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Validation of the General Anxiety Disorder-7 (GAD-7): Its Association with Psychological Factors in an Iranian Community Sample

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Abstract

The aims of the present study were (a) to develop a Farsi version of the General Anxiety Disorder-7 (GAD-7), (b) to explore correlations between general anxiety disorder, psychological well-being, mental health, and happiness, and (c) to explore gender-related differences. A sample of 488 subjects representing the general population of one of the cities in the North of Iran responded to the GAD-7, the WHO-5 Well-Being Index, the Self-Rating Scale of Mental Health, and the Self-Rating Scale of Happiness. Cronbach's alpha was .89 for the GAD-7. One factor was extracted, labeled "Anxiety". GAD-7 scores correlated negatively with psychological well-being, mental health and happiness, indicating good validity. The sex difference in the GAD-7 was statistically significant; women had higher anxiety than men. The GAD-7 had good psychometric properties in the present sample from Iran. This study provides evidence for the usefulness of the Farsi version of the GAD-7 for assessing anxiety and anxiety disorder in Iranian community residents. The GAD-7 may be useful as a screening instrument not only for anxiety but for psychological/emotional problems more generally. Considering the high correlations between GAD-7 and the other scales, we can propose that the GAD-7 measures in large part a "general factor of subjective well-being".

Keywords: Anxiety, Well-being, Mental health, Happiness, Iran

1 Introduction

Mental disorders are among the leading causes of global health burden (Santomauro et al., 2021). The Global Study of Disease, Injury, and Risk Factors (GBD 2019) results reveal that the most essential disabling mental disorders are depression and anxiety disorders. In addition, these two mental disorders are among the 25 leading causes or risk factors for global health burden worldwide (Vos et al., 2020).

Anxiety is defined in the literature as a common negative mood that occurs in various forms and affects emotional, cognitive, physical, behavioral, and relational states. In the clinical literature, this term refers to the presence of fear or anxiety that is disproportionate to the situation (Black & Grant 2014, p. 123). It includes feelings of anxiety, restlessness, worry, fear, irritability, and sadness. Anxiety, a natural reaction that prepares the person to respond to perceived dangers (Cole 2009, p. 59), is ultimately associated with death (Freud, 1999, p. 75). Every thought and experience that threatens the individual's existence and self can cause anxiety (Burger 2006, p. 82; Uysal & Turan, 2019).

Anxiety has become quite common in today's modern societies (Twenge, 2000), which is somewhat paradoxical because dangers from illness, starvation, homicide etc. have been greatly reduced in modern societies. It seems that as a result, anxiety tends to be free-floating or becomes attached to inappropriate objects and situations in modern society. Parallel to this, research on anxiety has increased. Various types and forms of anxiety can be mentioned. Chronic or severe anxiety causes emotional distress, obsessive

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thinking, compulsive behavior, relational struggles, and generalized restlessness. Anxiety often coexists with depression, which aggravate each other (Cole 2009, p. 59; Dadfar et al., 2020).

Anxiety is defined as anxiety neurosis in the second version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-II) (1968) published by the American Psychological Association, which does not have diagnoses of anxiety or generalized anxiety disorder. However, in DSM-III (1980), anxiety disorders were handled as a separate category, and Generalized Anxiety Disorder was defined as a sub-category. Generalized anxiety disorder, according to the DSM-III definition, is a generalized state of trait anxiety lasting at least one month without phobias, panic attacks, obsessions, or compulsions. Although the specific manifestations of anxiety vary from person to person, there are screening symptoms such as motor tension, autonomic hyperactivity, anxious anticipation, and alertness. Later, the duration of one month was increased to six months in the DSM-III-R (Black & Grant 2014, pp. 123-125).

It is estimated that between 2 % and 4 % of the general population have an anxiety disorder. This is not a small number. For example, although lifetime prevalence rates for any anxiety disorder in older adults (over 60 years) range from 10 % to 15.3 % based on a randomized population survey, anxiety disorders in this age group receive less clinical and research attention than depression or dementia (Diggs 2008, p. 127).

