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Internal Validation of the Latvian Version of 16-Item Prodromal Questionnaire in A Help-Seeking Adolescent Population: Psychometric Analysis and Associated Factors

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ABSTRACT

Objectives: The prodromal phase of a psychotic disorder is a period of altered functioning before the onset of the acute state; several interviews have been developed to determine whether individuals present with prodromal symptoms. The 16-item Prodromal Questionnaire (PQ-16) is a screening tool for evaluating those at risk of developing a psychotic disorder. The study aimed to evaluate the psychometric properties of the Latvian version of the PQ-16 in a sample of help-seeking adolescents referred for diagnostic assessment and look for possible associated socio-demographic and health-related factors.

Methods: A cross-sectional study included patients admitted for evaluation between November 2022 and February 2023 in Riga's Children's Clinical University Hospital Child Psychiatry clinic. The data were collected during outpatient consultations by mental health professionals. We used the Latvian translation of PQ-16 and the socio-demographic and health-related factors questionnaire. Data were analysed with IBM SPSS 28; the scale's diagnostic accuracy and internal validity were examined.

Results: The study involved 107 adolescents aged 12% to 17%, 80.5% female, with a mean age of 14.98 (CI 14.70–15.26). Socio-demographic data and health-related variables did not significantly differ between the sexes ($p > 0.05$). The Latvian PQ-16 demonstrated excellent internal reliability with a Cronbach's alpha of 0.890. All 16 items were found to be valid with $p < 0.001$. A significant number of participants (73.8%) scored above the current cut-off of ≥ 6 with a mean of 9.17 (95% CI 8.41–9.93). Certain socio-demographic factors, such as female gender ($p < 0.001$), fair school performance ($p = 0.048$) and recent changes in school performance ($p < 0.001$), demonstrated a significant association with higher scores. Additionally, there were found significant associations between positive screening and health-related factors such as obstetric complications ($p = 0.044$), smoking ($p = 0.002$), alcohol consumption ($p = 0.021$), history of bullying in school ($p < 0.001$) and emotional abuse at home ($p = 0.011$).

Conclusions: Latvian translation of PQ-16 showed high internal reliability and validity levels. Positive PQ-16 screening was associated with female gender, worsened school performance, obstetric complications, substance abuse and experienced emotional violence. The average score of 9.17 positive answers and 73.8% of participants screening positive for attenuated psychotic symptoms is significantly higher than in recent studies under similar conditions.

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1 | Introduction

Psychosis is a disabling mental disorder characterised by an altered state of mind, hallucinations, delusional ideas and disorganised behaviour (Singh et al. 2005) that usually manifests in adolescence or young adulthood (Solmi et al. 2022). It has become a significant public health issue lately, affecting up to 3% of the world's population (McGrath et al. 2004). It is known, that more than half of mental disorders start to present non-specific symptoms before the age of 14. According to recent data, the prevalence of mental disorders worldwide has reached 8% in children up to 9 years and 14% in adolescents (WHO 2022).

Over the last few decades, the research focus moved from early recognition and phase-specific intervention of first-episode psychosis to the prodromal phase (Schultze-Lutter et al. 2015). As early detection and treatment of psychotic diseases have been linked to better prognosis results (Van Os et al. 2009), there has been an increase in interest in identifying those who are at risk of developing psychosis, especially among adolescents, who are a high-risk population (Pantelis et al. 2009). A recent meta-analysis showed that the prevalence of UHR in the general adolescent population is 1.7% with a much higher prevalence in those who were referred to mental health services – 19.2% (de Pablo et al. 2021). It is worth mentioning that psychotic-like experiences (PLEs), characterised as subclinical delusions and transitory hallucinations, are relatively common in the general adolescent population, with reported prevalence rates ranging from 5% to 20% (Kelleher and Cannon 2011). Although the symptoms are less frequent and persistent, they qualitatively match those of active psychosis. Most often, they are mild and do not cause considerable functional impairment or distress; however, they could increase the risk of having a psychotic disorder later in life (Kelleher et al. 2012). Around 20% of adolescents with PLEs may develop persistent psychotic experiences and half of this group develop a psychotic disorder (Linscott and van Os 2013).

The prevention of severe mental disorders is vital in many ways, with the main goal of intervening with the premature death of those who suffer from severe mental conditions, which may occur 10 to 20 years earlier than the general population. Studies show, that only 25% of a healthy person's functionality and health are expected to be present in an individual experiencing acute schizophrenia (WHO 2022).

