

The Geriatric Anxiety Inventory in primary care: applicability and psychometric characteristics of the original and short form

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Abstract

Background: Generalized anxiety disorder (GAD) has negative implications for people's lives, but is often underdiagnosed in the elderly. There is a shortage of instruments to assess geriatric anxiety. **Objectives:** To analyze the applicability and psychometric properties of the Portuguese version of the Geriatric Anxiety Inventory (GAI) and its short form (GAI-SF) within primary care. **Methods:** Fifty-five seniors were classified as non-demented by a multidisciplinary panel. The protocol included the GAI, the Self-Reporting Questionnaire (SRQ-20), the Depression Scale D-10, Mini-Mental State Examination (MMSE), Bayer Scale for Activities of Daily Living (B-ADL) and the Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE). A sub-sample also completed the Beck Anxiety Inventory (BAI). **Results:** The GAI and GAI-SF showed good internal consistency (0.89; 0.62, respectively) and test-retest stability (0.58, 0.97). The GAI and GAI-SF correlated significantly with the SRQ-20 (0.74, 0.55) and BAI (0.75, 0.58). **Discussion:** The psychometric characteristics of the Brazilian versions of the GAI and GAI-SF suggest these instruments are suitable for application in the Brazilian elderly population within the primary care setting.

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Introduction

With the growth in the elderly population both in Brazil and worldwide, the demand for healthcare services by this group is set to rise. The first contact of the elderly with the public health service normally occurs in primary care¹. The healthcare treatment of older adults in primary care should entail multidimensional diagnostic testing, including screening for neuropsychiatric syndromes that can negatively impact cognitive performance and quality of life.

The most prevalent neuropsychiatric syndromes in the elderly population include major depression, anxiety disorders, mild cognitive impairment and dementias^{2,3}. Patients with anxiety disorders have poorer quality of life, are less productive and have higher rates of morbidity, mortality and comorbidity. Anxiety disorders also place a high social burden, both directly, in the form of individual suffering, for example, and indirectly, through the high demand for medical assistance to manage the physical symptoms resulting from anxiety. These social costs can be exacerbated by underevaluation, underdiagnosis and consequent inadequate treatment of this group of disorders³.

Generalized anxiety disorder (GAD) is the most common anxiety disorder in the elderly, whose prevalence tends to increase with aging⁴. GAD affects cognition and is predominantly associated with decline in memory^{3,5}. Additionally, studies have shown that the risk of cardiac events is greater in patients with GAD³. The prevalence of GAD in older adults varies across studies in the literature. Copeland et al.⁶ reported a GAD prevalence of 0.7% and 1.1% in elderly from New York and London, respectively. Lindsay et al.⁷ found a 3.7% GAD prevalence rate in a study involving 890 individuals older than 65 years living in the United Kingdom. In a study of 3,035 individuals aged 55-85 years, Gonçalves et al.³ found that 2.8% were diagnosed with GAD.

Some population-based studies suggest that anxious symptoms affect around 26% of individuals aged 65 or over^{8,9}. In a sample of 3,041 older adults aged 70-79, Mehta et al.¹⁰ noted that 15% exhibited anxious symptoms. Xavier et al.¹¹ found that 10.6% of a sample of 77 elderly individuals from Veranópolis, Rio Grande do Sul, presented

anxious symptoms. In a study by Maia et al.¹² of 327 elderly from Montes Claros, Minas Gerais, 29.3% of the sample had anxious and depressive symptoms.

Although GAD has serious consequences, the disorder is often underassessed in the elderly. There is a lack of specific instruments while depressive symptoms tend to be given more attention than anxious symptoms. In this context, Pachana et al.¹³ developed the Geriatric Anxiety Inventory (GAI), a brief screening instrument for assessing anxious symptoms in the elderly. In the validation study of the 20-item GAI, the Cronbach's alpha coefficient was 0.91 for normal elderly and 0.93 for patients of the psychogeriatric service. Convergent validity was determined by comparing the GAI against the Generalized Anxiety Disorder Severity Scale (GADS) ($r = 0.57$), the State-Trait Anxiety Inventory (STAI) ($r = -0.44$), Beck's Anxiety Inventory (BAI) ($r = 0.63$), the Penn State Worry Questionnaire (PSWQ) ($r = 0.70$) and the Positive and Negative Affect Schedule (PANAS) ($r = 0.58$ and $r = -0.34$, respectively). Test-retest reliability was found to be high ($r = 0.91$). Cut-offs indicating presence of GAD were defined as 10/11, with 84% specificity and 75% sensitivity. The GAI has recently been translated and validated in other countries including China, Italy and Spain¹⁴⁻¹⁶ where the psychometric parameters of the new versions have proven satisfactory.