One of the most common anxiety disorders seen in general medical practice and the general population is generalized anxiety disorder (GAD). The current prevalence of the disorder is estimated between 2.8 % and 8.5 % in general medical practice and between 1.6 % and 5.0 % in the general population (Spitzer et al., 2006). Until recently, generalized anxiety disorders (GAD) were considered relatively unimportant by clinicians and the public, partly because of their commonalities, the persistence of diagnostic uncertainty, and the paucity of empirical studies documenting disability (Dadfar et al., 2023; Judd et al., 1998). Anxiety often occurs with depression, fear, and other mental disorders. In some cases, anxiety was considered a symptom of other mental disorders and was not diagnosed separately (Diagnostic and Statistical Manual of Mental Disorders (DSM-III), 1980; Judd et al., 1998).

This has led to the fact that studies on anxiety are not as systematic as those on other mental disorders, such as depression. Although there are many studies on clinical depression, there are fewer studies on anxiety (Spitzer et al., 2006). While valuable tools are available for the routine detection of depression, tools related to anxiety are not sufficient. In particular, it is sometimes difficult to diagnose a general anxiety disorder (Garcia-Campayo et al., 2010; Spitzer et al., 2006). Anxiety measures have rarely been used in clinical practice due to the difficulties arising from the measurement methods and the necessity of clinician management rather than patient self-report. The General Anxiety Disorder-7 (GAD-7) was developed to eliminate this deficiency in clinical applications, identify common anxiety cases, and determine the severity of the symptom (Spitzer et al., 2006).

Spitzer et al. (2006) report that during the development process of the GAD-7 scale, they chose seven items with the highest correlation with the total score of the 13-item scale. In addition, the first 3 items ask about two essential criteria (A and B) of the DSM-IV definition. GAD-7 has cut-off points such as 5-10 and 15 points. It is understood that increasing scores are strongly associated with more than one domain of functional impairment and with disability days, so the scale can be used as a good measure of severity. These cut-off points can be interpreted as representing mild, moderate, and severe anxiety levels. The fact that the developed GAD-7 scale can distinguish between anxiety and depression was confirmed by factor analyses. The GAD-7 scale is decisive in primary health care services diagnosis. In addition, the fact that it is a short scale that does not require a specialist and can be completed by the patient significantly increases its usability (Garcia-Campayo et al., 2010; Spitzer et al., 2006).

In the World Health Organization (WHO, 2020) Eastern Mediterranean Region Report, it was reported that one in five (22 %) people living in the region, including Iran, have some mental disorder. The rates of depression and anxiety in the countries of the region are among the highest in the world. However, although some tools that measure anxiety disorder are standardized to Farsi norms (Kaviani et al., 2009), there is no specific robust screening or diagnostic tool to help identify generalized anxiety disorder quickly (Fattah et al., 2021). In this context, the aims of the present study were (a) to develop a Farsi version of the GAD-7, (b) to explore correlations of GAD-7 scores with psychological well-being, mental health, and happiness, and (c) to explore gender-related differences.

2 Methods

2.1 Participants

This cross-sectional study included a sample of 488 subjects of the general population in Gonbad Kavos City, Golestan Province in the North of Iran ($M_{age} = 29.50$, $SD = 11.49$; 73.4% female). The participants were recruited via a self-selection method.

2.2 Measures

2.2.1 General Anxiety Disorder-7 (GAD-7)

The GAD-7 was developed by Spitzer et al. (2006) as a brief measure for assessing generalized anxiety disorder (Spitzer et al., 2006) and a screening tool for anxiety disorders, e.g., panic disorder, social anxiety disorder, and posttraumatic stress disorder (Kroenke et al., 2007). The GAD-7 consists of seven items, each rated on a 4-point Likert scale: 0 (Not at all), 1 (Several days), 2 (More than half the days), and 3 (Nearly every day). Total scores range from 0 to 21. Scores are rated as minimal anxiety (0–4), mild anxiety (5–9), moderate anxiety (10–14), and severe anxiety (15 and greater). A cut-off of 8 was recommended for the GAD-7 (Plummer et al., 2016).

