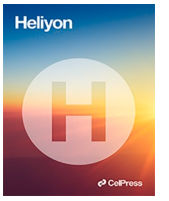
Heliyon 10 (2024) e39792

Contents lists available at ScienceDirect

Heliyon

journal homepage: www.cell.com/heliyon



Research article

Arabic translation and validation of the clinician administered Staden schizophrenia anxiety rating scale (S-SARS)

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ARTICLE INFO

Keywords:
Anxiety
Schizophrenia
S-SARS
Validation
Psychometric properties
Arabic

ABSTRACT

Background: Research on anxiety in patients with schizophrenia of Arab origin is surprisingly scarce, particularly given that expressions of both psychotic disorders and anxiety disorders can be largely shaped by cultural factors. This study proposes to complement previous research by exploring the psychometric characteristics of an Arabic translation of the Staden Schizophrenia Anxiety Rating Scale (S-SARS) in chronic, remitted patients diagnosed with schizophrenia. As the Arabic version of the Generalized Anxiety Disorder 7-Item Scale (GAD-7) has not been previously validated in Arabic in patients with schizophrenia, this study had as a secondary aim to investigate the psychometric properties of this scale before its use.

Method: This cross-sectional study was performed over a period of three months (August–October 2023). A total of 177 chronic inpatients diagnosed with schizophrenia (63.3 % males) who were remitted and clinically stable participated in the study.

Results: Confirmatory factor analyses showed that all 10 items loaded onto a single factor and had high factor loading values between .53 and .81. The reliability of the S-SARS in its Arabic version was excellent as attested by a McDonald's omega and a Cronbach's alpha coefficients of .90 and .89, respectively. The score of Arabic S-SARS correlated positively with the GAD-7 scores ($r = .55$; $p < .001$), thus supporting good convergent validity. As for discriminant validity, findings showed positive correlations between S-SARS and depression scores as assessed using the Calgary Depressive Symptoms Scale. In addition, the Arabic S-SARS correlated negatively with general functioning, further supporting the good validity and clinical relevance of the scale. Finally,

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https://doi.org/10.1016/j.heliyon.2024.e39792
Received 11 June 2024; Received in revised form 16 October 2024; Accepted 23 October 2024
Available online 23 October 2024

measurement invariance was established in the sex subsamples (males vs. females) at the scalar, metric and configural levels, with females showing more anxiety than males.
Conclusion: Findings suggest that the Arabic S-SARS holds good psychometric properties, and is suitable for use among Arabic-speaking people diagnosed with schizophrenia in both research and clinical practice. The Arabic version of S-SARS will hopefully be widely applied to provide useful and timely clinical information for monitoring and adequately treating patients with schizophrenia, in order to improve the course and prognosis of the disease.

1. Introduction

Anxiety was defined as "a complex cognitive, affective, physiological, and behavioural response system (i.e., threat mode) that is activated when anticipated events or circumstances are deemed to be highly aversive because they are perceived to be unpredictable, uncontrollable events that could potentially threaten the vital interests of the individual" ([1]; p. 5). Anxiety has been proposed as a risk factor for, a consequence of, and a core component of schizophrenia [2–6]. Anxiety is one of the important and common characteristics observed in schizophrenia. Estimated prevalence rates of comorbidity with anxiety disorders (panic disorder, social anxiety, and obsessive-compulsive disorder) were reported to be significantly elevated in schizophrenia (45.16 %) compared to the general population [5]. Meta-analytic findings demonstrated that 38.3 % of patients with schizophrenia met diagnostic criteria for at least one anxiety disorder [3]. Studies also observed increased rates of subclinical anxiety in schizophrenia, such as a lifetime prevalence of panic attacks of 45 % [7].

Previous reports suggest that anxiety symptoms seen in schizophrenia have both similar and distinct features with anxiety disorders [8–11]. For instance, individuals with schizophrenia anxiety express certain symptoms and clinical features that are different from those characterizing any of the specified anxiety syndromes [12–16], such as palpitations, trembling, restlessness, hyper-vigilance, and tension. However, most of the literature available on anxiety in schizophrenia is restricted to only focusing on established diagnostic categories, including obsessive-compulsive disorder, specific phobias, social anxiety disorder, and panic disorder [3,8,17]. It is still unknown and unclear whether anxiety that is not differentiated into these categories (i.e., undifferentiated anxiety [2], defined by the DSM-5 as an unspecified anxiety disorder and anxiety disorder not otherwise specified [18]) occurs as commonly as anxiety disorders in schizophrenia, and whether it can be empirically distinguishable from them. The actual rates of undifferentiated anxiety in schizophrenia are unclear. Some existing studies indicate that it is a common clinical problem, with preliminary estimates being of 36 % of patients with schizophrenia who display undifferentiated anxiety in the absence of diagnosable anxiety disorder [2].