The prodromal phase of psychosis is a period of altered functioning before the onset of the acute state, which can present with a progression of negative symptoms like blunted affect, avolition or social impairment (Correll and Schooler 2020) and increasing cognitive impairment, which includes difficulty in abstract thinking, poor attention and stereotyped thinking (McCutcheon, Keefe, and McGuire 2023). In 1996, the concept of ultra-high risk (UHR) of developing a psychotic disorder was introduced (A. Yung et al. 1996). UHR criteria mainly concentrate on present attenuated positive symptoms and divide at-risk individuals into three groups: attenuated psychotic symptoms, brief limited intermittent psychotic symptoms and genetic risk and deterioration syndrome. Since then, several semi-structured

diagnostic clinical interviews like Comprehensive Assessment of At-Risk Mental State (CAARMS) and Structured Interview of Prodromal/Psychosis-Risk Syndromes (SIPS) have been developed to determine whether individuals present with UHR. (Miller et al. 2003; A. R. Yung et al. 2005). It has commonly been assumed that UHR state has a particular predictive value of developing full-blown psychosis (Fusar-Poli et al. 2012).

Over the last two decades, the UHR approach to psychosis risk has had a tremendous impact on the field, prompting researchers and clinicians to consider the prospect of early detection and, perhaps, prevention of a psychotic disorder. However, there has been little research on how this practice works with children and adolescents. According to a recent meta-analysis, the transition rate from UHR status to full-blown psychosis in adolescents is from 9.5% after 1 year to 16.1% after 5 years (Lång et al. 2022).

Despite being crucial for the proper diagnosis of UHR states, diagnostic interviews typically demand additional training for mental health specialists and are very time-consuming (Brandizzi et al. 2014; Fusar-Poli et al. 2012). For that reason, self-report screening tools have been designed to identify candidates for later comprehensive clinical evaluation (Addington, Stowkowy, and Weiser 2015). The 16-item Prodromal Questionnaire (PQ-16) is a screening tool for evaluating those at risk of developing a psychotic disorder (Ising et al. 2012). According to the literature, PQ-16 is the most frequently employed instrument before conducting structured clinical interviews (Kline and Schiffman 2014). It consists of 16 statements that the respondent evaluates by the True/False Likert scale. This questionnaire evaluates two negative symptoms, nine perceptual abnormalities and six unusual thought contents. In case of a positive answer, the respondent should evaluate their experienced distress on a scale from '0' to '3'. A total symptom count of 6 and more and a distress score of 9 and more points predicted UHR state in previous studies with excellent sensitivity (87%) and specificity (87%).

At the moment, there is a lack of data on the applicability of PQ-16 on the adolescent population and on associated factors that may contribute to the UHR state's development (Gandhi and Cullen 2022). Moreover, in spite of the validation of PQ-16 in multiple countries (Aguiar et al. 2021; Kim et al. 2018; Pelizza et al. 2019), its suitability for the Latvian population has not yet been determined. Taking into account the lack of similar instruments to identify patients with a high risk for psychosis, an implementation of PQ-16 in local clinical practice can be beneficial in many ways. Several studies demonstrate its effectiveness and reliability as a screening tool, emphasising its practicality in various settings and by different healthcare personnel. The instrument can also be used in research settings, to discover potential triggers for the emergence of psychotic diseases. As structured CAARMS interview is currently in a local validation process, this study serves as a crucial first step in the UHR states research. Our study aims to evaluate the psychometric properties of the Latvian version of the PQ-16 in a sample of help-seeking adolescents referred for diagnostic assessment and look for possible associated socio-demographic and health-related factors.

2 | Materials and Methods

2.1 | Setting

The present study was conducted at Riga's Children's Clinical University Hospital Child Psychiatry clinic. Riga's Children's Clinical University Hospital is the only specialised paediatric facility in Latvia, providing in-patient care for 30000 children each year, with over 160000 children receiving outpatient medical care (Children's Clinical University Hospital 2023). Child Psychiatry Clinic is a single clinic that provides 7400 state-funded child and adolescent psychiatrists consultations annually, both primary and follow-up visits. The primary catchment region of the hospital consists of 989525 inhabitants as of the beginning of 2022, with 195127 being under 18years old (Official Statistics of Latvia 2023).

