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Validation of the Eight-Item Paranoid Thoughts Scale (GPTS-8) in Tunisian Arab Adults

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ABSTRACT

Background: Growing research indicated that it is highly valuable and clinically beneficial to quantitatively measure and detect the potential presence of paranoid thinking. Among the various existing self-report instruments to measure paranoia, the Green et al. Paranoid Thoughts Scale (GPTS) was recommended as having the most well-defined, clearly articulated construct underlying its items, and the strongest psychometric qualities in general and clinical population samples. Yet, the psychometric performance of the GPTS remains unknown in the Arab language and culture. To address this gap, our study aimed to explore the psychometric properties of an Arabic translation of the shortest version of the scale (i.e., the GPTS-8).

Methods: A cross-sectional study was conducted. Data were collected during the period September 1st 2024 to January 31th 2025. A total of 552 Arabic-speaking general population adults from Tunisia aged 25.81 ± 4.86 years participated.

Results: Analyses provided support for a bidimensional model, with a first dimension referring to ideas of persecution and a second one corresponding to ideas of reference. The internal consistency reliability coefficients were high, with both Cronbach's alpha and McDonald's ω reported to be 0.83 for ideas of persecution and 0.83 for ideas of reference. Measurement invariance was established for both subscales, implying that the Arabic GPTS-8 measures the same underlying construct of paranoia in the same way across male and female respondents. Finally, paranoia scores correlated positively with psychotic experiences scores, indicating convergent validity, as well as with depression, anxiety and insomnia scores, supporting the concurrent validity of the scale.

Conclusion: By translating and validating GPTS-8 for the first time in Arabic, this study contributes to rendering the tool available to a broader array of clinicians and researchers who work with Arabic-speaking people. We believe the new Arabic version of the GPTS-8 will provide further encouragement to research and development in this yet-unexplored field among Arabic-speakers.

1 | Introduction

Following the psychosis continuum paradigm, and based on empirical evidence in the field, a range of psychotic experiences occur within the diagnosis of schizophrenia, such as hallucinations, thought disorder, grandiosity, and paranoia (Peralta and Cuesta 1999; Wigman et al. 2011; Peralta et al. 2013; Paolini et al. 2016). The particular focus of this paper is paranoia, which refers to pervasive suspiciousness, unfounded fear and irrational distrust toward other people whose intentions are harmful and malevolent (American Psychiatric Association A: Diagnostic and statistical manual of mental disorders: DSM-5 2013). The spectrum of severity of paranoia varies from common concerns of mistrust and suspicion to severe persecutory delusions at the upper end, supporting that paranoid thinking in non-clinical populations may precede delusion formation (Kaymaz et al. 2012). Paranoia experiences represent the most frequent abnormal beliefs in schizophrenia and related psychotic disorders (Coid et al. 2013), and are widespread in the general population (Bebbington et al. 2013). To some extent, holding paranoid or suspicious beliefs about others' intentions may be adaptive in some social situations (Lyoo et al. 2003). However, when the degree of suspiciousness is exaggerated, distressing or begins to impair daily functioning, it could become a clinical problem. Indeed, paranoia may adversely affect social relationships (Hajdúk et al. 2019) and lead to social withdrawal from others (Freeman et al. 2007; Michalska da Rocha et al. 2018). Paranoid thoughts are also closely connected to general psychopathology, including anxiety, depression and well-being (Contreras et al. 2022). This highlights the crucial need for precise and accurate self-report measurements to quantify levels of paranoia.

With the exponentially increasing interest and research efforts in the etiology and course of paranoia over the past decades, multiple self-report measures were designed for use in clinical and nonclinical samples. Examples of questionnaires include the Paranoia Checklist (Freeman et al. 2005), the Personal Experiences of Paranoia Scale (Ellett et al. 2003), the Peters' Delusions Inventory (Peters et al. 1999), the Paranoia Scale (Fenigstein and Vanable 1992), and the Green et al. Paranoid Thoughts Scale (GPTS (Green et al. 2008),). While all these tools have contributed to refining the measurement of the paranoia construct and offered a base for research in this area, the GPTS stands out as one of the most extensively used and widely accepted in the scientific community.

The GPTS was developed based upon empirical (Moritz et al. 2012) and theoretical (Freeman et al. 2005) evidence supporting that paranoid thinking is a multidimensional construct. It thus accounts for the multifaceted nature of paranoia by encompassing two different dimensions that are persecutory thoughts and ideas of reference. In addition, the GPTS was shown to be accurate at differentiating between non-clinical individuals and those with clinical levels of paranoia (Freeman et al. 2021). Furthermore, items of the GPTS were created in consistency with the definition of persecutory ideation such that it reflects unfounded beliefs that harm deliberately intended by others is likely to occur (e.g., "I was sure someone wanted to hurt me" or "People have been hostile toward me on purpose") (Freeman and Garety 2000). In contrust, the content of other scales' items do not align with this definition (e.g., "I am sure I get a raw deal from life" or "No one really cares much what happens to you" in the Paranoia Scale (Fenigstein and Vanable 1992)). Statham et al. (Statham et al. 2019) systematically reviewed the literature on self-report paranoia measurement tools currently available for use among the general population, and identified the GPTS as covering the full range of severity of paranoid thoughts and as comparatively having the most robust evidence for its psychometric properties.