Overlooking anxiety in schizophrenia may increase the burden of the disease and lead to multiple detrimental consequences for patients, including more severe positive symptoms [17], higher risk of suicide and suicide attempts [16,19], poor antipsychotic medication management [20], higher risk of relapses [21], increased severity of comorbid medical conditions [15], poorer social functioning [14,22,23], and lower quality of life [13]. Other adverse outcomes of anxiety in schizophrenia have also been reported, such as longer and more frequent length of hospitalizations, negative attribution style, substance abuse [16], high rates of co-occurring mental illnesses, as well as increased use of mental health services [7]. All these observations highlight that accurately assessing and effectively addressing anxiety in schizophrenia may offer significant clinically relevant benefits for patients. Such assessment needs robust measurement instruments.

1.1. Measuring anxiety in schizophrenia

Anxiety in schizophrenia has long been evaluated using inadequate and non-specific measures. Among the first and most widely measures of perceived anxiety symptoms used in schizophrenia patients is the Hamilton Anxiety Rating Scale [24]. However, this scale presents numerous known drawbacks, including not appropriately measuring worry, which is a core component of anxiety, and measuring symptoms that rather capture depression. A systematic review of psychometric assessments of measures assessing anxiety in non-affective psychotic disorders concluded that the existing scales that were examined demonstrated poor performance against standardized quality assessment criteria, and no one showed solid psychometric characteristics or adequate methodological quality [25]. Some measures identified by this review as having acceptable properties for general screening include the Scale of Anxiety Evaluation in Schizophrenia [26], the Depression Anxiety Stress Scales [27], and the Beck Anxiety Index [28], whereas those suggested as likely to be adequate for assessing specific anxiety disorders/symptoms involve the Obsessive-Compulsive Inventory [29], the Yale-Brown Obsessive Compulsive Scale [30], the Liebowitz Social Anxiety Scale [31], the DSM-based Generalized Anxiety Disorder Symptoms Severity [6], the Perseverative Thinking Questionnaire [32], and the Psychological Stress Index [33]. An example of measures that have theoretically been designed to evaluate undifferentiated anxiety in the particular schizophrenia population, that is the SAES, was shown to have a broad conceptual scope excluding key expressions of anxiety (e.g., compulsions) and not specifically accounting for anxiety which is expressed within the content of psychotic symptoms (as all its items were taken from existing measures of anxiety) [34]. The latter represents a significant flaw, given that hallucinations and/or delusions with threatening content could be experienced by one patient as intensely terrifying and frightening, and not by another one.

To overcome the abovementioned gaps, Van Staden et al. [35] created and validated a new rating scale, i.e. the Staden Schizophrenia Anxiety Scale (S-SARS), to specifically capture anxiety in patients with schizophrenia. The S-SARS is an interviewer-administered scale that was conceptualized and developed to account for both formally diagnosed and undifferentiated

anxiety. It contains ten items. Five items assess specific anxiety (obsessive-compulsive anxiety, situational anxiety, anxiety attacks, perceptual anxiety, and persecutory and nihilistic anxiety), and five other items assess general anxiety (worry and fear, control-related anxiety, psychomotor and cognitive agitation, somatic anxiety, and impairment from anxiety). The S-SARS has initially been adopted in three published research papers [2,36,37], and later its psychometric properties were examined by analysing and pooling the data from these studies [35]. Results demonstrated the good validity and reliability of the S-SARS for evaluating the undifferentiated and specified anxiety in acute and residual stages of schizophrenia [35]. Later, the good validity and reliability of the S-SARS were supported in a Chinese-speaking sample of patients with schizophrenia [34].

1.2. Rationale

Literature on anxiety in patients with schizophrenia of Arab origin is surprisingly scarce, particularly given that expressions of both psychotic disorders [38] and anxiety disorders [39] can be largely shaped by cultural factors. We could find only two previous studies conducted in Lebanon, one used the DASS [40] while the other used the Lebanese Anxiety Scale-10 [41]. It is of note that in the two studies anxiety was not the main focus. Our study proposes to complement the literature by exploring the psychometric characteristics of an Arabic translation of the S-SARS in a sample of chronic, remitted patients with schizophrenia from Lebanon. It is anticipated that the Arabic S-SARS will show good factorial validity, high internal consistency, and appropriate convergent validity and concurrent validity against measures of anxiety, depression and general functioning. Therefore, the S-SARS is anticipated to be a useful tool for clinicians and researchers working in Arabic-speaking settings for accurately identifying anxiety in schizophrenia. As the Arabic version of the GAD-7 has not been previously validated in an Arabic-speaking clinical population of patients with schizophrenia, this study had as a second aim to investigate the psychometric characteristics of this scale before its use.

2. Methods

2.1. Sample and procedure

This study has a cross-sectional design, and was carried-out over a period of three months (August–October 2023). Potential participants were eligible if they were: (1) aged 18 years and over; (2) inpatients of the Lebanese long-stay Psychiatric Hospital of the Cross, Jal Eddib; (3) institutionalized for more than one year (The study population is described elsewhere [40,42]), (4) diagnosed with schizophrenia according to the DSM-5 criteria [43]; (5) clinically stable and remitted following Fleischhacker et al.'s definition [44]: "be symptomatically stable, as judged by the treating physician, be receiving a stable dose of an antipsychotic drug for at least 4 weeks before the survey and be in good general physical health"; and (6) at a chronic phase of the disease (i.e., over 12 months of illness duration) [45]. A total of 177 patients met the eligibility criteria. Among them, 90 patients were excluded for having a schizoaffective diagnosis according to the DSM-5, refused to participate, or had cognitive impairment (Fig. 1).