2.2 | Procedure

The study implicated a cross-sectional design and included patients admitted for the first time between November 2022 and March 2023. Participants in the study were help-seeking adolescents aged 12 to 17years who were referred for assessment to the Child Psychiatry Clinic by a general practitioner or other specialist doctor. Every adolescent referred during the mentioned period was invited to participate in a study. It was indicated to the patients and their families that refusal to participate would have no consequences regarding the assessment or treatment.

The exclusion criteria for partaking were as follows: previous known psychotic episodes, a history of prior antipsychotic exposure, intellectual disability (IQ <70), known neurological disorders, including brain injury or any other medical condition associated with psychiatric symptoms, as well as a lack of fluency in Latvian language.

The first of evaluation step consisted of filling out the PQ-16 and socio-demographic questionnaires before seeing a psychiatrist. We used the Latvian translation of PQ-16, which underwent linguistic validation by bilingual translators, ensuring the translated tool retained its original intent and semantic meaning while being contextually relevant and understandable for the Latvian population. The original English version of the PQ-16 was translated into Latvian by a fluent speaker of both English and Latvian languages, then translated back into English by a different translator who had no prior knowledge of the original document. The back-translated English version of the PQ-16 is then compared to the original version. The differences in meaning were identified and addressed by a third translator. The revised translation is then given to a small group of target language speakers for pilot testing. We referred to the screening process as 'screening for unusual experiences' rather than 'screening for psychotic symptoms' to avoid stigma. Participants were asked to provide scores based on their experience within the last 6 months. Clinicians involved in the patient's therapy had access to the PQ-16 scores; additional questions regarding health-related conditions were asked during the second step assessment with a psychiatrist. Based on the symptoms recognised by a psychiatrist or named by the parents or the adolescent, the diagnosis was established according to ICD-10 criteria (World Health Organization 2016).

In the context of psychiatric research and clinical practice in Latvia, it is noteworthy to mention the lack of validated psychometric tools, which significantly narrows the opportunities to validate new instruments. This issue particularly applies to external validation. Consequently, diagnoses in Latvia are predominantly established based on the ICD-10 diagnostic criteria. While this approach ensures alignment with global standards, the absence of localised tools underlines the need to develop and validate culturally tailored psychometric instruments in the region. This study is part of a project for implementing various screening instruments in clinical practice, like PQ-16 and CAARMS.

In accordance with the Helsinki Declaration, proper ethical permissions were sought for the study. The data were used anonymously for research purposes only; written informed consent was obtained from each study participant. The permission has been granted by the Riga Stradins University Research Ethics Committee (Number 2-PEK-4/566/2022).

2.3 | Statistical Analyses

In this study, we implemented the approach previously used in similar studies of validation of the PQ-16 tool. The statistical approach to the evaluation of the reliability and internal consistency of the instrument was identical to de Jong et al. and Pelizza et al. (de Jong et al. 2022; Pelizza et al. 2019).

As a reliability indicator, Cronbach's alpha statistics were used to analyse the internal consistency of the Latvian version of PQ-16 within the study sample (Pelizza et al. 2019). The correlation between each PQ-16 item and the overall questionnaire score was also examined. Then, with each removed item, we again checked Cronbach's alpha score. Removal of this item would be thought to improve the reliability of the questionnaire if this score improved after the item was removed (S. B. Green et al. 2016).

The statistical analysis was performed with SPSS 28.0. Descriptive statistics were used to calculate odds ratio and chi-square statistics to explore the differences in gender, socio-demographic and health-related characteristics and samples above or below the distress and total answer PQ-16 cut-off scores, which were determined as $>=9$ and $>=6$, respectively (19, 29). We used Mann-Whitney *U* tests to examine whether any of the above traits were associated with the PQ-16 total score. Associations between the PQ-16 scores and age was calculated using bivariate correlations. Kendall's τ was used for ordinal data and Spearman's ρ for continuous skewed data. A Mann-Whitney *U* test examined the difference between boys and girls on the PQ-16 total score. Correction for multiple testing was performed using the Benjamini-Hochberg procedure.

