria with the SIPS. Furthermore, patients were asked to complete a battery of questionnaires, including the PDI and LSHS-R. Every patient had consented to his/her clinical data being used for research in an anonymized way in group statistics.

Statistical Analyses

The statistical analyses were conducted using the Statistical Package for the Social Sciences 19. As a measure of the criterion validity, the association between the presence of PLEs and APS/psychotic symptoms was analyzed using the Pearson's correlation coefficient. At the given sample size, a moderate correlation of $r = 0.30$ was detectable at $\alpha = 5\%$ with a power of 93%. In addition, the degree of agreement between the presence of PLEs and APS/psychotic symptoms (i.e. between the two assessment modes) was calculated by Cohen's κ. Because correlation coefficients and κ values are effect sizes, their absolute values are more informative than their highly sample size-dependent significance levels.

The association of PLEs with the at-risk/psychosis group, the nonpsychotic disorder group and the subclinical mental problems group was studied by pairwise comparisons of the prevalence of any PLE in the groups by 2×2 χ^2 tests and its related effect size, Cramer's V.

Because of the focus on the respective effect sizes, an error adjustment for multiple testing was not carried out.

Results

The Prevalence of APS and Psychotic Symptoms

In the clinical interviews, 10 patients (8.1%) reported psychotic symptoms (fig. 2). Five patients with psychotic symptoms (4.1%) reported APS in addition. Altogether, APS were reported by 45 patients (36.6%); 19 (15.4%) reported attenuated delusions, 15 (12.2%) reported both attenuated delusions and attenuated hallucinations and 11 (8.9%) reported attenuated hallucinations (fig. 2). At least one APS and/or psychotic symptom was found in 50 patients (40.7%).

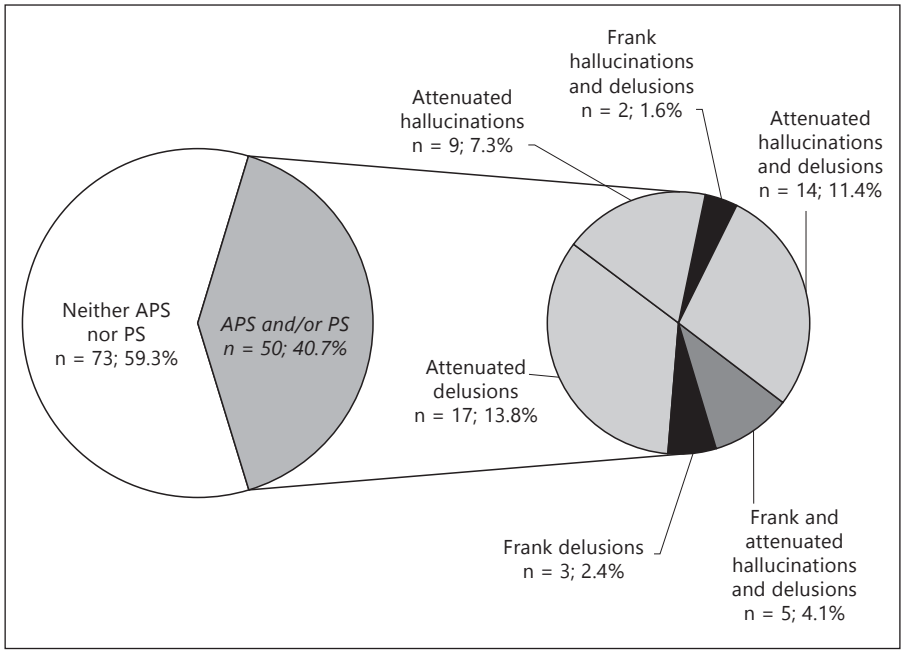

Fig. 2. Distribution of clinician-rated attenuated and psychotic hallucinations and delusions according to the SIPS [21]. PS = Psychotic symptoms.