2.1.1. Minimal sample size calculation

Based on an earlier research suggesting minimum sample varying between 3 and 20 times the number of the measure's variables [46], a sample ranging from 30 to 200 participants was deemed necessary for the confirmatory factor analysis.

2.2. Measures

2.2.1. Demographic and clinical characteristics

Face-to-face interviews were performed to collect data from all participants, with a duration of around 30–45 min for each interview. Interviews were conducted by two persons who hold a master in neuroscience and who received a training before the start of the data collection. The questionnaire was composed of an initial part involving data on patients' socio-demographics, namely sex, age,

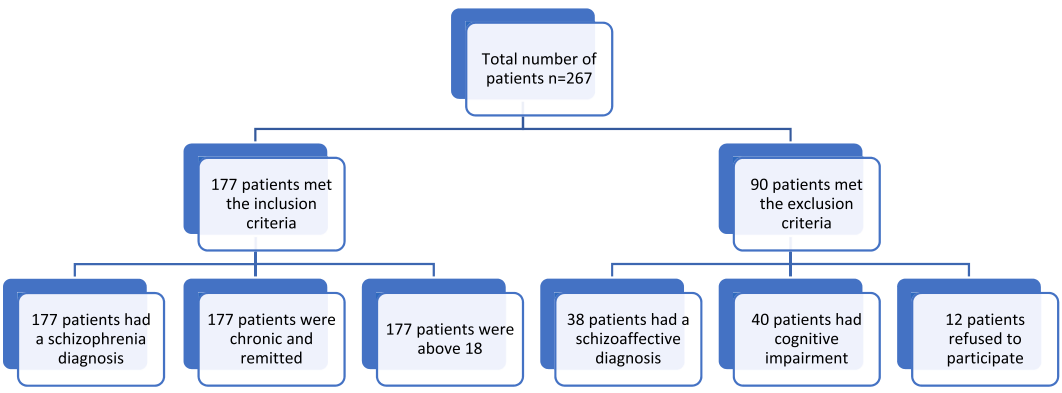

Fig. 1. Flowchart showing the recruitment process of our sample.

educational attainment, marital status; as well as clinical data including duration of hospitalization and duration of illness. Additionally, four scales were administered either by the participants themselves or by an interviewer.

2.2.2. The 10-item Staden schizophrenia anxiety rating scale (S-SARS)

The S-SARS is an interviewer-rated scale which contains ten items measuring both specific anxiety (5 items) and general anxiety (5 items) [35]. Items have six narrative anchor points with response categories varying from 0 to 5 to reflect the severity of anxiety during the last week. A forward-backward translation method was performed to obtain the Arabic translation of the S-SARS according to international guidelines [47]. A translator from Lebanon, who was independent to the research, firstly conducted the forward translation from English to Arabic. Afterwards, the Arabic translation was back-translated into English by a psychologist from Lebanon with full proficiency in the language. Then, the team addressed any context-specific discrepancies. A committee of experts composed of the two translators, the research team, a psychiatrist, and a psychologist reviewed the translated and original English versions to ensure the translation's accuracy. Finally, a pilot test was conducted on 30 participants to confirm that questions were clear and understandable.

2.2.3. The Generalized Anxiety Disorder 7-Item Scale (GAD-7)

The Arabic validated version of the GAD-7 was used in the present study [48,49] ($\omega = .84/\alpha = .83$). This is a 7-item self-reported measure that assesses anxiety symptoms over 2 weeks following the DSM-5 criteria. Items are scored from 0 (not at all) to 3 (nearly every day). Greater overall score indicate more severe anxiety levels.

2.2.4. The calgary depression scale for schizophrenia (CDSS)

The Arabic validated version of the CDSS was used [50] ($\omega = .82/\alpha = .81$). The CDSS is an interviewer-rated tool composed of 9 items which evaluate depression symptoms in patients with schizophrenia, while accurately distinguishing them from negative symptoms and extrapyramidal side effects [51].

2.2.5. Global assessment of functioning scale (GAF)

The GAF assesses levels of social functioning in patients with mental illness [52]. Each patient is assigned a number between 0 and 100, referring to interviewer's perception of the current degree of impairment in terms of psychosocial, educational, and/or occupational functioning.

2.3. Data analysis

We did not have any missing data in our database. A CFA was performed the originally proposed structure of the S-SARS. To check the adequacy of the model, we calculated the following fit indices: the Tucker-Lewis Index (TLI), the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the normed model chi-square (χ^2/df). Values $> .90$ for CFI and TLI, $\leq .08$ for RMSEA, and ≤ 5 for χ^2/df designate good fit of the model to the data [53]. The Bollen-Stine bootstrap confirmed the multivariate normality of the S-SARS and GAD-7 ($p = .423$ and $p = .395$ respectively).

A multi-group CFA [54] was performed to explore sex invariance of the S-SARS scores and ensure comparability across male and female respondents. In addition, this analysis can help detect whether some S-SARS items function differently across sexes and guarantee that the measure accurately does not differ between sexes, so that users of the scale do not draw misleading conclusions about group similarities or differences. ΔCFI $\leq .010$ and ΔSRMR $\leq .010$ or ΔRMSEA $\leq .015$ [55] confirmed the invariance at the metric, scalar and configural levels recommendations [54,56].