The original validation version of the GPTS was generated from an initial pool of 93 items that were administered to 50 patients who had persecutory delusions in the context of psychotic diagnoses and 353 university students. Analyses retained 32 items and two factors, social ideas of reference (16 items) and persecution (16 items) (Green et al. 2008). Besides, the measure showed adequate psychometric characteristics in terms of convergent validity, overall face validity, test-retest reliability, and sensitivity to change (Green et al. 2008). Later, and using a large sample of over 2000 individuals diagnosed with psychosis and over 8000 non-clinical individuals, Freeman et al. (Freeman et al. 2021) showed that the "Reference" subscale contained problematic items that cannot be entirely separable from the "persecutory ideation" subscale, turning attention to the potential for measurement error. Subsequently, the authors developed a Revised GPTS (R-GPTS) comprising stand-alone assessments of ideas of persecution (10 items) and ideas of reference (eight items). Both subscales yielded excellent psychometric properties across clinical and non-clinical levels of paranoia, making the R-GPTS a more precise measure that is recommended for future use (Freeman et al. 2021). Following its development, the R-GPTS was translated to different languages, including Chinese, German (Kingston et al. 2023), Polish (Kowalski et al. 2020) and French (Latteur et al. 2022). Based on multinational data from Australia, Germany, Hong Kong, UK, and USA, Schlier et al. (Schlier et al. 2024) demonstrated that the two-factor model of the R-GPTS is applicable across cultures. The R-GPTS, despite being a relatively newly developed instrument, has already been utilized in multiple research studies in different countries, including epidemiological studies (Rek et al. 2022), experimental studies to test mechanisms explaining the phenomenology of paranoia (Barnby et al. 2022), and interventional studies to reduce paranoia (Brown et al. 2020; Freeman et al. 2022). Yet, the psychometric performance of the GPTS remains unknown in the Arab language and culture.

In 2021, Bianchi and Verkuilen (Bianchi and Verkuilen 2021) developed a briefer, more concise version of the GPTS in community French-speaking individuals. The scale's items number was reduced to eight (GPTS-8), while maintaining its original two-factor structure (i.e., four-item "ideas of persecution" and four-item "ideas of social reference" factors), and without undermining the tool's criterion validity (Bianchi and Verkuilen 2021). In particular, GPTS-8 scores were found to correlate in a similar fashion as the longer forms of the GPTS with job satisfaction, depressive symptoms, and health status (Bianchi and Verkuilen 2021). The GPTS-8 is suggested to be more user-friendly and preferred over longer versions, as it requires less time to be answered, places less of a burden on respondents, and imposes lower costs on researchers. To expand on the

psychometric testing of the GPTS-8, Raffard et al. (Raffard et al. 2023) examined the instrument's structural invariance internal consistency, clinical sensitivity and convergent/divergent validities in individuals diagnosed with schizophrenia. The bifactorial structure of the scale was confirmed, its convergent and divergent validities were adequately supported, and its measurement invariance across schizophrenia patients versus non-psychiatric populations was established (Raffard et al. 2023). The scale was also able to discriminate between groups that are assumed to have different levels of paranoia, that are patients with schizophrenia and people from the general population, which indicates the clinical sensibility of the instrument (Raffard et al. 2023). However, psychometric findings of the GPTS-8 still need to be replicated in other languages and cultural contexts, such as Arabic, to confirm previous findings and lend more support to the universality of the underlying construct of paranoia as indexed by the scale. The lack of a valid and reliable measure of paranoia in the Arabic language has led, at least in part, to a lack of research on this construct in Tunisia. Therefore, the prevalence and incidence of paranoia remain to date unexplored and unknown in Tunisia, as in many other Arab countries.

To address this gap, our research aimed to explore the psychometric characteristics of the GPTS-8 in an Arabic-speaking population-based sample from Tunisia. Our research endeavors focused on the development and validation of an Arabic-language self-administered paranoia measure may lay the groundwork for epidemiological, etiological and interventional research, as well as for future large-scale cross-cultural projects. It is hypothesized that the scale will be reliable, contain two dimensions equivalently in both sexes, and have adequate concurrent validity.

2 | Methods

2.1 | Participants and Procedure

A cross-sectional design was employed. Data were collected during the period September 1st 2024 to January 31th 2025. A web-based approach was adopted to create, distribute, and gather data for this study. The survey form was developed according to the Checklist for Reporting Results of Internet e-Surveys (CHERRIES) guidelines (Eysenbach 2004). A link to the online questionnaire was created using Google form, was disseminated through WhatsApp, Instagram, Facebook, and other social media platforms to the persons in contact with the investigators. The following inclusion were applied: (1) being Tunisian aged at least 18 years old, (2) having no personal history of a psychotic disorder diagnosed by a psychiatrist, and no previous antipsychotics intake, (3) having access to the internet, and (4) agreeing to participate in the research. Convenience and snowball techniques were used to recruit participants in this research The setting of response was set to be one response to prevent multiple entries from a single respondent. The survey was constructed in Arabic. Its first section displayed detailed information about the study, along with investigators' contact details. The introductory paragraph outlined the voluntary nature of participation, confidentiality of personal information, the right to withdraw without penalty, and was followed by an informed consent form. This study's conduct was approved by the ethics committee of Razi psychiatric hospital, Manouba, Tunisia.

2.2 | Sample Size Calculation

Based on previous evidence suggesting that a minimum sample ranging from 3 to 20 times the number of the scale's items, a sample size ranging between 24 and 160 participants was deemed necessary to conduct the confirmatory factor analysis (Comrey and Lee 2013).

2.3 | Assessment Instruments

2.3.1 | Demographics

Participants self-reported their sex, age, level of education, marital status and occupation.

2.3.2 | The Eight-Item Green et al., Paranoid Thoughts Scale (GPTS-8)

The GPTS-8 is a briefest version of the GPTS (Bianchi and Verkuilen 2021). It measures paranoid thinking over the preceding month. It contains eight items divided into two four-item dimensions that are designated “Ideas of persecution” (e.g., “I have been upset by friends and colleagues judging me critically”) and “Ideas of social reference” (e.g., “I often heard people referring to me”). Each item can be rated on a five-point Likert-type scale ranging from 1 (“Not at all”) to 5 (“Totally”). Permission was obtained from the original author, Professor Renzo Bianchi, before proceeding with the translation process. The guidelines of adaptation and validation of scales for use instruments in cross-cultural health care research were followed to translate the GPTS-8 (Sousa and Rojjanasrirat 2011). First, the initial English version of the GPTS-8 was translated into Arabic through the forward translation process by a native Arabic-speaking professional translator. Second, a back translation of the Arabic version was performed by an independent bilingual, native Arabic-speaking translator with a university degree in English. Then, the original and reverse-translated English versions of the GPTS-8 were compared, any questions or ambiguities were discussed and resolved by a translation committee composed of the translators, the research team, and two psychiatrists (Fenn et al. 2020). Last, a pilot study was carried out to ensure that items are understandable and clear. No more changes were considered necessary.