More recently, the authors of the GAI developed a short version of the scale (GAI-SF)¹⁷, comprising only five of the original items. The GAI-SF has good internal consistency ($\alpha = 0.81$) and adequate convergent and divergent validity. These results have been confirmed in a clinical and non-clinical sample¹⁸.

In Brazil, Martiny et al.¹⁹ carried out the translation and semantic adaptation of the GAI into Brazilian Portuguese and performed a pilot application. Massena et al.²⁰ evaluated the psychometric properties of the Brazilian GAI in a sample of 72 elderly recruited from an outpatient psychogeriatric clinic and community centers. The internal consistency ($\alpha = 0.91$) and test-retest reliability ($p = 0.85$, $p < 0.001$) were high. Correlations with the BAI and the STAI were also high ($p = 0.68$, $p < 0.001$; $p = 0.61$, $p < 0.001$, respectively) evidencing concurrent validation. The cut-off point of 13 showed sensitivity of 83.3% and specificity of 84.6% for detecting GAD.

To date, no studies have been found on the GAI in the primary care setting while the short form (GAI-SF) has yet to be studied in Brazil. Bearing in mind that Primary Care Units are the entry point to healthcare in this country, and given that neuropsychiatric disorders are often underdiagnosed, assessing the applicability and psychometric characteristics of both the GAI and GAI-SF in the primary care setting is of paramount importance. Therefore, the objective of the present study was to assess some of the psychometric parameters of the Brazilian Portuguese version of the GAI and the GAI-SF to determine their concurrent and convergent validity, internal consistency and temporal stability, among elderly users of two Primary Care Units located in the eastern region of the city of São Paulo.

Methods

Participants

A total of 102 individuals aged over 60 years, registered in two Primary Care Units located in the eastern region of São Paulo, took part in a larger study which aimed to validate cognitive screening instruments. For the present study, the sample was composed of 55 participants who were classified as unimpaired in cognitive and functional performance. A sub-sample of 33 normal controls accepted the invitation for a re-assessment, in order to analyze the temporal stability of the GAI and GAI-SF. This new application was performed within an average of 30 weeks after the first visit. Also, a sub-sample of the group who was re-assessed ($n = 15$) completed the BAI.

There were no significant differences between the baseline and follow-up sub-sample ($n = 33$) (mean age = 73.81, SD = 6.51; mean schooling = 4.19, SD = 3.04; mean MMSE = 23.94, SD = 3.80) and the overall group of normal controls ($n = 55$). The group who completed the BAI in the follow-up ($n = 15$) was also statistically similar to the baseline and total follow-up sample (mean age = 72.92, SD = 6.59; mean schooling = 3.58, SD = 2.10; mean MMSE = 23.77, SD = 4.78).

To assure absence of dementia in the present sample, participants completed cognitive, functional and neuropsychiatric instruments. The protocols were later discussed by neuropsychologists and a psychogeriatrician and the participants were grouped into those with and without dementia, based on the results of the MMSE²¹, CAMCOG²², IQCODE^{23,24}, B-ADL²⁵, D-10²⁶ and supplementary information (age, educational level, comorbidities). Cut-off scores from previous national studies were used for each instrument²⁷. The gold standard for dementia diagnosis was clinical, based on the DSM-IV criteria for dementia.

Individuals presenting severe visual and/or auditory deficits, signs of advanced dementia, neurological/psychiatric syndromes (except dementia), present or previous alcohol abuse or diagnosed with depression or delirium, were excluded. Patients with a significant number of depression symptoms ($D-10 > 6$) were also excluded.

Instruments

Economic classification was established using the sociodemographic questionnaire of ABIPEME Criteria Brazil²⁸, which constitutes a socio-economic scale or classification built by attributing weights to a set of domestic items, in conjunction with the educational level of the head of the household.

The GAI was used to assess anxiety symptoms. Performance on the GAI-SF was calculated by tallying scores for questions 1, 6, 8, 10 and 11 of the GAI, in accordance with recommendations by the authors of the short scale¹⁷. The questions for the GAI-SF are: Question 1: I worry a lot of the time; Question 6: Little things bother me a lot; Question 8: I think of myself as a worrier; Question 10: I often feel nervous; Question 11: My own thoughts often make me nervous. These questions when analyzed as items in the full GAI scale had an item-total correlation from 0.388 to 0.552.