McDonald's ω and Cronbach's α values of .70 or more indicated good internal consistency. According to kurtosis and skewness values varying between ±1, the S-SARS and GAD-7 scores were considered normally distributed [57]. Subsequently, two means were compared using the Student *t*-test. S-SARS and GAD-7 scores were correlated with other scores using Pearson test. Values ~ .50 were considered strong, ~.30 were considered moderate, and $\leq .10$ were considered weak correlations [58].

3. Results

177 patients were included in the final analyses, 63.3 % were males, with a mean age of 57.86 ± 10.88 years.

3.1. Confirmatory factor analysis (CFA) of the S-SARS scale

A Weighted Least Squares Mean and Variance Adjusted (WLMSV) CFA was used to test the unidimensional model in our total sample. Findings showed that an excellent fit of the scale: $\chi^2/df = 46.72/35 = 1.25$, RMSEA = .00 (95 % CI .00, .00), SRMR = .036, CFI = 1.00, TLI = 1.00. Alternative models were also explored; however, inspection of Eigenvalues suggested a unidimensional model to be the only appropriate solution. A two-factor oblique solution showed negligible change in fit indices and a factor correlation of .80, further supporting a unidimensional structure. The reliability was found to be very good as reflected via the omega ($\omega = .90$) and alpha ($\alpha = .89$) coefficients.

Regarding the results of the CFA of the GAD-7 items, fit indices were modest at first: $\chi^2/df = 53.65/14 = 3.83$, RMSEA = .127 (90 % CI .092, .164), TLI = .867, CFI = .912, SRMR = .065. Since the modification index was high, a correlation between residuals of items 2 and 4 was added. Consequently, fit indices showed improvement as follows: $\chi^2/df = 27.23/13 = 2.09$, RMSEA = .079 (90 % CI .036,

.120), SRMR = .043, CFI = .968, TLI = .949. The reliability was very good as shown via the α = .85 and ω = .85 coefficients. Table 1 shows the loading factors obtained from the CFA for the S-SARS and GAD-t scales' items.

3.2. Sex invariance of the S-SARS and GAD-7 scales

As reported in Table 2, the invariance across sexes was established at the metric, scalar, and configural levels. No statistically significant differences were observed between male and female patients in GAD-7 scores (M = 3.38, SD = 4.40 vs M = 4.30, SD = 4.21, $t(175) = -1.371$, $p = .172$). However, female patients exhibited significantly greater S-SARS scores than males (M = 18.33, SD = 11.60 vs M = 11.80, SD = 10.65, $t(175) = -3.80$, $p < .001$).

3.3. Convergent and concurrent validity

The S-SARS total score was significantly and strongly linked to higher GAD-7 total score ($r = -.55$) and depression ($r = .72$) and lower general functionality ($r = -.62$) ($p < .001$ for all) (Table 3).

4. Discussion

Anxiety in schizophrenia is highly prevalent [3], has been suggested as both a cause and consequence of schizophrenia [59], and appears to negatively affect the course, treatment and prognosis of the disease [25,36,60]. Given the key roles that anxiety plays in schizophrenia, it is imperative that sensitive and psychometrically sound measures that comprehensively detect the different components of anxiety in this specific population be available for accurate assessment and monitoring of patients. To this end, this study aimed to translate to Arabic and validate the S-SARS, which is an interviewer-rated scale of both specified and undifferentiated anxiety specifically created for use in patients with schizophrenia [35]. As hypothesized, findings showed that the scale has a good structural validity, internal consistency, concurrent validity, and convergent validity, thus suggesting that the S-SARS is suitable for use with Arabic-speaking patients with psychotic disorders in terms of both clinical practice and research. As for our second aim, our results showed that the GAD-7 is psychometrically solid in terms of validity and reliability in both sexes, which confirms that the scale can be adopted to accurately evaluate self-reported anxiety in Arabic clinical settings.

Confirmatory factor analyses revealed that the 10 items loaded onto a single factor and had high factor loading values between .53 and .81. This reinforces the originally proposed one-factor structure of the S-SARS [35], indicating that all items assess the same anxiety construct and do so consistently. Consistent with our findings, the S-SARS also showed a single-factor structure with good fit using a sample of Chinese-speaking patients with acute-phase schizophrenia [34]. Although these results emphasize the importance of a higher-order, shared dimension of anxiety, users of the scale need to bear in mind that the scale was theoretically conceptualized to reflect both undifferentiated and specified anxiety in schizophrenia through five items for each dimension. Furthermore, the reliability of the Arabic S-SARS was excellent as attested by a McDonald's omega and a Cronbach's alpha coefficients of .90 and .89, respectively. These findings are in line with the original (α = .931) [35] and the Chinese (α = .89) [34] versions of the S-SARS.