2.3.3 | The Prodromal Questionnaire-Brief (PQ-B)

This is a self-report measure that contains 21 items to evaluate an array of psychotic experiences (i.e., hallucinations and delusions) (Ising et al. 2012; Loewy et al. 2005; van Bebber et al. 2017). Sample items include “Do you find yourself feeling mistrustful or suspicious of other people?” and “Do you feel that other people are watching you or talking about you?”. Each item is scored as Yes = 1 and No = 0. Total scores are calculated by

summing up the scores of all 21 items, with higher scores reflecting a greater endorsement of psychotic experiences. The version validated in Arabic was employed, which showed good validity and excellent reliability in a multi-country sample of young adults (Cronbach's α was > 0.90 in all six countries and in both sexes) (Fekih-Romdhane, Jahrami, et al. 2023). The Cronbach's alpha in this study of 0.93.

2.3.4 | The Patient Health Questionnaire-9 (PHQ-9)

The PHQ-9 was adopted to evaluate depressive symptoms over the past 15 days through nine items (e.g., "Feeling down, depressed, or hopeless") (Kroenke et al. 2001). Items are rated on a four-point response scale ranging from "not at all" = 0 to "nearly every day" = 3, with total scores designating more severe levels of depression. The version validated in Arabic was employed, which demonstrated good validity and reliability (Cronbach's alpha = 0.84) (Dagher et al. 2023). In our sample, Cronbach's alpha was of 0.86.

2.3.5 | The Generalized Anxiety Disorder Seven-Item (GAD-7)

The GAD-7 contains seven items (e.g., "Feeling afraid, as if something awful might happen") measuring the severity of anxiety symptoms endorsed over the past 15 days (Spitzer et al. 2006). Scores can be calculated by assigning ratings to the different response categories as follows: of 0, 1, 2, and 3, respectively, of "not at all" = 0, "several days" = 1, "more than half the days" = 2, and "nearly every day" = 3. Greater total scores reflect more severe anxiety symptoms. The version validated in Arabic was used study, which showed a factor loading onto one dimension (Cronbach's α = 0.87), along with measurement invariance across sex groups, and good divergent and convergent validity (El Khoury-Malhame et al. 2024). In our sample, Cronbach's alpha was of 0.92.

2.3.6 | The Insomnia Severity Index (ISI)

The ISI measures the severity of insomnia symptoms over the past 2 weeks through seven items(e.g., "Difficulty falling asleep", or "Problem waking up too early in the morning") (Bastien et al. 2001). Items are rated on a five-point scale that varies from 0 ("None", "Very Satisfied", "Not at all Interfering", "Not at all Noticeable", or "Not at all") to 4 ("Very Severe", "Very Dissatisfied", "Very Much Interfering", "Very Much Noticeable" or "Very Much"). Greater total scores indicate more severe insomnia symptoms. The version of the ISI validated in Arabic was adopted, which demonstrated good construct validity and has shown to be reliable (α = 0.830) (Hallit et al. 2019). The current sample yielded a Cronbach's α of 0.84.

2.4 | Analytic Strategy

No missing responses were present in the dataset. Using the SPSS AMOS v.29 software, data from the total sample was utilized to perform a confirmatory factor analysis (CFA). Following the recommendations of Mundfrom et al. of 3–20 times the number of the scale's variables, we aimed to enroll a minimum of 160 individuals (Mundfrom et al. 2005). The maximum likelihood method was used to obtain parameter estimates were. Multiple fit indices were calculated: root mean square error of approximation (RMSEA; $\leq$ 0.08), Tucker-Lewis Index (TLI; $\geq$ 0.90), standardized root mean square residual (SRMR; $\leq$ 0.05), and Comparative Fit Index (CFI; $\geq$ 0.90), reflecting good fit of the model to the data (Hu and Bentler 1999). Moreover, evidence of convergent validity was supported through values of the average variance extracted (AVE) $\geq$ 0.50 (Malhotra and Dash 2011). Multivariate normality was not verified at first; therefore, we performed non-parametric bootstrapping procedure.

Multi-group CFA was used to test sex invariance of GTPS-8 scores using the total sample (Chen 2007). Measurement invariance across sex groups was examined at the metric, configural, and scalar levels (Vadenberg and Lance 2000). Values of ΔCFI $\leq$ 0.010 and ΔRMSEA $\leq$ 0.015 or ΔSRMR $\leq$ 0.010 were accepted as evidence of invariance (Swami et al. 2022). A difference between sexes in terms of GTPS-8 scores was checked via the Student's *t*-test.

McDonald's ω and Cronbach's α were used to examine composite reliability, with values > 0.70 reflecting adequate composite reliability (Dunn et al. 2014). The skewness and kurtosis values for each item of the scale varied between −1 and +1, suggesting normality (Hair et al. 2017). Pearson test was used to correlate the GPTS scores with the other scales in the survey.

3 | Results

Our final sample was composed of 552 adults with a mean age of 25.81 $\pm$ 4.86 years. The majority were of female sex (70.3%) and university educational level (97.6%) (Table 1).

3.1 | Confirmatory Factor Analysis of the GPTS-8 Scale

CFA indicated that the fit of the two-factor model of the GPTS-8 scale was acceptable: RMSEA = 0.092 (90% CI 0.075, 0.109), SRMR = 0.038, CFI = 0.954, TLI = 0.933. The standardized estimates of factor loads were all adequate (Figure 1). Convergent validity was demonstrated, with an AVE value of 0.55. The composite reliability of scores was adequate for the total score (ω = 0.88/α = 0.88), Factor 1 (ω = 0.83/α = 0.83) and Factor 2 (ω = 0.83/α = 0.83). The fit of the second-order model of the GTPS-8 scale was acceptable too: RMSEA = 0.092 (90% CI 0.075, 0.109), SRMR = 0.038, CFI = 0.954, TLI = 0.933.