3 | Results

3.1 | Sample Characteristics

The socio-demographic characteristics of the participants and the diagnoses after the assessment are shown in Table 1. Totally 107 participants aged 14.98 (CI 14.70–15.26) were included during the study period. Most participants were female, resided

in Riga and lived in a family with both parents. The most frequent diagnosis, established in 34% of cases, was a depressive episode (F32, according to ICD-10). If a diagnosis was established for less than four patients, it was included in the category 'Other.'

Among health-related factors, the most frequent ones were COVID-19 infection within two last years (74.8%), self-harming behaviour (46.7%), family history of mental disorder (31.8%) and smoking (27.1%). The complete list of explored factors is shown in Table 2.

3.2 | PQ-16 Inner Validity

Cronbach's alpha for the total answer score on the Latvian translation of PQ-16 was 0.890. All 16 items were found to be valid with $p < 0.001$. Removing item 7, 'I get extremely anxious when meeting people for the first time,' slightly improved Cronbach's Alpha to 0.895, consistent with a recent Italian study (Pelizza et al. 2019). All item-total correlations and Cronbach's alpha if the item was deleted can be observed in Table 3.

3.3 | PQ-16 Scores

In the current study, the average count of PQ-16 positive answers was 9.17 (95% CI 8.41–9.93) and participants scored an average of 16.57 (95% CI 14.59–18.55) points on the distress scale. 79.4%

TABLE 1 | Socio-demographic characteristics of the participants.

	N	%
<i>Gender</i>		
Male	20	18.7
Female	87	81.3
<i>Area of residence</i>		
Capital	73	68.2
City < 100.000 inh.	34	31.8
<i>Family</i>		
Single-parent	46	43.0
Full	61	57.0
<i>School performance</i>		
Good	27	25.2
Fair	66	60.7
Bad	14	12.1
<i>Diagnosis</i>		
Depressive episode	34	32.1
Depressive conduct disorder	15	14.2
Anxiety disorder	30	28.3
Other	28	25.5

of participants screened positive according to the answer count criteria and 73.8% according to the distress score.

Item 15 (OR 49.179, 95% CI 6.341–381.432), item 5 (OR 37.091, 95% CI 10.783–127.580) and item 10 (OR 27.692, 95% CI 3.586–213.842) had the highest odds ratios for scoring positive on the total score scale, item 6 (OR 1.583, 95% CI 1.344–1.880) and item 9 (OR 1.609, 95% CI 1.347–1.922) had the lowest ones.

3.4 | PQ-16 Association With Socio-Demographic and Health-Related Factors

No significant correlations were found between age and PQ-16 scores in distress ($p = 0.271$) and total answer ($p = 0.317$) scores. Patients diagnosed with a disorder other than depressive episode (F32, ICD-10), neurotic and stress-related disorders (F4, ICD-10), or depressive conduct disorder (F92, ICD-10) scored significantly lower than those with the abovementioned diagnoses. Associations between socio-demographic and health-related factors are presented in Table 4 and Table 5, respectively. We explored the differences in mean distress and total answer scores and compared the groups by scoring positive or negative on each scale.

Female gender, worsening school performance within last year, history of bullying at school and home, smoking and self-harming behaviour were significantly associated with higher scores on the distress scale, answering 'True' to more statements and scoring positive both by distress and answer count criteria.

There was found a statistically significant difference in mean PQ-16 distress score between participants with fair and other school performances ($p = 0.048$) and the mean total answer count was higher in participants with regular alcohol consumption ($p = 0.021$). Drug use was associated with a higher probability of scoring positive according to the total answer scale ($p = 0.049$).

TABLE 2 | Prevalence of health-related factors in the study population.

Factor	N	%
Obstetric complications	23	21.5
Infection during the first year of life	13	12.1
Chronic somatic illness	23	21.5
COVID-19 infection	80	74.8
Smoking	29	27.1
Alcohol consumption	11	10.3
Drug usage	16	15.0
Family history of psychotic spectrum disorder	7	6.5
Family history of any mental disorder	34	31.8
History of bullying in school	56	52.3
History of emotional abuse at home	34	31.8
Self-harming behaviour	50	46.7

TABLE 3 | Internal consistency of the Latvian translation of PQ-16.