In our sample, S-SARS scores correlated in a positive way with GAD-7 scores. Despite the fact that the GAD-7 has a narrow scope in only focusing on generalized anxiety manifestations, and is not specific to schizophrenia patients, results support good convergent validity in Lebanese chronic patients with schizophrenia during remission phase, and are in agreement with previous evidence. Indeed, this psychometric property was also demonstrated in the original validation study using a mixed sample of South African inpatients (in the acute phase) and outpatients (in partial remission) with schizophrenia [35], as well as with the Chinese version of the scale [34], by

Table 1
Standardised estimates of factor loadings from the confirmatory factor analysis (CFA) of the Staden schizophrenia anxiety rating scale.

Original item number	Items	Loading factor
Model 1: Staden Schizophrenia Anxiety Rating Scale		
1	Persecutory and Nihilistic Anxiety	.78
2	Perceptual Anxiety	.86
3	Anxiety Attacks	.75
4	Situational Anxiety	.61
5	Obsessive-Compulsive Anxiety	.86
6	Somatic anxiety	.72
7	Psychomotor and Cognitive agitation	.71
8	Worry and fear	.79
9	Control-related anxiety	.79
10	Impairment from Anxiety	.75
Model 2: Generalized Anxiety Disorder scale (7 items)		
1	Feeling nervous, anxious, or on edge	.79
2	Not being able to stop or control worrying	.55
3	Worrying too much about different things	.71
4	Trouble relaxing	.49
5	Being so restless that it is hard to sit still	.73
6	Becoming easily annoyed or irritable	.73
7	Feeling afraid, as if something awful might happen	.61

Table 2
Measurement Invariance of the S-SARS and GAD-7 scores across sex in the total sample.

Model	CFI	RMSEA	SRMR	Model Comparison	ΔCFI	ΔRMSEA	ΔSRMR
Model 1: Staden Schizophrenia Anxiety Rating Scale							
Males	.955	.067	.053				
Females	.952	.084	.059				
Configural	.953	.052	.053				
Metric	.928	.061	.067	Configural vs metric	.025	.009	.014
Scalar	.915	.063	.071	Metric vs scalar	.013	.002	.004
Model 2: Generalized Anxiety Disorder scale (7 items)							
Males	.955	.089	.063				
Females	.908	.151	.069				
Configural	.934	.082	.063				
Metric	.936	.073	.066	Configural vs metric	.002	.009	.003
Scalar	.939	.065	.067	Metric vs scalar	.003	.008	.001

Note. CFI = Comparative fit index; SRMR = Standardised root mean square residual; RMSEA = Steiger-Lind root mean square error of approximation.

Table 3
Correlation matrix of continuous variables.

	Mean ± SD	1	2	3	4
1. Staden Schizophrenia Anxiety	14.20 ± 11.42	1			
2. GAD-7 Anxiety	3.72 ± 4.34	.55***	1		
3. Depression	3.95 ± 4.35	.72***	.57***	1	
4. General Functioning	70.64 ± 18.42	−.62***	−.41***	−60***	1

*** $P < .001$.

observing strong positive correlations between S-SARS and HAM-A scores. These findings provide additional evidence that the S-SARS can be used as a sound tool to specifically and accurately measure and characterize the severity of specified/undifferentiated anxiety in schizophrenia. As for discriminant validity, findings were in accordance with those of Van Staden et al. [35], showing positive correlations between S-SARS and depression scores as assessed using the Calgary Depressive Symptoms Scale [35]. In addition, the Arabic S-SARS correlated negatively with general functioning, further supporting the good validity and clinical relevance of the scale.

Finally, measurement invariance was established in the sex subsamples (males vs. females) at the scalar, metric and configural levels. Although this psychometric property was not tested in the original and Chinese adapted versions of the S-SARS, it is essential to investigate whether the measure operates in the exact same manner, and whether the underlying construct has the same psychological meaning and theoretical structure across sex [61]. The relevance of this finding is supported by previous research pointing to substantial sex-based differences in symptom presentation in patients with schizophrenia [62]. Although few reports focused on sex differences of the comorbidity of anxiety symptoms in schizophrenia, some general population studies described a wider range of reported anxiety symptoms for females than males [63–65]. In addition, important cross-sex differences in cognitive impairment characteristics have been consistently reported in schizophrenia [66], which might lead to differences in the understanding and interpretation of items between male and female patients. Therefore, establishing sex invariance enables meaningful and accurate in between-sex comparisons, which is critical for studies with a sex perspective. In other words, this implies that S-SARS latent mean scores can be compared between males and females without bias. This is a relevant result given that, as shown in present findings, anxiety manifestations may vary across female and male patients [67]. Future studies need to examine measurement invariance across sex for the S-SARS before making any conclusions about comparisons between sex groups using this scale.

4.1. Study limitations

Some limitations pertaining to the current findings need to be acknowledged. The forward-backward translation process was done by one translator each time instead of two translators as recommended by Beaton et al. [47] Some important psychometric characteristics, such as predictive validity, inter-rater reliability or test-retest reliability could not be assessed in the context of the present study. In addition, only chronic remitted inpatients with schizophrenia were involved. However, anxiety features and the S-SARS performance may be different in outpatients and acute-phase patients. The present sample was sex disproportionate, composed of 63.3 % males. It is of note, however, that a majority of male participants has also been reported in previous validation studies of the S-SARS [35], as well as in probabilistic schizophrenia samples [68]. Finally, information on patients' medication was not collected. Some participants could be prescribed benzodiazepines or other anxiolytic medications that might affect anxiety manifestations. Therefore, the results might not be generalizable despite being conform to the original scale's validation.