2.2.2 World Health Organization-five Well-Being Index (WHO-5)

The five items of the WHO-5 ask about positive mood, vitality, and general interests. Each of the items is rated on a 6-point Likert scale. Previous studies have found acceptable psychometric properties of the WHO-5 in different versions and in various clinical and non-clinical samples (Dadfar et al., 2018). The Farsi version of the WHO-5 was available on the WHO website in 2017 (WHO, 2017).

2.2.3 The Self–Rating Scale of Mental Health and The Self-Rating Scale of Happiness

These scales consist of separate single-item questions: "What is your estimation of your mental health in general?" and "To what degree do you feel happy in general?" These questions are rated on a scale from 0 to 10. The participants were requested (a) to respond according to their global estimation and general feeling (and not their present states), (b) to know that 0 is the minimum and that 10 is the maximum score, and (c) to circle a number which seems to them to describe their actual feeling accurately. High scores indicate a high level of mental health and happiness. The one-week test–retest reliabilities of the two self-rating scales ranged between .86 and .89, indicating high temporal stability and corroborating the trait-like nature of the scores (Abdel-Khalek, 2006; Abdel-Khalek & Lester, 2017; Dadfar et al., 2021).

2.3 Procedure

In the present study, the GAD-7 was translated from English to Farsi and was back-translated from Farsi to English. Based on this, the final version of the Farsi GAD-7 was developed. The GAD-7 was designed as a Google form and delivered to subjects living in various areas of Gonbad Kavos City, Golestan Province, Iran. The respondents were recruited by a self-selection method. Data were collected between 30/07/2022 and 30/11/2022.

2.4 Data analysis

The data were analyzed with descriptive statistics, Pearson correlation coefficients, and a principal components analysis (PCA) with a varimax rotation using SPSS version 26. Eigenvalue greater than or equal to 1.0 and the scree plot were used to determine the number of factors to be retained. Factor loadings $> .5$ were considered adequate. Then, a structural equation model was used to analyze whether the factor structures of the new version were confirmed in the AMOS program.

3 Results

The mean total score for the Farsi version of the General Anxiety Disorder-7 (GAD-7) was 6.43 ($SD = 5.18$). Skewness and kurtosis of all scale items were examined, with ± 1.5 taken as the reference value (Curran et al., 1996). Based on this reference value, although the responses to the GAD7-5 statement deviate from the general trend, the data can still be considered to have a near-normal distribution despite their positive skewness (See Table 1).

Table 1: Means (*M*), standard deviations (*SD*), skewness, and kurtosis of the GAD-7 items.

	GAD7-1	GAD7-2	GAD7-3	GAD7-4	GAD7-5	GAD7-6	GAD7-7
Mean	1.12	0.88	1.11	0.92	0.55	1.02	0.83
SD	0.92	0.92	1.00	0.97	0.85	1.03	0.97
Skewness	0.607	0.800	0.546	0.768	1.463	0.683	0.907
Kurtosis	-0.357	-0.240	-0.757	-0.449	1.204	-0.695	-0.292
Variance	0.842	0.840	0.998	0.934	0.716	1.057	0.945
Median	1	1	1	1	1	1	1

The item-total correlations ranged from .690 to .844 (Table 2). They ranged from .633 to .849 for males, and from .705 to .841 for females. Cronbach's α was .89. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy for the GAD-7 was .913. The Bartlett's Test of Sphericity χ^2 was 1722.9 ($df = 21$, $p > .001$). The GAD-7 is a unifactorial scale, with one salient component labeled Anxiety explaining 61.1 % of total variance (Table 2 and Figure 1).

Table 2: Inter-item correlations, item-total correlations, loadings on first principal component and Cronbach's α for the GAD-7 items (N = 488). All correlations are statistically significant at the .01 level.