Nr.	Item	Item-total correlation	Cronbach's alpha if item deleted
1	I feel uninterested in the things I used to enjoy.	0.594	0.884
2	I often seem to live through events exactly as they happened before (deja-vu).	0.578	0.885
3	I sometimes smell or taste things that other people can't smell or taste.	0.639	0.882
4	I often hear unusual sounds like banging, clicking, hissing, clapping or ringing in my ears.	0.750	0.877
5	I have been confused at times whether something I experienced was real or imaginary.	0.676	0.880
6	When I look at a person, or look at myself in a mirror, I have seen the face change right before my eyes.	0.615	0.883
7	I get extremely anxious when meeting people for the first time.	0.382	0.895
8	Have seen things that other people apparently can't see.	0.644	0.882
9	My thoughts are sometimes so strong that I can almost hear them.	0.699	0.879
10	I sometimes see special meanings in advertisements, shop windows, or in the way things are arranged around me.	0.538	0.886
11	Sometimes I have felt that I'm not in control of my own ideas or thoughts.	0.725	0.875
12	Sometimes I feel suddenly distracted by distant sounds that I am not normally aware of.	0.675	0.881
13	I have heard things other people can't hear, like voices of people whispering or talking.	0.528	0.886
14	I often feel that others have it in for me.	0.506	0.888
15	I have had the sense that some person or force is around me, even though I could not see anyone.	0.705	0.879
16	I feel that parts of my body have changed in some way, or that parts of my body are working differently than before.	0.551	0.885

Note: The bold value represents the improved Cronbach's Alpha for the internal consistency of the scale after removing item 7.

Obstetric complications were associated with higher mean distress scores ($p=0.050$) and a probability of scoring positive according to distress criteria ($p=0.044$).

4 | Discussion

This study aimed to assess the psychometric properties of the Latvian translation of PQ-16 in a sample of help-seeking

adolescents referred to psychiatric assessment and to identify potential socio-demographic and health-related factors related to the possible ultra-high-risk state. Validating the PQ-16 in the Latvian context is critical as it provides a culturally sensitive tool for the early identification of psychosis risk in the Latvian adolescent population. This study, though focused on Latvia, carries global relevance. The unique symptomatology and risk factors identified can inform more culturally nuanced mental health practices worldwide. Based on these

TABLE 4 | PQ-16 scores and association with socio-demographic factors.

	PQ-16 distress score, Mean (95% CI)	P value	PQ-16 total answer score, Mean (95% CI)	P value	Distress-positive, n, %	P value	Answers-positive, n, %	P value
Sex								
	Male	8.50 (CI 4.88–12.12)	<0.001	5.85 (CI 3.98–7.72)	<0.001	8 (40.0%)	11 (55.0%)	0.005
	Female	18.43 (CI 16.30–20.55)		9.93 (CI 9.17–10.69)		71 (81.6%)	74 (85.1%)	
Area of residence	Riga	16.84 (CI 14.31–19.36)	0.997	9.12 (CI 8.13–10.11)	0.836	54 (74.0%)	57 (78.1%)	0.408
	Other city	16.00 (CI 12.78–19.22)		9.26 (CI 8.10–10.42)		25 (73.8%)	28 (82.4%)	
Family	Full	15.33 (CI 12.79–17.87)	0.150	8.80 (CI 7.81–9.79)	0.228	45 (73.8%)	50 (82.0%)	0.286
	Single-parent	18.29 (CI 14.98–21.60)		9.60 (CI 8.35–10.85)		33 (73.3%)	34 (75.6%)	
Changes in school performance within last year	Stable	12.77 (CI 9.90–15.63)	<0.001	7.62 (CI 6.46–8.78)	<0.001	28 (59.6%)	31 (66.0%)	0.003
	Worsened	19.71 (CI 17.09–22.32)		10.38 (CI 9.43–11.33)		49 (84.5%)	52 (89.7%)	
School performance	Good	12.67 (CI 9.22–16.11)	0.048	8.07 (CI 6.86–9.29)	0.080	17 (63.0%)	22 (81.5%)	0.245
	Fair	18.57 (CI 15.96–21.18)		9.72 (CI 8.70–10.74)		52 (80.0%)	53 (81.5%)	
	Bad	14.92 (CI 8.19–21.65)		8.46 (5.61–11.32)		8 (61.5%)	8 (61.5%)	
Diagnosis after the first evaluation ^a	F32	19.68 (CI 16.37–22.98)	<0.001	10.29 (CI 9.06–11.53)	0.004	30 (88.2%)	30 (88.2%)	0.006
	F92	19.67 (CI 13.61–25.73)		10.33 (CI 8.32–12.35)		12 (80.0%)	13 (86.7%)	
	F4	17.97 (CI 14.04–21.89)		9.70 (CI 8.46–10.94)		24 (80.0%)	26 (86.7%)	
	Other	9.48 (CI 6.44–12.52)		6.59 (CI 4.87–8.31)		12 (44.4%)	15 (55.6%)	

Note: The associations indicating statistical significance, are highlighted in bold within the table.