The GAI-SF score was extracted from the application of the GAI, and it was not applied separately. The sub-sample reassessed to determine temporal stability of both the GAI and GAI-SF also completed the BAI²⁹ in order to provide a measure of convergent validity. The Self-Reporting Questionnaire (SRQ-20), which includes questions on anxiety symptoms, was used as an additional measure of convergent validity.

Procedures

The duration of the testing session was around 90 minutes. All participants filled out the Informed Consent Form prior to undergoing the first assessment. The project was approved by the Research Ethics Committee of the Municipal Secretariat for Health under the Research Protocol n° 476/11 and by the Research Ethics Committee of the University of São Paulo School of Medicine.

Statistical analyses

A descriptive analysis of the sociodemographic characteristics was carried out. Given that the variables exhibited normal distribution, parametric tests were employed. GAI and GAI-SF internal consistency was calculated using Cronbach's α . Scores on the GAI and GAI-SF were compared for gender, age and education using ANOVAs. Convergent validity was assessed by correlating GAI and GAI-SF scores with total scores on the BAI and SRQ-20 using Pearson correlation test. For discriminant validity, GAI and GAI-SF scores were correlated with performance on the MMSE, IQCODE and B-ADL. Correlation between the first and second application of the GAI and GAI-SF was calculated using Pearson's correlation. Statistical analysis was carried out using the SPSS v.17 software program. The level of significance adopted for the statistical tests was 5%, corresponding to a p -value < 0.05 .

Results

The sample comprised 55 non-demented older adults, with a predominance of women (78.2%), individuals aged 70-79 years, and with 1-4 years of education (Table 1). The majority of participants reported household work as their main occupation and were classified into the C2 socioeconomic class. The clinical characteristics of the sample are described in Table 2.

The women had higher scores than men on both the GAI and GAI-SF, although this difference was not statistically significant (GAI: men $M = 7.25$, $SD = 4.59$; women $M = 9.74$, $SD = 4.88$; GAI-SF: men $M = 2.67$, $SD = 1.61$; women $M = 3.14$, $SD = 1.42$). After stratifying the elderly by age and education, no statistical difference between the groups for GAI and GAI-SF persisted (data not shown).

The GAI showed good internal consistency, with a Cronbach's α of 0.89. The reliability analysis revealed a test-retest correlation of 0.58 ($p < 0.001$). The GAI-SF had internal consistency of 0.62 and test-retest correlation of 0.97 ($p < 0.001$).

The correlations (Table 3) revealed a significant association between scores on the GAI and GAI-SF with performance on the SRQ-20. During follow-up assessment, correlations of 0.75 ($p = 0.002$) between the GAI and the BAI, and of 0.58 ($p = 0.031$) between the GAI-SF and the BAI, were found. No significant correlations were found between the GAI or GAI-SF and age, education, MMSE, IQCODE or B-ADL scores. A significant correlation was found between the full 20-item GAI and the 5-item GAI-SF in the baseline assessment ($r = 0.77$, $p < 0.001$).

Discussion

The objective of the present study was to analyse validation parameters of the GAI and GAI-SF in a primary care setting. The analysis included determination of internal consistency, test-retest reliability, convergent validity with the SRQ-20 and BAI, as well as discriminant validity with the MMSE, IQCODE and B-ADL.

Table 1. Sociodemographic characterization of the sample (n = 55)

Variables	N	%
Sex		
Men	12	21.8
Women	43	78.2
Age Groups		
60-69	19	34.5
70-79	25	45.5
80 +	11	20.0
Mean (SD)	72.78 (7.37)	
Median	74.00	
Minimum-Maximum	60-91	
Education (in years)*		
Illiterate	9	16.4
1 – 4 years	23	41.8
5 +	22	40.0
Mean (SD)	4.78 (3.56)	
Median	4.00	
Minimum – Maximum	0-17	
Occupation		
Housework	13	23.6
Manual Labor	34	61.8
Qualified Labor	8	14.5
Socioeconomic Classification**		
Class B1	3	5.5
Class B2	15	27.3
Class C1	14	25.5
Class C2	18	32.7
Class D	2	3.6

* Missing data = 1; ** Missing data = 3.