Over the last 2 weeks, how often have you been bothered by any of the following problems?	2	3	4	5	6	7	*r* with total score	Factor loading
1. Feeling nervous, anxious, or on edge	.703	.682	.470	.491	.550	.555	.814	.823
2. Being unable to stop or control worrying	1	.703	.476	.526	.563	.563	.828	.839
3. Worrying too much about different things		1	.482	.528	.613	.577	.844	.848
4. Trouble relaxing			1	.512	.428	.401	.690	.674
5. Being so restless that it is hard to sit still				1	.498	.509	.734	.736
6. Becoming easily annoyed or irritable					1	.565	.780	.773
7. Feeling afraid something awful might happen						1	.766	.763
Cronbach's Alpha					.89			
% of total variance explained					61.1			

The confirmatory factor solution presented in Figure 2 produced an acceptable fit, with a χ^2/df ratio of 3.6. This is lower than 5, as recommended. GFI was 0.96 (> 0.95), AGFI = 0.93 (> 0.90), CFI = 0.97 (> 0.90), NFI = 0.97 (> 0.90), RMSEA = 0.074 (≤ 0.080), and SRMR = 0.031 (< 0.05). All estimated loadings were statistically significant ($p < 0.001$), the sign obtained was as expected, and the model was correctly identified (See Figure 2 and Table 3).

Table 4 shows that correlations of the GAD-7 with WHO-5 and the two self-rating scales of Mental Health and Happiness were statistically significant and negative, indicating good validity. Also the sex difference was statistically significant. Women had higher anxiety than men (Table 5).

In response to the question, "If you ticked any of the anxiety problems, to what extent have these problems made it difficult for you to do things, take care of household chores, or get along with others?", they reported as follows: not at all (33.4 %), some (55.3 %), much (8.2 %), and very much (3.1 %).

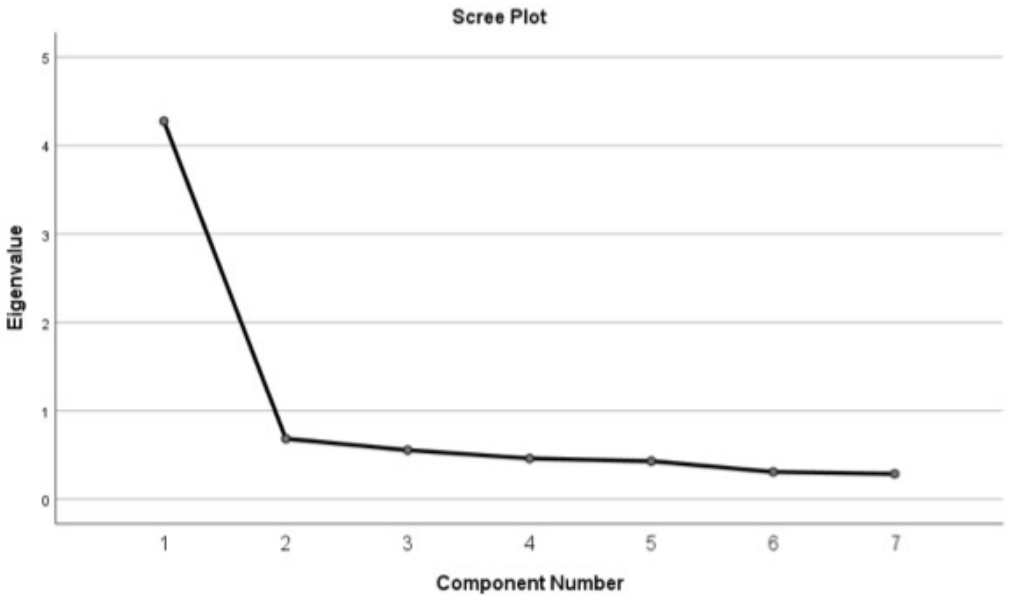

Figure 1: Scree plot of the General Anxiety Disorder-7 (GAD-7).

