

ORIGINAL ARTICLE

General Health Questionnaire-12 reliability, factor structure, and external validity among older adults in India

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ABSTRACT

Aims: The purpose of this study is to analyze the internal consistency, factor structure, and external validity of the 12-item General Health Questionnaire (GHQ-12) among older adults in India.

Settings and Design: This study analyzes data collected as part of the UNFPA “Building Knowledge Base on Ageing in India (BKPAI)” project. The BKPAI Survey was conducted in 2011 in seven major demographically advanced states of India – Himachal Pradesh, Punjab, West Bengal, Odisha, Maharashtra, Kerala, and Tamil Nadu.

Materials and Methods: A community-based representative sample of 9692 respondents aged 60 and above from seven Indian states was employed. The GHQ-12 questionnaire was administered.

Statistical Analysis: The Cronbach’s alpha was calculated to analyze internal consistency. Factor analysis was applied to explore the factor structure of GHQ-12, and then correlation coefficients were calculated to examine the external validity of the measurement.

Results: The Cronbach’s alpha of the GHQ-12 is 0.9. Factor analysis reveals two significant components which accounted for 59% of the variance. The correlation between the overall score of GHQ-12 and the subjective well-being inventory (SUBI) is 0.58.

Conclusions: The GHQ-12 shows adequate reliability among the older population in India.

Key words: General Health Questionnaire, India, older adults, reliability

INTRODUCTION

Screening psychological distress helps early detection for people at risk of mental illness. The General Health Questionnaire (GHQ) created by Goldberg in 1972 is a tool which has been widely used to assess such distress.^[1] The GHQ-12 comprises 12 questions regarding the general level of happiness, the experience of depressive and anxiety


symptoms, perceived stress, and sleep disturbance over the previous 4 weeks. Each item has a 4-point response scale.^[2]

In most studies, the GHQ-12 has been used as a unidimensional measure. Some factor analysis studies found that GHQ-12 measures three domains including social dysfunction, anxiety, and loss of confidence.^[3-5] However, other studies have identified only two factors – depression and social dysfunction^[6,7] – and a further study argued that separate domains do not contribute to identifying vulnerable population groups or the factors associated with distress.^[8]

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The validating study of the GHQ-12 against standardized psychiatric interviews across 15 countries around the world showed uniformly good results.^[2] In India, the GHQ has been validated in Kannada,^[9] Hindi,^[10] and Tamil.^[11] However, these studies were based on a small clinic sample in one state, with the participants being young adults, and there remains a lack of studies across multiple states and focusing among older adults. The purpose of this study is to analyze the internal consistency, factor structure, and external validity of GHQ-12 among older adults in seven states in India with different languages and cultures.

MATERIALS AND METHODS

Subjects

This study analyzes data collected as part of the UNFPA “Building Knowledge Base on Ageing in India (BKPAI)” project. The BKPAI Survey was conducted in 2011 in seven major demographically advanced states of India: Himachal Pradesh, Punjab, West Bengal, Odisha, Maharashtra, Kerala, and Tamil Nadu. A representative sample was obtained using a random sampling method covering the Northern, Southern, Western, and Eastern regions. The primary sampling units were households. All those aged 60 and above in the sampled households were interviewed face to face. The completion rate for households was 94.7% and 92.9% for elderly respondents. The detailed information about the survey sampling is described in a previous report.^[12] The total sample size interviewed is 9692. Of these, 214 are excluded because of missing values (missingness is not mutually exclusive) on the GHQ-12 score ($n = 36$) and subjective well-being inventory (SUBI) score ($n = 192$). No demographic (age and gender) differences were observed between excluding and study cases. The final analytical sample is 9478 adults aged 60 and above (4988 women and 4490 men), 63.4% aged between 60 and 69 years, 26.5% aged between 70 and 79 years, and 10.1% aged 80 years and above (mean age = 68.0 years, standard deviation [SD] = 7.2).

Instruments

The GHQ-12 is used to measure the psychological distress and the SUBI, which is another instrument measuring mental health, is used to check the external validity of GHQ. The GHQ-12 includes the following 12 questions: (1) Have you recently been able to concentrate on whatever you are doing? (2) Have you recently lost much sleep due to some worry? (3) Have you recently felt constantly under strain? (4) Have you recently felt that you could not overcome your difficulties? (5) Have you recently been feeling unhappy and depressed? (6) Have you recently been losing confidence in yourself? (7) Have you recently been thinking of yourself as a worthless person? (8) Have you recently felt that you are playing a useful role in life? (9) Have you recently felt capable of making decisions about things? (10) Have you recently been able to enjoy your

normal day-to-day activities? (11) Have you recently been able to face up to your problems? (12) Have you recently been feeling reasonably happy, all things considered?