^aAbbreviation: F32: Depressive episode (ICD-10), F4: Neurotic and stress-related disorders (ICD-10), F92: Depressive conduct disorder (ICD-10).

TABLE 5 | PQ-16 scores and association with health-related factors.

		PQ-16 distress score, Mean (95% CI)	P value	PQ-16 total answer score, Mean (95% CI)	P value	Distress-positive (n, %)	P value	Answers-positive (n, %)	P value
Obstetric complications	Yes	20.93 (CI 16.75–25.15)	0.050	10.47 (CI 8.78–12.15)	0.162	14 (93.3%)	0.044	14 (93.3%)	0.118
	No	15.88 (CI 13.59–18.16)		8.86 (CI 7.99–9.74)		61 (69.3%)		67 (76.1%)	
Infection during the first year of life	Yes	18.77 (CI 13.81–23.70)	0.298	9.92 (CI 7.67–12.18)	0.382	12 (92.3%)	0.090	12 (92.3%)	0.196
	No	16.48 (CI 14.28–18.69)		9.11 (CI 8.27–9.95)		66 (71.0%)		72 (77.4%)	
Chronic somatic illness	Yes	17.43 (CI 13.06–21.81)	0.670	9.43 (CI 7.76–11.11)	0.794	18 (78.3%)	0.388	19 (82.6%)	0.450
	No	16.58 (CI 14.27–18.89)		9.15 (CI 8.25–10.04)		60 (72.3%)		65 (78.3%)	
COVID-19 infection	Yes	16.27 (CI 13.96–18.57)	0.364	9.08 (CI 8.18–9.97)	0.487	58 (72.5%)	0.320	64 (80.0%)	0.623
	No	18.36 (CI 14.04–22.68)		9.64 (CI 7.99–11.29)		20 (80.0%)		20 (80.0%)	
Smoking	Yes	21.07 (CI 18.13–24.01)	0.002	11.07 (CI 9.94–12.20)	0.003	27 (93.1%)	0.003	27 (93.1%)	0.024
	No	14.94 (CI 12.49–17.38)		8.45 (CI 7.52–9.38)		51 (66.2%)		57 (74.0%)	
Alcohol consumption	Yes	20.55 (CI 14.76–26.33)	0.105	11.49 (CI 9.04–13.86)	0.021	9 (81.8%)	0.403	10 (90.0%)	0.285
	No	16.32 (CI 14.17–18.48)		8.91 (CI 8.10–9.71)		69 (72.6%)		74 (77.9%)	
Drug use	Yes	19.73 (CI 15.26–24.21)	0.131	10.87 (CI 9.42–12.31)	0.075	14 (87.5%)	0.143	15 (93.8%)	0.049
	No	16.27 (CI 14.03–18.51)		8.93 (CI 8.06–9.80)		64 (71.1%)		69 (76.8%)	
Family history of psychotic spectrum disorder	Yes	16.43 (CI 5.51–27.34)	0.879	8.71 (CI 5.76–11.67)	0.623	5 (71.4%)	0.596	6 (85.7%)	0.553
	No	16.79 (CI 14.72–18.87)		9.25 (CI 8.43–10.06)		73 (73.7%)		78 (78.8%)	
Family history of any mental disorder	Yes	18.44 (CI 14.47–22.42)	0.237	9.74 (CI 8.34–11.13)	0.254	26 (76.5%)	0.400	28 (82.4%)	0.381
	No	15.96 (CI 13.63–18.28)		8.96 (CI 8.01–9.91)		51 (71.8%)		55 (77.5%)	
History of bullying at school	Yes	19.80 (CI 17.26–22.35)	<0.001	10.70 (CI 9.84–11.55)	<0.001	50 (89.3%)	<0.001	52 (92.9%)	<0.001
	No	13.04 (CI 10.15–15.93)		7.46 (CI 6.29–8.63)		28 (56.0%)		32 (64.0%)	
History of emotional violence at home	Yes	20.12 (CI 16.76–23.48)	0.013	10.68 (CI 9.62–11.73)	0.011	30 (88.2%)	0.014	31 (91.2%)	0.030
	No	14.96 (CI 12.53–17.39)		8.46 (CI 7.47–9.44)		48 (66.7%)		53 (73.6%)	