3.2 | Sex Invariance

The invariance across sexes was established at the metric, configural, and scalar levels (Table 2). The comparison among sexes of the total GTPS-8 scores (7.15 $\pm$ 6.90 vs. 6.41 $\pm$ 6.46;

$t(550) = 1.20$; $p = 0.229$; Cohen's d = 0.112), ideas of reference (4.12 ± 3.88 vs. 3.54 ± 3.62; $t(550) = 1.69$; $p = 0.092$; Cohen's d = 0.157) and ideas of persecution (3.02 ± 3.66 vs. 2.87 ± 3.61; $t(550) = 1.20$; $p = 0.639$; Cohen's d = 0.044) showed no significant difference between males and females.

3.3 | Concurrent Validity

Higher paranoia thoughts were significantly and positively associated with higher psychotic experiences ($r = 0.44$; $p < 0.001$), depression ($r = 0.41$; $p < 0.001$), anxiety ($r = 0.37$; $p < 0.001$) and insomnia ($r = 0.28$; $p < 0.001$) (Table 3).

TABLE 1 | Characteristics of the participants ($n = 552$).

Age (years)	25.81 ± 4.86
Sex	
Male	164 (29.7%)
Female	388 (70.3%)
Marital status	
Married	82 (14.9%)
Unmarried	470 (85.1%)
Education level	
Secondary or less	13 (2.4%)
University	539 (97.6%)
Occupation	
Employed	226 (40.9%)
Unemployed	17 (3.1%)
Student	309 (56.0%)

4 | Discussion

Recent and growing research indicated that it is highly valuable and clinically beneficial to quantitatively measure and detect the potential presence of, and longitudinal changes in, paranoid thinking. Among the various existing self-report measures of paranoia, the GPTS was recommended as having the most well-defined, clearly articulated construct underlying its items, and the strongest psychometric qualities in clinical and general population samples (Statham et al. 2019). To our knowledge, the current research is the first attempt to formally test the measurement properties of the GPTS in its shortest form in an Arab country and culture. Analyses provided support for a two-factor model, good reliability, adequate convergent and concurrent validity of the Arabic GPTS-8, thus suggesting its usefulness for efficiently and rapidly grading the severity of paranoid thoughts in the general population.

In terms of factor structure, CFA suggested a bidimensional solution, with a first dimension referring to ideas of persecution and a second one corresponding to ideas of reference. Besides, the internal consistency reliability coefficients were high, with both Cronbach's alpha and McDonald's ω reported to be 0.83 for ideas of reference and 0.83 for ideas of persecution. As such, the Arabic scale seems to appropriately reflect and measure the multidimensional conceptualization of the paranoia construct as postulated by Green et al. (Green et al. 2008). Our findings are in line with those of previous validations in both individuals from the general population (Bianchi and Verkuilen 2021) and those diagnosed with schizophrenia (Raffard et al. 2023). High internal consistency of the GPTS-8 was also observed in French-speaking patients with schizophrenia from France (ω values of 0.86–0.92) (Raffard et al. 2023) and nonclinical French-speaking population from Switzerland (ω values of 0.85–0.88) (Bianchi and Verkuilen 2021). Based on these observations, it can be assumed that paranoid ideation as assessed using GPTS-8 is a

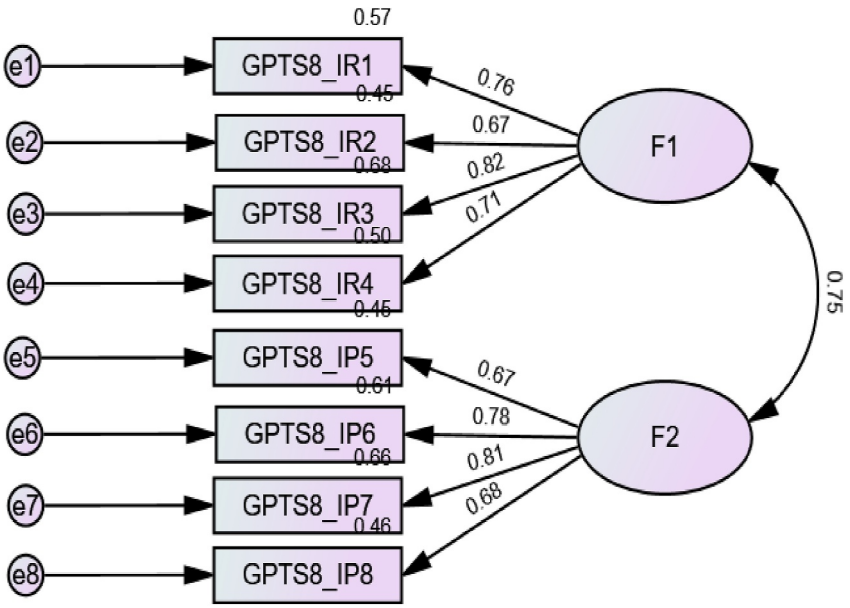

FIGURE 1 | Standardized loading factors of the Paranoid Thoughts Scale (GTPS-8) items in Arabic. F1 = ideas of reference; F2 = ideas of persecution.

TABLE 2 | Measurement Invariance of the GTPS-8 across sex in the total sample.

Model	CFI	RMSEA	SRMR	Model comparison	ΔCFI	ΔRMSEA	ΔSRMR
Configural	0.951	0.068	0.056				
Metric	0.949	0.065	0.064	Configural versus metric	0.002	0.003	0.008
Scalar	0.937	0.067	0.066	Metric versus scalar	0.012	0.002	0.002

Abbreviations: CFI = Comparative fit index; RMSEA = root mean square error of approximation; SRMR = Standardized root mean square residual.

TABLE 3 | Pearson correlation matrix.

	1	2	3	4	5	6
1. Paranoia thoughts	1					
2. Ideas of reference	0.90***	1				
3. Ideas of persecution	0.90***	0.62***	1			
4. Psychotic experiences (PQ-B scores)	0.44***	0.37***	0.42***	1		
5. Depression (PHQ-9 scores)	0.41***	0.37***	0.36***	0.48***	1	
6. Anxiety (GAD-7 scores)	0.37***	0.32***	0.35***	0.42***	0.65***	1
7. Insomnia (ISI scores)	0.28***	0.23***	0.27***	0.39***	0.63***	0.48***

***$p < 0.001$.

global, stable construct that can apply to a wide variety of people across different cultural and linguistic contexts.