The Prevalence of PLEs

All but 2 patients (98.4%) reported PLEs according to the simple rating; 112 patients (91.8%) confirmed the presence of at least one delusion-like experience according to the PDI, slightly fewer confirmed at least one hallucination-like experience according to the LSHS-R (n = 110; 90.2%) and 102 (83.6%) reported both. For the simple ratings, positive confirmation of delusion-like experiences was not significantly related to that of hallucination-like ones [$\chi^2(1) = 1.269$, $p = 0.255$].

As expected, the prevalence of PLEs according to the high or compound rating at 52.8% (n = 65) was lower yet still higher than the prevalence of APS/psychotic symptoms. Applying high and compound ratings, hallucination-like experiences (n = 42; 37.7%) were as frequent as delusion-like ones (n = 42; 37.7%); both were reported by 27 patients (22.1%). The presence of any one compound-rated delusion-like experience was significantly related to that of any one high-rated hallucination-like experience [$\chi^2(1) = 13.852$, $p < 0.001$].

The Criterion Validity of PLEs

Of the 50 patients with APS/psychotic symptoms, all (100%) reported simple-rated PLEs; yet, of the 73 patients without APS/psychotic symptoms, 71 (97.3%) also reported simple-rated PLEs. Thus, the presence of simple-rated PLEs was unrelated to the presence of APS/psychotic symptoms [$\chi^2(1) = 1.393$, $p = 0.283$], and a level of agreement just exceeding chance ($\kappa = 0.022$) was found (table 1).

With regard to the compound- and high-rated PLEs, 37 patients (74.0%) with APS/psychotic symptoms reported PLEs, while only 28 (38.4%) of those without did so. Although the presence of compound- and high-rated PLEs was significantly related to the presence of APS/psychotic symptoms [$\chi^2(1) = 15.130$, $p < 0.001$], the level of agreement between self-rating and clinician rating (i.e. between PLEs and APS/psychotic symptoms) was only fair ($\kappa = 0.340$) and, therefore, insufficient.

Generally, the presence of delusion- or hallucination-like experiences was only weakly correlated with a positive clinical rating of APS and/or psychotic symptoms ($r < 0.300$), except for the compound ratings of delusion-like experiences in the PDI. Compound-rated delusion-like experiences were moderately correlated with most of the clinician ratings of attenuated delusions, any psychotic symptom and any APS (table 1). However, a moderate degree of agreement between the clinician ratings and self-ratings was observed ($\kappa > 0.400$) only between compound-rated delusion-like experiences and the presence of any APS/psychotic symptoms (table 1).

The Association of PLEs with Nonpsychotic Disorders

Simple ratings of delusion- and hallucination-like experiences were highly frequent in all three groups, with only moderate group effects in favor of the at-risk/psy-

Table 1. Correlations between the presence of self-rated PLEs (assessed by the LSHS-R [6, 27] and PDI [6, 26]) and the presence of clinician-rated APS and/or psychotic symptoms according to the SIPS [22] (n = 123)

	Any simple-rated hallucination-like experience (LSHR-R)	Any high-rated hallucination-like experience (LSHR-R)	Any simple-rated delusion-like experience (PDI)	Any compound-rated delusion-like experience (PDI)
Any attenuated hallucination	r = 0.168 (2.8%) p = 0.065 κ = 0.055	r = 0.234 (5.5%) p = 0.010 κ = 0.214		
Any psychotic hallucination	r = 0.061 (0.4%) p = 0.506 κ = 0.007	r = 0.142 (2.0%) p = 0.120 κ = 0.064		
Any attenuated or psychotic hallucination	r = 0.184 (3.4%) p = 0.042 κ = 0.066	r = 0.281 (7.9%) p = 0.002 κ = 0.266		
Any attenuated delusion			r = 0.184 (3.4%) p = 0.042 κ = 0.065	r = 0.236 (5.7%) p = 0.009 κ = 0.230
Any psychotic delusion			r = 0.084 (0.7%) p = 0.358 κ = 0.014	**r = 0.364** (13.2%) p = 0.000 κ = 0.233
Any attenuated or psychotic delusion			r = 0.210 (4.4%) p = 0.020 κ = 0.085	**r = 0.380** (14.4%) p = 0.000 κ = 0.379
Any APS	r = 0.133 (1.8%) p = 0.143 κ = 0.062	r = 0.226 (5.1%) p = 0.012 κ = 0.226	r = 0.164 (2.7%) p = 0.070 κ = 0.071	**r = 0.320** (10.2%) p = 0.000 κ = 0.320
Any psychotic symptom	r = –0.002 (0.0004%) p = 0.986 κ = 0.000	r = 0.137 (1.9%) p = 0.131 κ = 0.092	r = 0.088 (0.8%) p = 0.330 κ = 0.016	**r = 0.323** (10.4%) p = 0.000 κ = 0.217
Any APS/psychotic symptom	r = 0.102 (1.0%) p = 0.263 κ = 0.052	r = 0.294 (8.6%) p = 0.001 κ = 0.294	r = 0.186 (3.5%) p = 0.040 κ = 0.086	**r = 0.421** (17.7%) p = 0.000 **κ = 0.420**