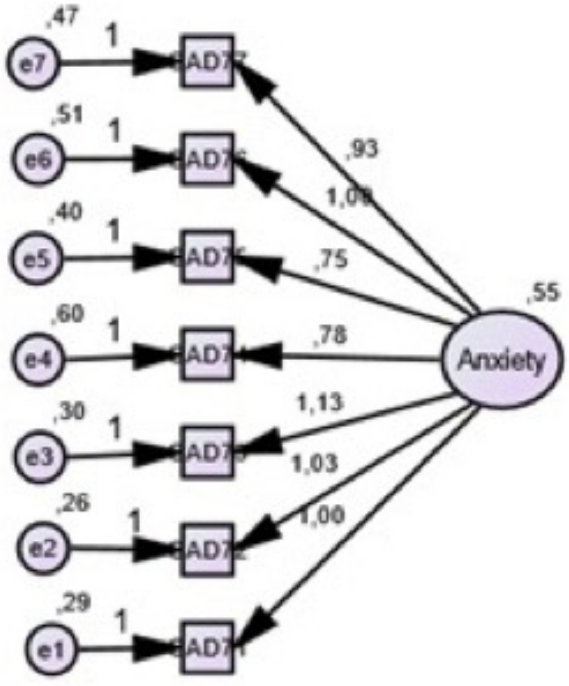

Figure 2: Measurement model with standardized loadings.

4 Discussion

This study applied various analyses to develop the Farsi version of the General Anxiety Disorder-7 (GAD-7) scale. Item-total correlations varied between .690 and .844 (Table 2). A single-factor structure emerged with a high correlation between each item of the scale and the total score. In addition, the Cronbach α value, a measure of internal consistency, is .89. Spitzer et al. (2006) found Cronbach $\alpha = .92$ when they created the short version of the Generalized Anxiety Disorder Scale. Garcia-Campayo et al. (2010) reported the Cronbach alpha value as .82 when they adapted the GAD-7 scale to the Spanish language and culture.

Table 3: Standardized regression weights: (Group number 1 - Default model).

Path	Estimate
GAD-7 1 <— GAD-7	.806
GAD-7 2 <— GAD-7	.827
GAD-7 3 <— GAD-7	.837
GAD-7 4 <— GAD-7	.595
GAD-7 5 <— GAD-7	.659
GAD-7 6 <— GAD-7	.718
GAD-7 7 <— GAD-7	.705

Table 4: Means (*M*), standard deviations (*SD*), and correlations of the GAD-7 with other scales. All correlations are statistically significant at the .01 level (2-tailed).

Scales	M (SD)	r with GAD-7 total
WHO-five Well-Being Index (WHO-5)	14.98 (6.13)	-.661
Self-Rating Scale of Mental Health	7.15 (2.34)	-.516
Self-Rating Scale of Happiness	7.28 (2.27)	-.477

Table 5: Means (*M*), standard deviations (*SD*), and t-test for sex in the GAD-7.

Sex	N	M	SD	F	t	*p*
Female	358	6.83	5.29	2.364	2.81	.005
Male	130	5.35	4.71			

Donker et al. (2011), who validated the GAD-7 into Dutch, determined Cronbach $\alpha = .86$. Tong et al. (2016), who validated the GAD-7 scale on Chinese patients with epilepsy, again found a high Cronbach alpha value of .88. The alpha value obtained in our Iranian study is similar to the values obtained in other adaptation studies. Considering that values of .90 and above are considered excellent, it can be said that the internal consistency coefficient for the Farsi version, whose psychometric properties and validity and reliability were examined in this study, is close to perfect.

In order to determine the structure of the GAD-7 scale in Iranian culture, exploratory factor analysis (EFA) was performed. The KMO value of .913 in this analysis indicates that the sample in which the scale was evaluated was sufficient. It also explains 61.1 % of the variance. In other words, the GAD-7 scale can explain 61 % of the individual differences in anxiety. Furthermore, when the factor loadings of each statement that make up the GAD-7 scale are examined, it is understood that the lowest factor loading is .674 (See Table 2). This confirms the structural validity of the Farsi version of the GAD-7 scale.

In addition, confirmatory factor analysis (CFA) was performed to determine the scale's psychometric properties. We examined all the more commonly used fit indices, and found that all of them indicate acceptable model fit according to Aylar (2017). In addition, when the table showing the regression weights is examined, it is seen that the lowest value is .595. Taken together, the results of both exploratory and confirmatory factor analysis show that the Farsi version of the GAD-7 has only one single dominant factor. It measures a single construct.