Measurement invariance was established for both the "ideas of reference" and the "persecutory thoughts" subscales, implying that the Arabic GPTS-8 measures the same underlying construct of paranoia in the same way across male and female respondents. With adequate evidence provided for that this measurement property, testing for differences in mean latent construct values across sex groups could be accurately enabled in future studies. This allows researchers and practitioners to ensure that similar levels of the latent of construct of paranoid thinking are indicative of the same risk of occurrence and intensity of the paranoia spectrum across males and females. In our sample, no significant differences were observed between male and female participants in terms of total GTPS-8 scores and subscores. Our results are inconsistent with the general trend in empirical literature suggesting that more males than females in the general population report paranoia experiences (Freeman et al. 2011; Johns et al. 2004). However, research on sex differences in paranoia has also shown conflicting results, which can be attributed to cultural differences in the endorsement and experience of psychotic phenomena (Fekih-Romdhane et al. 2023; Fekih-Romdhane et al. 2022). Indeed, studies from Tunisia and other Arab countries reported no significant differences across sex in the presence and severity of psychotic experiences in the general population (e.g. (Fekih-Romdhane et al. 2023, 2024),). Further research into the experience of paranoid ideation across sex in non-clinical populations is required to help advance understanding of how sex influences the occurrence and nature of psychotic experiences in various contexts.

Finally, paranoia scores correlated positively with psychotic experiences scores as assessed using the PQ-B, indicating convergent validity, as well as with depression, anxiety and insomnia, attesting to the concurrent validity of the GPTS-8 in its Arabic version. Our results concur with current theoretical psychological models of paranoia which propose that insomnia, depression and anxiety are important determinants of the inception and persistence of paranoia (Freeman et al. 2012). For instance, previous evidence has shown that insomnia and sleep disturbances frequently occur in people with high levels of paranoid thinking, and were suggested as contributors to the development of persecutory ideation (Freeman et al. 2009). Overall, it can be inferred that the Arabic version of the GPTS-8 is a clinically useful and practical alternative of the R-GPTS that captures the core of paranoid ideation as a bidimensional construct with two separate "ideas of persecution" and "ideas of reference" indices.

4.1 | Practical Implications

Our results suggest that GPTS-8 represents a relevant and useful instrument with adequate validity and reliability for measuring, treating and monitoring the phenomenon of paranoid beliefs among Arabic-speaking people. Providing a psychometrically sound paranoia measure for use among Arabic speakers empowers healthcare professionals and researchers to better understand the distribution of paranoia symptoms across Arab populations and optimize care for help-seekers presenting with various levels of paranoid ideation. The GPTS-8 is valuable because it is simple to use and easy to implement in low-resource settings in Arab low- and middle-income countries, such as Tunisia, where researchers and practitioners who often work under challenging conditions, time pressure and financial strain. Thus, we believe the new Arabic version of the GPTS-8 will provide further encouragement to research and development in this yet-unexplored field among Arabic-speakers.

4.2 | Study Limitations

Our study has some limitations. First, our general population sample was recruited using a non-probabilistic, snowball sampling technique, which means that its epidemiological representativeness may be questioned. Second, only self-report measures

were used. It would be relevant to replicate our findings using clinical interviews (such as the Comprehensive Assessment of At-Risk Mental States (Yung et al. 2005)) to test the level of agreement between interviewer- and self-rated persecutory ideation. Third, other important psychometric properties were not reported. For example, future studies exploring test-retest reliability and inter-rater reliability of the GPTS-8 could determine the stability and consistency of the instrument over different times, and the degree of agreement between the scores assigned by different raters, respectively. Moreover, future investigation of measurement invariance of the GPTS-8 across different Arab countries (Tunisia vs. others) and across languages (Arabic vs. others) could help ensure the equivalence of the paranoia construct, and enable future cross-national and cross-cultural comparisons between countries to be done accurately.

5 | Conclusion

The Arabic version of the GPTS-8 is suggested to be reliable and valid with a two-factor structure, thus addressing the multidimensional nature of the paranoia experience. By translating and validating the GPTS-8 in Arabic, this study contributes to rendering the tool available to a broader array of clinicians and researchers who work with Arabic-speaking people. Because of its reduced length and cost-efficiency, the GPTS-8 is suitable for use in large-scale epidemiological studies or longitudinal, multiple time-point studies where researchers can be under pressure for time or resources.

Author Contributions

Feten Fekih-Romdhane: conceptualization, investigation, methodology, project administration, resources, supervision, validation, visualization, writing – original draft preparation, writing – review and editing. **Ons Ghorbel:** data curation, writing – review and editing. **Carlos Laranjeira:** writing – review and editing. **Majda Cheour:** writing – review and editing. **Frederic Harb:** writing – review and editing. **Souheil Hallit:** formal analysis, resources, software, writing – original draft preparation, writing – review and editing.

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Ethics Statement

Each participant provided a voluntary oral informed assent before beginning the survey. The research protocol was approved by the ethics committee of the Razi psychiatric hospital, Manouba, Tunisia. The study was performed following the standards for medical research involving human subjects recommended by the Declaration of Helsinki for human research.

Consent

The authors have nothing to report.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

References

American Psychiatric Association A: Diagnostic and Statistical Manual of Mental Disorders: DSM-5. 2013, Vol. 5. American Psychiatric Association.

Barnby, J. M., M. A. Mehta, and M. Moutoussis. 2022. "The Computational Relationship Between Reinforcement Learning, Social Inference, and Paranoia." *PLoS Computational Biology* 18, no. 7: e1010326. https://doi.org/10.1371/journal.pcbi.1010326.

Bastien, C. H., A. Vallières, and C. M. Morin. 2001. "Validation of the Insomnia Severity Index as an Outcome Measure for Insomnia Research." *Sleep Medicine* 2, no. 4: 297–307. https://doi.org/10.1016/s1389-9457(00)00065-4.

Bebbington, P. E., O. McBride, C. Steel, et al. 2013. "The Structure of Paranoia in the General Population." *British Journal of Psychiatry* 202, no. 6: 419–427. https://doi.org/10.1192/bjp.bp.112.119032.