Values represent Pearson's r (explained variance), two-sided p values and κ values. Values in bold indicate a moderate agreement of $0.600 \geq \kappa > 0.400$ [36] and/or an at least moderate correlation of $0.500 > r \geq 0.300$.

chosis group (table 2). Considering compound or high ratings, prevalence rates went down considerably in all three groups, although the decrease was lowest in the at-risk/psychosis group (table 2). In particular, the compound ratings of delusion-like experiences discriminated the at-risk/psychosis group from the other groups, even if only with a moderate effect size. The groups with subclinical mental problems and nonpsychotic disorders did not differ in any comparison (table 2). At a cutoff of 'any one PLE', simple-rated delusion-like experiences correctly classified 50.4% as at risk/psychotic or not, and simple-rated hallucination-like ones 50.0%, while compound-rated delusion-like experiences correctly classified 70.7%, and high-rated hallucination-like experiences correctly classified 64.8%.

Discussion

In line with some earlier reports [23, 24], it was found that self-rated PLEs overestimated the prevalence of clinician-rated psychotic symptoms severalfold, even if additional qualifiers were accounted for. Only in the case of delusion-like experiences assessed with the PDI was their

Table 2. Prevalence of PLEs (assessed by the LSHS-R [6, 27] and PDI [6, 26]) in those with an at-risk mental state or psychosis (n = 54), a nonpsychotic mental disorder (n = 55) or no full-blown mental disorder (n = 14)

	Any simple-rated hallucination-like experience (LSHR-R)	Any high-rated hallucination-like experience (LSHR-R)	Any simple-rated delusion-like experience (PDI)	Any compound-rated delusion-like experience (PDI)
No full-blown mental disorder	92.9%	42.9%	78.6%	14.3%
Nonpsychotic mental disorder	83.6%	21.8%	89.1%	21.8%
At-risk mental state or psychosis	96.2%	52.8%	98.1%	59.3%
No disorder vs. nonpsychotic disorder	n.s. V = 0.105	n.s. V = 0.193	n.s. V = 0.126	n.s. V = 0.075
No disorder vs. at risk/psychosis	n.s. V = 0.066	n.s. V = 0.081	$\chi^2 = 7.696$ p = 0.025 V = 0.336	$\chi^2 = 8.995$ p = 0.003 V = 0.364
Nonpsychotic disorder vs. at risk/psychosis	$\chi^2 = 4.677$ p = 0.031 V = 0.208	$\chi^2 = 11.131$ p = 0.001 V = 0.321	n.s. V = 0.185	$\chi^2 = 15.868$ p < 0.001 V = 0.382

Statistical results represent $\chi^2(1)$ values, two-sided p values and Cramer's V. Cramer's V is interpreted as follows: 0.01 = Small effect; 0.03 = moderate effect; 0.05 = large effect. n.s. = Not significant ($p \geq 0.05$).

validity as an approximation of clinician-rated (attenuated) delusions somewhat improved by the consideration of a certain level of distress and preoccupation as well as a high degree of the patient's conviction of these phenomena being real-world experiences. Even when these additional qualifiers were considered, the correlation between the presence of at least one delusion-like experience and at least one clinically rated delusion was still only moderate, and about 85% of the variance of clinician-rated delusions was unaccounted for by self-rated delusion-like experiences. Accordingly, the agreement between both assessment modes was only fair and, therefore, insufficient. These negative findings were even aggravated in hallucination-like experiences assessed with the LSHS-R; their presence was only weakly correlated with clinician-rated hallucinations in both the simple and high rating. Thus, contrary to earlier suggestions [2, 23, 27, 32, 33], PLEs – at least when assessed with the PDI and the LSHS-R and, most probably, with instruments modeled on these such as the CAPE – cannot be regarded as a valid estimate of clinician-rated psychotic symptoms, even if additional qualifiers are taken into account.