5. Conclusion

To date, only scant research has focused on anxiety in schizophrenia, and there was no specific and accurate measure to assess anxiety among Arabic-speaking patients. This study was performed to examine the reliability and validity of the Arabic of the S-SARS, a

clinician-administered measure of specified and undifferentiated anxiety that is specifically designed for patients with schizophrenia. The structural validity revealed one dimension, composed of all 10 S-SARS items, with excellent internal consistency. Results supported good convergent validity and discriminant validity. Measurement invariance was achieved across sex groups at the configural, metric, and scalar levels. In sum, findings suggest that the Arabic S-SARS holds good psychometric properties, and can be applied in Arabic-speaking patients with schizophrenia in both research and clinical practice. The Arabic version of S-SARS will hopefully be widely applied to provide useful and timely clinical information for monitoring and adequately treating patients with schizophrenia, to improve the course and prognosis of the disease. In addition, offering this scale with allow to gain more insight regarding anxiety-related processes and anxiolytic treatment effects in this population.

CRediT authorship contribution statement

Feten Fekih-Romdhane: Writing – review & editing, Writing – original draft, Conceptualization. **Fadila Al Mouzakzak:** Data curation. **Ghinwa Abilmona:** Conceptualization, data curation. **Ahmed Moustafa:** Writing – review & editing, Formal analysis. **Oussama Dahdouh:** Data curation. **Souheil Hallit:** Writing – review & editing, Writing – original draft, Validation, Supervision, Software, Resources, Methodology, Investigation, Conceptualization.

Ethical approval

The Ethics and Research Committee of the Psychiatric Hospital of the Cross approved this study protocol (HPC005-08-23). The study objectives and general instructions were thoroughly explained to each patient by the interviewer. A written informed consent was considered obtained from all patients upon submitting the online form.

Availability of data and materials

All data generated or analysed during this study are not publicly available. The dataset supporting the conclusions is available upon request to the corresponding author.

Funding

None.

Declaration of competing interest

Declarations of interest: none.

References

[1] D.A. Clark, A.T. Beck, Cognitive Therapy of Anxiety Disorders: Science and Practice, Guilford Press, 2011.
[2] K. Naidu, W. Van Staden, L. Fletcher, Discerning undifferentiated anxiety from syndromal anxiety in acute-phase schizophrenia, Ann. Gen. Psychiatr. 19 (2020) 1–10.
[3] A.M. Achim, et al., How prevalent are anxiety disorders in schizophrenia? A meta-analysis and critical review on a significant association, Schizophr. Bull. 37 (4) (2011) 811–821.
[4] M. Nebioglu, A. Altindag, The prevalence of comorbid anxiety disorders in outpatients with schizophrenia, Int. J. Psychiatr. Clin. Pract. 13 (4) (2009) 312–317.
[5] C. Kiran, S. Chaudhury, Prevalence of comorbid anxiety disorders in schizophrenia, Ind. Psychiatr. J. 25 (1) (2016) 35.
[6] S. Seedat, et al., Measuring anxiety in patients with schizophrenia, J. Nerv. Ment. Dis. 195 (4) (2007) 320–324.
[7] R. Goodwin, J.S. Lyons, R.J. McNally, Panic attacks in schizophrenia, Schizophr. Res. 58 (2–3) (2002) 213–220.
[8] P. Bosanac, S.G. Mancuso, D.J. Castle, Anxiety symptoms in psychotic disorders: results from the second Australian national mental health survey, Clin. Schizophrenia Relat. Psychoses 10 (2) (2016) 93–100.
[9] T. Van Putten, The many faces of akathisia, Compr. Psychiatr. 16 (1) (1975) 43–47.
[10] P. Fusar-Poli, et al., Comorbid depressive and anxiety disorders in 509 individuals with an at-risk mental state: impact on psychopathology and transition to psychosis, Schizophr. Bull. 40 (1) (2014) 120–131.
[11] R.H. Howland, et al., Concurrent anxiety and substance use disorders among outpatients with major depression: clinical features and effect on treatment outcome, Drug Alcohol Depend. 99 (1–3) (2009) 248–260.
[12] E. Lieburg, et al., Two subdomains of negative symptoms in psychotic disorders: established and confirmed in two large cohorts, J. Psychiatr. Res. 47 (6) (2013) 718–725.
[13] S. Priebe, et al., Association between symptoms and quality of life in patients with schizophrenia: a pooled analysis of changes over time, Schizophr. Res. 133 (1–3) (2011) 17–21.
[14] K.L. Romm, et al., Severe social anxiety in early psychosis is associated with poor premorbid functioning, depression, and reduced quality of life, Compr. Psychiatr. 53 (5) (2012) 434–440.
[15] J.T. Wigman, et al., Evidence that psychotic symptoms are prevalent in disorders of anxiety and depression, impacting on illness onset, risk, and severity—implications for diagnosis and ultra–high risk research, Schizophr. Bull. 38 (2) (2012) 247–257.
[16] N. Tarrier, A. Picken, Co-morbid PTSD and suicidality in individuals with schizophrenia and substance and alcohol abuse, Soc. Psychiatr. Psychiatr. Epidemiol. 46 (2011) 1079–1086.
[17] S. Hartley, C. Barrowclough, G. Haddock, Anxiety and depression in psychosis: a systematic review of associations with positive psychotic symptoms, Acta Psychiatr. Scand. 128 (5) (2013) 327–346.
[18] American Psychological Association. *Diagnostic And Statistical Manual of Mental Disorders: DSM-5. 2013*, American psychiatric association, Washington, DC, 2013.
[19] T. Taiminen, et al., The schizophrenia suicide risk scale (SSRS): development and initial validation, Schizophr. Res. 47 (2–3) (2001) 199–213.