Bianchi, R., and J. Verkuilen. 2021. "Green Et Al. Paranoid Thoughts Scale": French Validation and Development of a Brief Version." *Personality and Individual Differences* 171: 110554. https://doi.org/10.1016/j.paid.2020.110554.

Brown, P., F. Waite, A. Rovira, A. Nickless, and D. Freeman. 2020. "Virtual Reality Clinical-Experimental Tests of Compassion Treatment Techniques to Reduce Paranoia." *Scientific Reports* 10, no. 1: 8547. https://doi.org/10.1038/s41598-020-64957-7.

Chen, F. F. 2007. "Sensitivity of Goodness of Fit Indexes to Lack of Measurement Invariance." *Structural Equation Modeling: A Multidisciplinary Journal* 14, no. 3: 464–504. https://doi.org/10.1080/10705510701301834.

Coid, J. W., S. Ullrich, C. Kallis, et al. 2013. "The Relationship Between Delusions and Violence: Findings From the East London First Episode Psychosis Study." *JAMA Psychiatry* 70, no. 5: 465–471. https://doi.org/10.1001/jamapsychiatry.2013.12.

Comrey, A. L., and H. B. Lee. 2013. *A First Course in Factor Analysis*. Psychology press.

Contreras, A., C. Valiente, C. Vázquez, et al. 2022. "The Network Structure of Paranoia Dimensions and Its Mental Health Correlates in the General Population: The Core Role of Loneliness." *Schizophrenia Research* 246: 65–73. https://doi.org/10.1016/j.schres.2022.06.005.

Dagher, D., S. Samaha, M. Mhanna, et al. 2023. "Depressive Symptoms Among a Sample of Lebanese Adolescents: Scale Validation and Correlates With Disordered Eating." *Archives of Pediatrics* 30, no. 6: 401–407. https://doi.org/10.1016/j.arcped.2023.04.007.

Dunn, T. J., T. Baguley, and V. Brunsden. 2014. "From Alpha to Omega: A Practical Solution to the Pervasive Problem of Internal Consistency Estimation." *British Journal of Psychology* 105, no. 3: 399–412. https://doi.org/10.1111/bjop.12046.

El Khoury-Malhame, M., S. Hallit, M.-J. Sanchez-Ruiz, S. El Hajj, and R. Doumit. 2024. "Psychometric Validation of the Arabic Version of the GAD-7 Among Lebanese Adolescents." *PLoS One* 20, no. 8: e0329627. https://doi.org/10.1371/journal.pone.0329627.

Ellett, L., B. Lopes, and P. Chadwick. 2003. "Paranoia in a Nonclinical Population of College Students." *Journal of Nervous and Mental Disease* 191, no. 7: 425–430. https://doi.org/10.1097/01.NMD.0000081646.33030.EF.

Eysenbach G. "Improving the Quality of Web Surveys: The Checklist for Reporting Results of Internet E-Surveys (CHERRIES)." In., vol. *Journal*

of Medical Internet Research, 6(3): Gunther Eysenbach Centre for Global eHealth Innovation, Toronto, Canada; 2004: e34. https://doi.org/10.2196/jmir.6.3.e34.

Fekih-Romdhane, F., F. Ghrissi, M. Stambouli, et al. 2024. "Moderating Effect of Alexithymia Between Problem Gambling and Psychotic Experiences in University Students." *BMC Psychiatry* 24, no. 1: 19. https://doi.org/10.1186/s12888-023-05472-7.

Fekih-Romdhane, F., H. Jahrami, A. Alhuwailah, et al. 2023. "Cross-Country Validation of the Arabic Version of the Prodromal Questionnaire–Brief (PQ-B) in Young Adults From the General Population of the Middle East and North Africa (MENA) Region." *International Journal of Mental Health and Addiction* 22, no. 5: 1–21. https://doi.org/10.1007/s11469-023-01048-4.

Fekih-Romdhane F., S. Obeid, S. Hallit: "Psychotic Experiences and Symptoms in Adolescents and Young Adults From Different Countries and Cultural Backgrounds." In. *Frontiers in Psychiatry*, 14: Frontiers Media SA; 2023: 1275061. https://doi.org/10.3389/fpsyt.2023.1275061.

Fekih-Romdhane, F., S. R. Pandi-Perumal, P. Conus, et al. 2022. "Prevalence and Risk Factors of Self-Reported Psychotic Experiences Among High School and College Students: A Systematic Review, Meta-Analysis, and Meta-Regression." *Acta Psychiatrica Scandinavica* 146, no. 6: 492–514. https://doi.org/10.1111/acps.13494.

Fekih-Romdhane, F., M. Stambouli, D. Malaeb, et al. 2023. "Insomnia and Distress as Mediators on the Relationship From cyber-victimization to self-reported Psychotic Experiences: A Binational Study From Tunisia and Lebanon." *BMC Psychiatry* 23, no. 1: 524. https://doi.org/10.1186/s12888-023-05019-w.

Fenigstein, A., and P. A. Vanable. 1992. "Paranoia and Self-Consciousness." *Journal of Personality and Social Psychology* 62, no. 1: 129–138. https://doi.org/10.1037/0022-3514.62.1.129.

Fenn, J., C.-S. Tan, and S. George. 2020. "Development, Validation and Translation of Psychological Tests." *BJPsych Advances* 26, no. 5: 306–315. https://doi.org/10.1192/bja.2020.33.

Freeman, D., and P. A. Garety. 2000. "Comments on the Content of Persecutory Delusions: Does the Definition Need Clarification?" *British Journal of Clinical Psychology* 39, no. 4: 407–414. https://doi.org/10.1348/014466500163400.

Freeman, D., P. A. Garety, P. E. Bebbington, et al. 2005. "Psychological Investigation of the Structure of Paranoia in a Non-clinical Population." *British Journal of Psychiatry* 186, no. 5: 427–435. https://doi.org/10.1192/bjp.186.5.427.