However, based on the apparent difference between prevalence rates of PLEs and psychotic disorders, it had been argued that the high rates of PLEs in the general population might reflect high rates of subclinical APS just below the threshold of clinician-rated psychotic symptoms rather than psychotic symptoms themselves [1]. In line with this argument, and ignoring the difference in assessments [18], it has been cautioned that the current at-risk criteria for psychosis – first and foremost APS – might be rather common phenomena of no pathological significance and, therefore, not fit to be used as diagnostic criteria [14, 15]. Yet, the correlation and agreement of clinician-rated APS with self-reported PLEs in our study were just as low as those between psychotic symptoms and PLEs, although the difference in prevalence rates between APS and PLEs was even mitigated by the higher prevalence of APS compared to psychotic symptoms. Furthermore, the use of additional qualifiers or higher threshold values again did not substantially improve the correlation and agreement between APS and self-reported PLEs.

In addition, in line with earlier studies indicating an association of PLEs with mental problems and disorders in general and not only with potentially prepsychotic or psychotic conditions [1, 10, 25, 26], at the cutoff of 'any one PLE' according to the PDI or LSHS-R, simple ratings of PLEs were highly frequent in all three groups. Consequently, had they been used as a screener as suggested by several studies [36–38], simple-rated PLEs would have been highly sensitive but far too unspecific, as they would have detected nearly everyone with mental problems presenting at the early detection center, including those

without any mental disorder. The specificity of PLEs might have been higher at higher thresholds, but most likely at the cost of sensitivity, as reported in a study evaluating the CAPE as a screening instrument for at-risk states according to the Comprehensive Assessment of At-Risk Mental States [36].

With the compound or high rating, PLEs were distinctively more frequent in the at-risk/psychosis group; however, in this group they would have failed to detect more than 40%, thus possessing too little sensitivity for a screening instrument [39]. Yet, at correct classification rates of 70.7 and 64.8% when the compound rating was considered, both the PDI and LSHS-R were superior to the 44% rate recently reported for the Prodromal Questionnaire in a large, more unselected help-seeking sample [37].

There are some strengths and weaknesses to our study. Firstly, we did not study a general population but rather a help-seeking sample. Yet, help seeking has been argued to raise the validity of PLEs [2]; consequently, a sample bias towards higher rather than lower correlations or levels of agreement between APS/psychotic symptoms and PLEs would have to be assumed in our study, and thus, even lower criterion validity might have to be assumed for the general population. Furthermore, the fact that APS and psychotic symptoms were not a rare event in our help-seeking sample – as might have been the case in a general population sample [40] – should have increased the reliability of the κ calculation, because κ is known to be unreliable for rare observations [41].

In conclusion, our findings in a help-seeking sample indicate that self-reported PLEs cannot be considered a valid approximation of APS or (transient) psychotic symptoms as defined in early detection research, even if additional qualifiers are used. Consequently, the prevalence and, therefore, the potential pathological significance of APS in the general population cannot be deduced from epidemiological studies of self-reported PLEs but warrants dedicated studies that assess these symptoms in a way that reflects their clinical evaluation. Furthermore, self-reported PLEs would have been too unspecific with the simple rating and too insensitive with the compound rating to be recommendable for screening for patients potentially at risk for psychosis. Thus, although PLEs may possess some predictive value [3, 42], in-depth clinical interviews still have to be considered the best possible assessment of APS and psychotic symptoms and, therefore, of the estimation of an increased risk for psychosis.

Disclosure Statement

The authors declare no conflicts of interest in relation to the subject of this study.

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