The SUBI consists of the following nine questions to measure feelings of well-being or ill-being experienced by an individual in various life concerns:^[13] (1) Do you feel your life is interesting? (2) Compared with the past, how do you feel your present life is? (3) On the whole, how happy are you with the kind of things you have been doing in recent years? (4) Do you think you have achieved in your life the standard of living and the social status that you had expected? (5) How do you feel about the extent to which you have achieved success and are getting ahead? (6) Do you normally accomplish what you wanted to accomplish? (7) Do you feel you can manage situations even when they do not turn out to be as expected? (8) Do you feel confident that in case of a crisis (anything that substantially upsets your situation in life) you will be able to handle it or face it boldly? (9) The way things are going now, do you feel confident in coping with your future? The questionnaires for each state were bilingual, with questions in both the primary language of the states (Hindi, Punjabi, Bengali and Nepali, Odia, Marathi, Malayalam, and Tamil) and English.

For the GHQ, the scoring method (0-0-1-1) is used to sum up the points to a total score ranging between 0 and 12, with a higher score indicating poorer mental health. For the SUBI, the three responses on each item are scored (1-2-3), with the points summed to a total score ranging between 9 and 27, with a higher score indicating poorer well-being.

Methods

Cronbach's alpha was calculated to analyze internal consistency. It ranges from 0 to 1.00, with values close to 1.00 indicating high consistency. A value of 0.7–0.8 is an acceptable value. The normal alpha is appropriate when items on a scale are summed to produce a single score for that scale.

Factor analysis was applied to explore factor structure of GHQ-12. The adequacy of the correlation matrix of the GHQ-12 item was checked, and it was observed that there was a strong and statistically significant correlation between the variables (0.3–0.6). The principle component extraction method was adopted as it is suggested in establishing preliminary solutions in exploratory factor analysis.^[14] Factor extraction was based on a statistical criterion of eigenvalues >1. The initial un-rotated solution suggested some items load onto more than one factors. To obtain a more interpretable and simplified solution, the orthogonal varimax rotation was chosen to test any diverse underlying structures in GHQ-12 items. The cutoff threshold to define the item as representing the factor was chosen with the factor loading at >0.5. Then, the correlation coefficients were calculated to examine the external validity of the

GHQ-12 score as a whole and in terms of the individual factors.

RESULTS

A mean GHQ-12 score of 3.4 (SD = 3.7) was obtained in the sample, 3.7 (SD = 3.8) for women and 3.1 (SD = 3.6) for men. The difference between women and men was statistically significant ($P < 0.001$). The mean score varies across states, with the lowest score 1.7 (SD = 2.8) in Punjab and the highest score 4.7 (SD = 3.7) in Odisha. The other five states score in between – Himachal Pradesh 2.3 (SD = 3.6), Kerala 2.5 (SD = 3.2), Maharashtra 3.6 (SD = 3.7), Tamil Nadu 4.5 (SD = 4.4), and West Bengal 4.7 (SD = 2.9). The difference was statistically significant ($P < 0.001$). At GHQ-12 score ≥ 4 , 3839 (40.5%) of elderly respondents were deemed to be psychologically distressed.

Internal consistency

Table 1 shows the results of the reliability analysis. The values in the column labeled “Adjusted item-scale correlation” are the correlations between each item and the total score from the questionnaire. In a reliable scale, all items should correlate with the total. If any of these values is < 0.3 , it means that a particular item does not correlate very well with the overall scale. Both the sample and subsamples have item-total correlations above 0.5, which is encouraging. The values in the column labeled “Cronbach alpha if the item is eliminated” are the values of the overall alpha if that item was not included in the calculation. The overall alpha is 0.9, and therefore, all values in this column should be around that same value. The results show that none of the items would substantially affect reliability if they were omitted, reflecting a reasonable degree of reliability.

An alpha value of 0.90 for the entire sample indicates a very good reliability, with satisfactory internal consistency being the case for both women and men. Compared with other states, the West Bengal subsample had the poorer internal consistency, with an alpha of 0.74. The range of item-scale correlations is between 0.7 and 0.5, with item 3 “felt constantly under strain” being the one with the lowest correlation coefficient.

Factor structure

Table 2 shows the factor loadings after the Varimax rotation. Two factors were obtained. Based on the items allocated on each factor, Factor I may be called “social dysfunction” and Factor II may be termed “depression” accordingly. The data met the Kaiser–Meyer–Olkin criteria for sampling adequacy as 0.93 is greater than the suggested minimum of 0.6. The Bartlett’s test for sphericity was significant ($\chi^2 = 50581, P < 0.001$). Overall, the tests suggest that the data meet the minimum standards for factor analysis.