Freeman, D., P. A. Garety, E. Kuipers, D. Fowler, P. E. Bebbington, and G. Dunn. 2007. "Acting on Persecutory Delusions: The Importance of Safety Seeking." *Behaviour Research and Therapy* 45, no. 1: 89–99. https://doi.org/10.1016/j.brat.2006.01.014.

Freeman, D., S. Lambe, T. Kabir, et al. 2022. "Automated Virtual Reality Therapy to Treat Agoraphobic Avoidance and Distress in Patients With Psychosis (Gamechange): A Multicentre, Parallel-Group, Single-Blind, Randomised, Controlled Trial in England With Mediation and Moderation Analyses." *Lancet Psychiatry* 9, no. 5: 375–388. https://doi.org/10.1016/S2215-0366(22)00060-8.

Freeman, D., B. S. Loe, D. Kingdon, H. Startup, A. Molodynski, L. Rosebrock, P. Brown, B. Sheaves, F. Waite, J. C. Bird, The revised Green, et al. 2021. "Paranoid Thoughts Scale (R-GPTS): Psychometric Properties, Severity Ranges, and Clinical Cut-Offs." *Psychological Medicine* 51, no. 2: 244–253. https://doi.org/10.1017/S0033291719003155.

Freeman, D., S. McManus, T. Brugha, H. Meltzer, R. Jenkins, and P. Bebbington. 2011. "Concomitants of Paranoia in the General Population." *Psychological Medicine* 41, no. 5: 923–936. https://doi.org/10.1017/S0033291710001546.

Freeman, D., K. Pugh, N. Vorontsova, and L. Southgate. 2009. "Insomnia and Paranoia." *Schizophrenia Research* 108, no. 1–3: 280–284. https://doi.org/10.1016/j.schres.2008.12.001.

Freeman, D., D. Stahl, S. McManus, et al. 2012. "Insomnia, Worry, Anxiety and Depression as Predictors of the Occurrence and Persistence of Paranoid Thinking." *Social Psychiatry and Psychiatric Epidemiology* 47, no. 8: 1195–1203. https://doi.org/10.1007/s00127-011-0433-1.

Green, C., D. Freeman, E. Kuipers, et al. 2008. "Measuring Ideas of Persecution and Social Reference: The Green Et Al. Paranoid Thought Scales (GPTS)." *Psychological Medicine* 38, no. 1: 101–111. https://doi.org/10.1017/S0033291707001638.

Hair, Jr J. F., M. Sarstedt, and C. M. Ringle. 2017. *Gudergan SP: ABvanced Issues in Partial Least Squares Structural Equation modeling*. saGe publications.

Hajdúk, M., H. S. Klein, P. D. Harvey, D. L. Penn, and A. E. Pinkham. 2019. "Paranoia and Interpersonal Functioning Across the Continuum From Healthy to Pathological–Network Analysis." *British Journal of Clinical Psychology* 58, no. 1: 19–34. https://doi.org/10.1111/bjc.12199.

Hallit, S., C. Haddad, R. Hallit, et al. 2019. "Validation of Selected Sleeping Disorders Related Scales in Arabic Among the Lebanese Population." *Sleep and Biological Rhythms* 17, no. 2: 183–189. https://doi.org/10.1007/s41105-018-0196-0.

Hu, Lt, and P. M. Bentler. 1999. "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives." *Structural Equation Modeling: A Multidisciplinary Journal* 6, no. 1: 1–55. https://doi.org/10.1080/10705519909540118.

Ising, H. K., W. Veling, R. L. Loewy, et al. 2012. "The Validity of the 16-Item Version of the Prodromal Questionnaire (PQ-16) to Screen for Ultra High Risk of Developing Psychosis in the General Help-Seeking Population." *Schizophrenia Bulletin* 38, no. 6: 1288–1296. https://doi.org/10.1093/schbul/sbs068.

Johns, L. C., M. Cannon, N. Singleton, et al. 2004. "Prevalence and Correlates of Self-Reported Psychotic Symptoms in the British Population." *British Journal of Psychiatry* 185, no. 4: 298–305. https://doi.org/10.1192/bjp.185.4.298.

Kaymaz, N., M. Drukker, R. Lieb, et al. 2012. "Do Subthreshold Psychotic Experiences Predict Clinical Outcomes in Unselected Non-Help-Seeking Population-based Samples? A Systematic Review and Meta-Analysis, Enriched With New Results." *Psychological Medicine* 42, no. 11: 2239–2253. https://doi.org/10.1017/S0033291711002911.

Kingston, J., B. Schlier, L. Ellett, et al. 2023. "The Pandemic Paranoia Scale (PPS): Factor Structure and Measurement Invariance Across Languages." *Psychological Medicine* 53, no. 6: 2652–2661. https://doi.org/10.1017/S0033291721004633.

Kowalski, J., M. Marchlewska, Z. Molenda, P. Górska, and Ł Gawęda. 2020. "Adherence to Safety and Self-Isolation Guidelines, Conspiracy and Paranoia-Like Beliefs During COVID-19 Pandemic in Poland-Associations and Moderators." *Psychiatry Research* 294: 113540. https://doi.org/10.1016/j.psychres.2020.113540.

Kroenke, K., R. L. Spitzer, and J. B. Williams. 2001. "The PHQ-9: Validity of a Brief Depression Severity Measure." *Journal of General Internal Medicine* 16, no. 9: 606–613. https://doi.org/10.1046/j.1525-1497.2001.016009606.x.

Latteur, A., F. Larøi, and C. Bortolon. 2022. "Translation and Validation of the French Version of the Revised Green Et Al., Paranoid Thoughts Scale (R-GPTS) in Two Samples: Non-Clinical and Clinical Adults." *Psychologica Belgica* 62, no. 1: 208–217. https://doi.org/10.5334/pb.1134.

Loewy, R. L., C. E. Bearden, J. K. Johnson, A. Raine, and T. D. Cannon. 2005. "The Prodromal Questionnaire (PQ): Preliminary Validation of a Self-Report Screening Measure for Prodromal and Psychotic Syndromes." *Schizophrenia Research* 77, no. 2–3: 141–149. https://doi.org/10.1016/j.schres.2005.03.007.