Table 2. Clinical characterization of the sample (n = 55)

Variable	Mean	SD±	Minimum	Median	Maximum
MMSE	23.98	3.76	16.00	25.00	30.00
IQCODE	3.23	0.23	2.34	3.20	3.66
B-ADL	2.61	1.34	1.00	2.12	6.09
SRQ-20	5.65	3.69	0.00	5.00	14.00
D-10	3.15	2.10	0.00	3.00	8.00
GAI	9.20	4.89	0.00	8.00	20.00
GAI-SF	3.04	1.44	0.00	3.00	5.00

MMSE: Mini-Mental State Examination; IQCODE: The Informant Questionnaire on Cognitive Decline in the Elderly; B-ADL: Bayer Activity of Daily Living; SRQ: Self-Reporting Questionnaire; D-10: Depression scale with ten items; GAI: Geriatric Anxiety Inventory; GAI-SF: Geriatric Anxiety Inventory Short Form.

Table 3. Correlation matrix for study variables (n = 55)

		GAI	GAI-SF	Age	Education	SRQ-20	MMSE	IQCODE
Age	r	0.02	0.073					
Education	r	-0.12	-0.12	-0.13				
SRQ-20	r	0.74**	0.55**	0.17	0.08			
MMSE	r	-0.02	-0.02	0.37**	-0.32*	0.00		
IQCODE	r	0.08	0.06	-0.096	0.40**	0.75	-0.32*	
B-ADL	r	0.08	-0.09	-0.15	0.27*	0.14	-0.39**	0.49**

MMSE: Mini-Mental State Examination; IQCODE: The Informant Questionnaire on Cognitive Decline in the Elderly; B-ADL: Bayer Activity of Daily Living; SRQ: Self-Reporting Questionnaire; D-10: Depression scale with ten items; GAI: Geriatric Anxiety Inventory; GAI-SF: Geriatric Anxiety Inventory Short Form.

** Correlation significance $p < 0.01$; * Correlation significance $p < 0.05$.

The results showed that the GAI and GAI-SF can be easily applied in primary care, including in the low-educated population. The GAI showed high internal consistency (0.89), proving comparable to the original validation study and the Brazilian version of the GAI²⁰. Accordingly, Márquez-González *et al.*¹⁶ found a Cronbach's alpha of 0.91 for the Spanish version of the GAI and Diefenbach *et al.*³⁰, in a North-American sample, found an internal consistency of 0.93. In the present study, a satisfactory test-retest correlation of 0.58 was reported for the GAI, corroborating the results of Massena *et al.*²⁰ who found a correlation of 0.68. In the study of Diefenbach *et al.*³⁰, test-retest correlation was 0.95. These discrepant findings may be associated with the length of time between baseline and follow up assessments.

In the present study, internal consistency for the GAI-SF proved adequate (0.62) but lower than the one reported in the original study (0.81)¹⁷ and a more recent investigation (0.72)¹⁸, both involving Australian seniors. On the other hand, the temporal stability of the GAI-SF was high in the present study (0.97).

In general, the internal consistency and temporal stability for the GAI were lower in the present sample compared to previous studies. However, it should be noted that the present study had a smaller sample and was conducted in primary care with low-educated elderly. Additionally, the time elapsed between initial and post-test assessments varied across studies. These aspects might explain the disparities between the present and previous studies.

Previous studies have shown that women tend to have more anxious symptoms than men. In the study by Gonçalves *et al.*³, of the 84 patients diagnosed with GAD, 55 were women. In the study of Márquez-González *et al.*¹⁶, women had higher scores on the GAI. In the present study, women also had higher anxious symptomatology, with higher scores on the GAI, yet without statistical significance, perhaps due to small sample size.

In the follow up sub sample, the GAI and GAI-SF correlated significantly with the BAI, suggesting good convergent validity and corroborating the findings of previous studies^{13,17,18,20}. A significant correlation was also found with the SRQ-20, which assesses common mental disorders and includes a number of questions on depression and anxiety. These results are similar to those found by Johnco *et al.*¹⁸ in a non-clinical sample. Satisfactory discriminant validity between the GAI and GAI-SF and scales assessing cognitive and functional domains was observed, again in line with previous studies^{18,20}.

The results of the present study suggest that the psychometric characteristics of the Brazilian versions of the GAI and GAI-SF render these instruments suitable for application in the Brazilian elderly population in the primary care setting. Overall, the statements were readily understood by the elderly participants even in the presence of low education. Nevertheless, this study has some limitations to be addressed in future investigations. The sample studied was small and no comparison between elderly with and without anxiety disorders was made. The use of the GAI and GAI-SF in primary care has the potential to help to diagnose anxiety disorders among seniors. This may help to improve the treatment for this condition.

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