[20] A.W. Nyhuis, et al., Predictors of switching antipsychotic medications in the treatment of schizophrenia, BMC Psychiatr. 10 (2010) 1–11.
[21] F. Bayle, et al., Clinical features of panic attacks in schizophrenia, Eur. Psychiatr. 16 (6) (2001) 349–353.
[22] J.J. Blanchard, K.T. Mueser, A.S. Bellack, Anhedonia, positive and negative affect, and social functioning in schizophrenia, Schizophr. Bull. 24 (3) (1998) 413–424.
[23] A.M. Achim, et al., Impact of social anxiety on social cognition and functioning in patients with recent-onset schizophrenia spectrum disorders, Schizophr. Res. 145 (1–3) (2013) 75–81.
[24] M. Hamilton, The assessment of anxiety states by rating, Br. J. Med. Psychol. 32 (1) (1959), https://doi.org/10.1111/j.2044-8341.1959.tb00467.x, 50–5.
[25] E.L. Smith, et al., Are there reliable and valid measures of anxiety for people with psychosis? A systematic review of psychometric properties, Psychol Psychother 94 (1) (2021) 173–198.
[26] P.-M. Llorca, et al., A composite scale applied to evaluate anxiety in schizophrenic patients (SAES), Eur. Arch. Psychiatr. Clin. Neurosci. 264 (2014) 171–178.
[27] P.F. Lovibond, S.H. Lovibond, The structure of negative emotional states: comparison of the depression anxiety stress scales (DASS) with the Beck depression and anxiety inventories, Behav. Res. Ther. 33 (3) (1995) 335–343.
[28] A.T. Beck, et al., An inventory for measuring clinical anxiety: psychometric properties, J. Consult. Clin. Psychol. 56 (6) (1988) 893.
[29] J.D. Huppert, T.E. Smith, W.J. Apfeldorf, Use of self-report measures of anxiety and depression in outpatients with schizophrenia: reliability and validity, J. Psychopathol. Behav. Assess. 24 (2002) 275–283.
[30] W.K. Goodman, et al., The Yale-Brown obsessive compulsive scale: I. Development, use, and reliability, Arch. Gen. Psychiatr. 46 (11) (1989) 1006–1011.
[31] K. Romm, et al., Assessment of social anxiety in first episode psychosis using the Liebowitz Social Anxiety scale as a self-report measure, Eur. Psychiatr. 26 (2) (2011) 115–121.
[32] T. Ehring, et al., The Perseverative Thinking Questionnaire (PTQ): validation of a content-independent measure of repetitive negative thinking, J. Behav. Ther. Exp. Psychiatr. 42 (2) (2011) 225–232.
[33] I.F. Tso, T.B. Grove, S.F. Taylor, Self-assessment of psychological stress in schizophrenia: preliminary evidence of reliability and validity, Psychiatr. Res. 195 (1–2) (2012) 39–44.
[34] C. Du, et al., Testing the validity and reliability of the Chinese version of the Staden schizophrenia anxiety rating scale, Front. Psychiatr. 13 (2022).
[35] W. Van Staden, A. Dlagnekova, K. Naidu, Validity and reliability of the Staden schizophrenia anxiety rating scale, Diagnostics 12 (4) (2022) 831.
[36] K. Naidu, W. van Staden, M. van der Linde, Severity of psychotic episodes in predicting concurrent depressive and anxiety features in acute phase schizophrenia, BMC Psychiatr. 14 (2014) 1–7.
[37] A. Dlagnekova, W. Van Staden, A. Masenge, Validity and reliability of the Vigour Assessment Scale in avolitional schizophrenia outpatients, Schizophr. Res. 235 (2021) 36–43.
[38] F. Fekih-Romdhane, S. Obeid, S. Hallit, Psychotic experiences and symptoms in adolescents and young adults from different countries and cultural backgrounds, Front. Psychiatr. 14 (2023) 1275061.
[39] S.G. Hofmann, D.E. Hinton, Cross-cultural aspects of anxiety disorders, Curr Psychiatry Rep 16 (6) (2014) 450.
[40] C. Rahme, et al., Exploring the association between lifetime traumatic experiences and positive psychotic symptoms in a group of long-stay patients with schizophrenia: the mediating effect of depression, anxiety, and distress, BMC Psychiatr. 23 (1) (2023) 29.
[41] Z. Bitar, et al., Treatment satisfaction and its association with anxiety, depression and fear of COVID-19 among Lebanese inpatients with schizophrenia, Pharm. Pract. 19 (3) (2021).
[42] C. Beainy, et al., Decreased insight, but not self-stigma or belief about medicine, is associated with greater severity of delusions in a sample of long-stay patients with schizophrenia: a cross-sectional study, BMC Psychiatr. 23 (1) (2023) 222.