Table 1: Item-scale analysis of the General Health Questionnaire-12

	Adjusted item-scale correlation	Cronbach alpha if the item is omitted
Able to concentrate	0.62	0.89
Loss of sleep over worry	0.58	0.89
Felt constantly under strain	0.53	0.90
Could not overcome difficulties	0.55	0.90
Feeling unhappy and depressed	0.63	0.89
Losing confidence	0.66	0.89
Thinking of self as worthless	0.65	0.89
Playing a useful role	0.65	0.89
Capable of making decisions	0.66	0.89
Able to enjoy day-to-day activities	0.66	0.90
Able to face problems	0.59	0.89
Feeling reasonably happy	0.65	0.89
Internal consistency of GHQ-12		
Entire sample	Alpha 0.90	
Himachal Pradesh	Alpha 0.94	
Punjab	Alpha 0.90	
West Bengal	Alpha 0.74	
Odisha	Alpha 0.87	
Maharashtra	Alpha 0.90	
Kerala	Alpha 0.89	
Tamil Nadu	Alpha 0.94	
Men	Alpha 0.90	
Women	Alpha 0.90	

Source: Authors’ analysis of 2011 UNFPA Building Knowledge Base on Ageing in India Survey. UNFPA – United Nations Population Fund; GHQ – General Health Questionnaire

Table 3 shows the eigenvalues and percentage of explained variance associated with each. Both factors have eigenvalues that exceed the unit, a criterion used to guide the number of meaningful factors. Before the rotation, Factor I is a major factor and accounts for nearly half of the variance of the GHQ-12, whereas Factor II is a minor factor. Together, the two factors account for 59% of the variance of the GHQ-12.

External validity

External validity was analyzed by calculating the correlations between the total score of GHQ-12 and its two factors, and the SUBI’s total score. The results display a modest positive correlation of 0.58 with the total GHQ-12 score, of 0.5 with Factor I, and of 0.32 with Factor II. All three correlations are statistically significant [Table 4].

DISCUSSION

The reliability of the GHQ-12 in the older Indian population is 0.90, with little difference between men and women, and more variation among states, with West Bengal indicating the lowest reliability, although this value is within the acceptable range. The overall reliability is slightly higher than in previous research among younger adults in Indian.^[10,11]

With regard to the factor structure, two factors emerged in the older Indian population: “social dysfunction” and

Table 2: Factor loadings for the 12-item General Health Questionnaire (varimax rotation)

	Factor loadings	
	Factor I	Factor II
Able to concentrate	0.59	
Loss of sleep over worry		0.72
Felt constantly under strain		0.77
Could not overcome difficulties		0.71
Feeling unhappy and depressed		0.73
Losing confidence		0.64
Thinking of self as worthless		0.64
Playing a useful role	0.71	
Capable of making decisions	0.78	
Able to enjoy day-to-day activities	0.80	
Able to face problems	0.74	
Feeling reasonably happy	0.77	
KMO	Bartlett's sphericity	Determinant
0.93	$\chi^2=50581.19$	0.005
	$P<0.000$	

Source: Author's analysis of 2011 UNFPA Building Knowledge Base on Ageing in India Survey. UNFPA – United Nations Population Fund; KMO – Kaiser-Meyer-Olkin

Table 3: Eigenvalues and percentage of explained variance for the General Health Questionnaire-12

	Without rotation		Varimax rotation	
	Eigenvalue	Percentage explained variance	Eigenvalue	Percentage explained variance
Factor I	5.7	47.8	3.7	30.9
Factor II	1.4	11.3	3.4	28.1

Source: Author's analysis of 2011 UNFPA Building Knowledge Base on Ageing in India Survey. UNFPA – United Nations Population Fund

Table 4: Pearson's correlation coefficients (*r*) between General Health Questionnaire-12 and subjective well-being inventory

GHQ-12	SUBI	
	<i>r</i>	<i>P</i>
Overall scores	0.58	0.000
Factor I	0.50	0.000
Factor II	0.32	0.000

Source: Author's analysis of 2011 UNFPA Building Knowledge Base on Ageing in India Survey. UNFPA – United Nations Population Fund; GHQ – General Health Questionnaire; SUBI – Subjective Well-being Inventory

“depression.” This feature is consistent with previous research in other countries.^[6,7]

The analysis of external validity reveals that the GHQ-12 has a positive association with the SUBI. The correlation is lower when the factors are analyzed independently than that when the overall GHQ-12 score is applied. This finding might favor a unidimensional property of GHQ-12.

However, given the data limitation (lack of data that can generate diagnoses, such as the International Classification of Disease 10th Edition system,^[15] or the Composite International Diagnostic Interview [assessment]), we could not conduct a sensitivity and specificity test.

CONCLUSION

The GHQ-12 shows adequate reliability among the older population in India.

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Conflicts of interest

There are no conflicts of interest.

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