Lyoo, I. K., T. Youn, T. H. Ha, H. S. Park, and J. S. Kwon. 2003. "Classification of Frequency Distributions of Diagnostic Criteria Scores in Twelve Personality Disorders by the Curve Fitting Method."

Psychiatry and Clinical Neurosciences 57, no. 4: 417–423. https://doi.org/10.1046/j.1440-1819.2003.01141.x.

Malhotra N., S. Dash: *Marketing Research: An Applied Orientation* (; Pearson); 2011.

Michalska da Rocha, B., S. Rhodes, E. Vasilopoulou, and P. Hutton. 2018. "Loneliness in Psychosis: A Meta-Analytical Review." *Schizophrenia Bulletin* 44, no. 1: 114–125. https://doi.org/10.1093/schbul/sbx036.

Moritz, S., N. Van Quaquebeke, and T. M. Lincoln. 2012. "Jumping to Conclusions is Associated With Paranoia but Not General Suspiciousness: A Comparison of Two Versions of the Probabilistic Reasoning Paradigm." *Schizophrenia research and treatment* 2012, no. 1: 384039–9. https://doi.org/10.1155/2012/384039.

Mundfrom, D. J., D. G. Shaw, and T. L. Ke. 2005. "Minimum Sample Size Recommendations for Conducting Factor Analyses." *International Journal of Testing* 5, no. 2: 159–168. https://doi.org/10.1207/s15327574ijt0502_4.

Paolini, E., P. Moretti, and M. T. Compton. 2016. "Delusions in First-Episode Psychosis: Principal Component Analysis of Twelve Types of Delusions and Demographic and Clinical Correlates of Resulting Domains." *Psychiatry Research* 243: 5–13. https://doi.org/10.1016/j.psychres.2016.06.002.

Peralta, V., and M. J. Cuesta. 1999. "Dimensional Structure of Psychotic Symptoms: An Item-Level Analysis of SAPS and SANS Symptoms in Psychotic Disorders." *Schizophrenia Research* 38, no. 1: 13–26. https://doi.org/10.1016/s0920-9964(99)00003-1.

Peralta, V., L. Moreno-Izco, L. Calvo-Barrena, and M. J. Cuesta. 2013. "The Low-and Higher-Order Factor Structure of Symptoms in Patients With a First Episode of Psychosis." *Schizophrenia Research* 147, no. 1: 116–124. https://doi.org/10.1016/j.schres.2013.03.018.

Peters, E. R., S. A. Joseph, and P. A. Garety. 1999. "Measurement of Delusional Ideation in the Normal Population: Introducing the PDI (Peters Et Al. Delusions Inventory)." *Schizophrenia Bulletin* 25, no. 3: 553–576. https://doi.org/10.1093/oxfordjournals.schbul.a033401.

Raffard, S., C. Madouini, Y. Laraki, et al. 2023. "Paranoid Thoughts Scale-Revised": Structural Invariance and Clinical Utility of a Brief Version in Schizophrenia." *Journal of Psychiatric Research* 163: 9–13. https://doi.org/10.1016/j.jpsychires.2023.05.036.

Rek, S. V., D. Freeman, M. A. Reinhard, et al. 2022. "Differential Psychological Response to the COVID-19 Pandemic in Psychiatric Inpatients Compared to a Non-Clinical Population From Germany." *European Archives of Psychiatry and Clinical Neuroscience* 272: 1–13. https://doi.org/10.1007/s00406-021-01291-7.

Schlier, B., T. M. Lincoln, J. L. Kingston, et al. 2024. "Cross-Cultural Validation of the Revised Green Et Al., Paranoid Thoughts Scale." *Psychological Medicine* 54, no. 9: 1–7. https://doi.org/10.1017/S0033291724000072.

Sousa, V. D., and W. Rojjanasrirat. 2011. "Translation, Adaptation and Validation of Instruments or Scales for Use in Cross-Cultural Health Care Research: A Clear and User-Friendly Guideline." *Journal of Evaluation in Clinical Practice* 17, no. 2: 268–274. https://doi.org/10.1111/j.1365-2753.2010.01434.x.

Spitzer, R. L., K. Kroenke, J. B. Williams, and B. Löwe. 2006. "A Brief Measure for Assessing Generalized Anxiety Disorder: The GAD-7." *Archives of Internal Medicine* 166, no. 10: 1092–1097. https://doi.org/10.1001/archinte.166.10.1092.

Statham, V., L.-M. Emerson, and G. Rowse. 2019. "A Systematic Review of Self-Report Measures of Paranoia." *Psychological Assessment* 31, no. 2: 139–158. https://doi.org/10.1037/pas0000645.

Swami, V., J. Todd, V. Azzi, et al. 2022. "Psychometric Properties of an Arabic Translation of the Functionality Appreciation Scale (FAS) in Lebanese Adults." *Body Image* 42: 361–369. https://doi.org/10.1016/j.bodyim.2022.07.008.

Vadenberg, R., and C. Lance. 2000. "A Review and Synthesis of the Measurement in Variance Literature: Suggestions, Practices, and Recommendations for Organizational Research." *Organizational Research Methods* 3, no. 1: 4–70. https://doi.org/10.1177/109442810031002.

van Bebber, J., J. T. Wigman, R. R. Meijer, et al. 2017. "The Prodromal Questionnaire: A Case for Irt-Based Adaptive Testing of Psychotic Experiences?" *International Journal of Methods in Psychiatric Research* 26, no. 2: e1518. https://doi.org/10.1002/mpr.1518.

Wigman, J. T., W. A. Vollebergh, Q. A. Raaijmakers, et al. 2011. "The Structure of the Extended Psychosis Phenotype in Early Adolescence—A Cross-Sample Replication." *Schizophrenia Bulletin* 37, no. 4: 850–860. https://doi.org/10.1093/schbul/sbp154.

Yung, A. R., H. P. Yuen, P. D. McGorry, et al. 2005. "Mapping the Onset of Psychosis: The Comprehensive Assessment of At-Risk Mental States." *Australian and New Zealand Journal of Psychiatry* 39, no. 11–12: 964–971. https://doi.org/10.1080/j.1440-1614.2005.01714.x.