(Continues)

TABLE 5 | (Continued)

		PQ-16 distress score, Mean (95% CI)	P value	PQ-16 total answer score, Mean (95% CI)	P value	Distress-positive (n, %)	P value	Answers-positive (n, %)	P value
Self-harming behaviour	Yes	21.38 (CI 18.76–24.00)	<0.001	11.04 (CI 10.18–11.90)	<0.001	47 (94.0%)	<0.001	48 (96.0%)	<0.001
	No	12.31 (CI 9.73–14.89)		7.49 (CI 6.40–8.59)		30 (54.5%)		35 (63.6%)	

Note: The associations indicating statistical significance, are highlighted in bold within the table.

findings, the potential broader age applicability of the PQ-16 could advance universal screening and prevention efforts. Overall, the study contributes valuable insights into global psychosis prevention.

In clinical practice, the PQ-16 is often used as a preliminary screening tool to identify individuals who may be at risk for psychosis. Those who screen positive on the PQ-16 are then referred for a more comprehensive evaluation using instruments like CAARMS or SIPS. This sequential use enhances the efficiency and accuracy of identifying at-risk individuals. By using both PQ-16 and CAARMS, clinicians can more accurately identify individuals in the prodromal phase of psychosis, with a lower count of false-positive screenings (Savill et al. 2018).

According to recent research, the majority of young people who may be at risk for psychosis go undiagnosed until they develop the disorder (de Jong et al. 2022). There is still a lack of data on the prevalence of UHR states in the general adolescent population, mostly because instruments like CAARMS or SIPS are very time-consuming, leading to skipping this area in primary evaluation in clinical settings. In contrast, as a brief and straightforward questionnaire, the PQ-16 can be easily administered. This allows clinicians to quickly assess a large number of patients and prioritise those who may need further evaluation. Clinicians can use the preliminary screening results to engage patients in discussions about risk factors, potential lifestyle changes and preventative strategies. Using a screening tool like the PQ-16 might also help in reducing the stigma around seeking help for mental health issues. If individuals can see that questions regarding their PLEs are a standard part of care, they may feel more comfortable discussing those experiences further without fear of judgement.

In our study, we focused on a help-seeking sample to test the psychometric properties of the PQ-16 in a clinical setting. The chosen cohort was based on prior studies by international colleagues. The first and most influential study on the topic by Ising et al. (Ising et al. 2012), which established the cut-off points for positive screening, was also conducted in the clinical setting (secondary mental health care service 'PsyQ Haaglanden' in the Hague area); therefore, this cohort is more applicable to this particular study. In the recent systematic review by Savill et al. (Savill et al. 2018), the group of studies with populations seeking help for non-specific mental health concerns recruited in secondary mental health care settings were considered eligible.

The high internal consistency of the scale (Cronbach's alpha of 0.890) aligns with previous studies validating PQ-16 in different populations (de Jong et al. 2018; Kim et al. 2018; Savill et al. 2018), attesting to its reliability for the Latvian adolescent population. The removal of item 7 slightly improved the score, suggesting that this item may not be culturally sensitive and might need adaptation or further elucidation in non-English-speaking populations (Addington, Stowkowy, and Weiser 2015).

Our findings demonstrate high odds ratios for items 5, 10 and 15, which differs from previous studies (Pelizza et al. 2019), suggesting that these symptoms could be cultural-specific and crucial in identifying UHR states among adolescents in Latvia. Notably,

no significant correlations were found between age and PQ-16 scores, which may indicate the potential use of this instrument in a broader age range.

The study further identified a significant association between several socio-demographic and health-related factors with higher PQ-16 scores. For instance, female gender, declining school performance, bullying, smoking, drug use and self-harming behaviour are linked with higher scores on the distress scale, aligning with prior research establishing these factors as stressors and probable risk factors for psychosis (Fusar-Poli et al. 2017; M. J. Green et al. 2014; Pantelis et al. 2005). Moreover, the associations of obstetric complications with higher PQ-16 scores echo previous studies emphasising the role of biological factors in the development of UHR states and psychosis (Kappelman, Perry, and Khandaker 2022; Wahbeh and Avramopoulos 2021).