In addition to these analyses, the correlations of the Farsi-adapted GAD-7 scale with the Farsi version of the WHO-5 scale, which has acceptable psychometric properties and relates to positive mood, vitality, and general interests, were examined. There was a statistically significant negative correlation. Accordingly, while the individual's positive mood and vitality increase, his/her GAD-7 scores decrease. In addition, the GAD-7's relationships with the Self-Rating Scale of Mental Health and the Self-Rating Scale of Happiness

were examined. The two scales had moderate, statistically significant ($p < .01$) negative relationships with GAD-7. Accordingly, as the general anxiety level of the individual increases, perceptions of general mental health and happiness decrease.

This relationship between the three scales reveals that the GAD-7 scale is a suitable tool for measuring generalized anxiety in Iranian culture, a scale capable of distinguishing between good and anxious moods. It even suggests that it may be useful as a screening instrument not only for anxiety but for psychological/emotional problems more generally. In Table 4 we reported the correlations between GAD-7 and the other scales. We observed in addition that WHO-5 well-being positively correlated with mental health ($r = .561$) and happiness ($r = .621$), and mental health positively correlated with happiness ($r = .670$). Therefore we can propose that the GAD-7 measures in large part a "general factor of subjective well-being".

The mean score on the GAD-7 scale obtained by our study participants is 6.43, in the "mild generalized anxiety disorder" range. When examined from this aspect (Spitzer et al., 2006), it is understood that the Iranian sample has mild GAD. In an earlier study conducted on a hospitalized sample diagnosed with Covid-19 in Iran, Fattah et al. (2021) reported the mean score as 4.37. For the Korean version, the researchers reported a mean of 9.98 ± 5.71 (Lee et al., 2022). In a study conducted on patients with migraine, it was reported that while an average of 3.7 ± 3.4 was obtained in people without a clinical diagnosis of GAD, this average increased to 10.2 ± 5.4 in participants with diagnosed GAD (Seo & Park, 2015). Donker et al. (2011) reported that in the Dutch adaptation study, the GAD-7 average of the participants without a clinical diagnosis of anxiety or depression was 8.0, while the average of those with any mental disorder diagnosed according to DSM increased to 11.6. Because our results are similar to these others, it can be said that anxiety levels in Iran are not markedly different from those in other countries, and the Farsi version of the GAD-7 is a measurement tool capable of measuring anxiety.

GAD-7 averages were found to be higher in women than in men. This is in line with numerous studies which all found that women score higher than men on measures of anxiety, as well as related constructs such as neuroticism. For example, Fattah et al. (2021) reported that female patients reported higher levels of generalized anxiety and death anxiety than male patients in their study conducted in Iran. Also a study conducted by Omani-Samani et al. (2018) with a sample in Iran found that women score substantially higher than men. The similarity between the results of Omani-Samani et al. and the present study indicates that the scale can accurately measure general anxiety. In the Garcia-Campayo et al. (2010) study, no statistically significant difference was found between the averages of the two gender groups. Accordingly, it can be said that the self-reported general anxiety levels of women usually are higher than those of men, especially in the Iranian samples.

The present study had some limitations. It is based on a convenience sample of Iran, and the findings were based only on Iranian community residents. Other limitations are the number of participants, and the cross-sectional nature of the design. A further limitation is the lack of other measures believed to measure anxiety or similar constructs, to confirm construct validity, or at least criterion validity. These limitations could be mentioned as possibilities for future work. A proposed next step would be to study the performance of different normal and clinical groups on the GAD-7. These are projects for future studies.

5 Conclusions

The General Anxiety Disorder-7 (GAD-7) had good psychometric properties in the present sample from Iran. The GAD-7 has a one dimensional structure. This study provides evidence for the usefulness of the Farsi version for assessing anxiety disorder in Iranian community residents. Therefore, use of the Farsi version of the GAD-7 for measuring anxiety disorder in Iranian populations is suggested. The GAD-7 may be useful as a screening instrument not only for anxiety but for psychological/emotional problems more generally. Regarding the correlations between GAD-7 and the other scales, but not those among the other scales, it is suspected these correlations are very substantial and most likely statistically significant. If this is so, it can propose that the GAD-7 measures in large part a "general factor of subjective well-being".

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