[43] A. American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders: DSM-5, vol. 5, American psychiatric association, Washington, DC, 2013.
[44] W.W. Fleischhacker, et al., Perceived functioning, well-being and psychiatric symptoms in patients with stable schizophrenia treated with long-acting risperidone for 1 year, Br. J. Psychiatr. 187 (2) (2005) 131–136.
[45] W. Hwang, et al., Out-of-pocket medical spending for care of chronic conditions, Health affairs 20 (6) (2001) 267–278.
[46] D.J. Mundfrom, D.G. Shaw, T.L. Ke, Minimum sample size recommendations for conducting factor analyses, Int. J. Test. 5 (2) (2005) 159–168.
[47] D.E. Beaton, et al., Guidelines for the process of cross-cultural adaptation of self-report measures, Spine 25 (24) (2000) 3186–3191.
[48] H. Sawaya, et al., Adaptation and initial validation of the patient health questionnaire - 9 (PHQ-9) and the generalized anxiety disorder - 7 questionnaire (GAD-7) in an Arabic speaking Lebanese psychiatric outpatient sample, Psychiatry Res 239 (2016) 245–252.
[49] M. El Khoury-Malhame, et al., Psychometric Validation of the Arabic Version of the GAD-7 Among Lebanese Adolescents, 2024.
[50] Y. Hani, et al., Validation of the Arabic version of Calgary depression scale for schizophrenia, PLoS One 11 (9) (2016) e0162304.
[51] D. Addington, J. Addington, B. Schissel, *Calgary depression Scale for schizophrenia (CDSS)*. American psychiatric association, in: Task Force for the Handbook of Psychiatric Measures, vol. 2000, American Psychiatric Association, 2000, pp. 504–507. Washington DC.
[52] S.H. Jones, et al., A brief mental health outcome scale: reliability and validity of the Global Assessment of Functioning (GAF), Br. J. Psychiatr. 166 (5) (1995) 654–659.
[53] L.t. Hu, P.M. Bentler, Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives, Struct. Equ. Model.: A Multidiscip. J. 6 (1) (1999) 1–55.
[54] F.F. Chen, Sensitivity of goodness of fit indexes to lack of measurement invariance, Struct. Equ. Model.: A Multidiscip. J. 14 (3) (2007) 464–504.
[55] V. Swami, et al., Psychometric properties of an Arabic translation of the functionality appreciation scale (FAS) in Lebanese adults, Body Image 42 (2022) 361–369.
[56] G.W. Cheung, R.B. Rensvold, Evaluating goodness-of-fit indexes for testing measurement invariance, Struct. Equ. Model. 9 (2) (2002) 233–255.
[57] Hair Jr J.F, et al., Advanced Issues in Partial Least Squares Structural Equation Modeling, saGe publications, 2017.
[58] J. Cohen, Quantitative methods in psychology: a power primer, in: Psychological Bulletin, Citeseer, 1992.
[59] M. Birchwood, Pathways to emotional dysfunction in first-episode psychosis, Br. J. Psychiatr. 182 (5) (2003) 373–375.
[60] H. Temmingh, D.J. Stein, Anxiety in patients with schizophrenia: epidemiology and management, CNS Drugs 29 (2015) 819–832.
[61] B.M. Byrne, Testing for multigroup equivalence of a measuring instrument: a walk through the process, Psicothema (2008) 872–882.
[62] R.K. Willhite, et al., Gender differences in symptoms, functioning and social support in patients at ultra-high risk for developing a psychotic disorder, Schizophr. Res. 104 (1) (2008) 237–245.
[63] S.A. Shields, Reports of bodily change in anxiety, sadness, and anger, Motiv. Emot. 8 (1984) 1–21.
[64] K.A. Armstrong, N.G. Khawaja, Gender differences in anxiety: an investigation of the symptoms, cognitions, and sensitivity towards anxiety in a nonclinical population, Behav. Cognit. Psychother. 30 (2) (2002) 227–231.
[65] O. Vesga-López, et al., Gender differences in generalized anxiety disorder: results from the national epidemiologic survey on alcohol and related conditions (NESARC), J. Clin. Psychiatr. 69 (10) (2008) 1606.
[66] B. Zhang, et al., Gender differences measured by the MATRICS consensus cognitive battery in chronic schizophrenia patients, Sci. Rep. 7 (1) (2017) 11821.
[67] C.P. McLean, et al., Gender differences in anxiety disorders: prevalence, course of illness, comorbidity and burden of illness, J. Psychiatr. Res. 45 (8) (2011) 1027–1035.
[68] J. McGrath, et al., Schizophrenia: a concise overview of incidence, prevalence, and mortality, Epidemiol. Rev. 30 (1) (2008) 67–76.