The gender discrepancy in this study, where many more girls participated, may be influenced by several factors specific to the children population. Some research suggests that girls may be more likely to internalise problems, making them more aware of their symptoms and more likely to seek help (Zahn-Waxler, Shirtcliff, and Marceau 2008). Furthermore, societal gender norms can play a role, as girls are often socialised to be more expressive about their emotions (Chaplin and Aldao 2013). In addition, parental perception and influence could play a significant role. Some studies suggest that parents are more likely to identify and respond to mental health issues in girls than in boys (Mackenzie et al. 2012). This parental influence also could contribute to a higher representation of females in this project.

The notably increased positive screening rates in the Latvian adolescent help-seeking population, 78.9% according to the total answer scale and 78.6% according to the distress scale is a significant finding that warrants further investigation. The transcultural applicability of psychometric screening tools poses challenges due to varying cultural interpretations of mental health symptoms and socioeconomic disparities. Tools developed in one cultural context may unintentionally incorporate invalid or inappropriate assumptions in another, leading to potential biases (Canino and Alegria 2008). Language translation poses issues, as literal translations may fail to express the original intended meanings, particularly when considering idioms and cultural nuances (Gjersing, Caplehorn, and Clausen 2010). It is worth noting that in the validation process, socioeconomic conditions and contextual factors should also be considered, as they can significantly impact the interpretation and relevance of certain items (Betancourt and López 1993). Patient pathways in local healthcare also can be mentioned as a notable factor impacting higher average scores in the Latvian population. A long waiting time to get an appointment with a healthcare professional, as well as an existing stigmatisation of mental health issues, can lead to a late referral to services when an illness already has reached a notable grade of disability and polymorphism in symptoms. Our study in contrast with similar validation was conducted after the COVID-19 pandemic, which in turn had a dramatic impact on the mental health of children and adolescents (Meherali et al. 2021).

Recently, there has been a concerted effort to increase awareness and understanding of psychosis and its risk factors among both healthcare providers and the general public. This increased awareness might lead to higher rates of individuals seeking help and being screened, which could contribute to the higher positive screening rates. Moreover, the changes in social environment, such as the impact of the pandemic, could potentially affect our population's mental health (Smith et al. 2021). Stressful life events, increased isolation and the changes in routine may contribute to higher rates of individuals exhibiting signs of psychosis risk (Hossain et al. 2020; Meherali et al. 2021).

It should be noted that the current study has several limitations, which should be acknowledged when interpreting the results. Firstly, the study applied a cross-sectional design and thus we cannot infer any causal relationships between identified factors and positive screening. Longitudinal follow-up data were unavailable, so the actual conversion rates to psychosis among participants could not be determined. Secondly, the sample comprised help-seeking adolescents referred for diagnostic assessment, which might limit the generalisability of the findings to the general population. As healthcare professionals referred all the participants, this population might present with more pronounced or severe symptoms than the general adolescent population, potentially leading to overestimating the PQ-16's performance (Schultze-Lutter et al. 2015). Lastly, the lack of a 'gold standard clinical interview for ultra-high risk, such as CAARMS or SIPS, validated for the Latvian population, may have impacted the validity of the results. The PQ-16, while a valuable tool, is a self-report measure; its results can be influenced by subjective interpretation and are potentially less accurate than a structured clinical interview (Kline and Schiffman 2014). While these limitations must be considered, this study provides essential preliminary findings that can guide future research efforts and aid in developing effective strategies for early detection and intervention in psychosis.

In conclusion, although our results offer valuable insights into the utility of PQ-16 for the Latvian adolescent population, further longitudinal studies and assessment with semi-structured clinical interviews are necessary to establish the tool's predictive value for the transition to psychosis in light of the high rates of false positives reported in the literature (de Jong et al. 2022; Howie et al. 2022; Savill et al. 2018). Furthermore, future research could investigate potential cultural and contextual factors that might influence the perception and reporting of prodromal symptoms. The increase in positive screening rates in our population is a complex issue that requires a multifaceted approach to understand fully. Continued research into this trend is vital to enhance our understanding of psychosis risk and to improve prevention and intervention strategies.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are openly available upon request.

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