

Reliability and factor analysis of general health questionnaire 12 in malay version among women with abnormal pap smear results

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RESEARCH

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ABSTRACT

Background

The General Health Questionnaire-12 (GHQ-12) is widely used to detect minor psychiatric and potential non-psychiatric disorders, and has been translated into many languages and validated for a variety of populations. GHQ-12 has been used for medical students, in health sciences, and other disciplines in order to study the impact on general health of current disease.

Aims

The purpose of this study is to determine the reliability and validity of GHQ-12 in Malay version among women with an abnormal Pap smear result.

Methods

This is a cross-sectional study of 70 Malaysian women with an abnormal Pap smear. The data was collected in 2015. The self-administered questionnaire on sociodemographic and GHQ-12 was completed by respondents within 15 minutes. Data was analysed using SPSS version 22.

Results

Exploratory factor analysis in the Malay version of GHQ-12 depicts five models with a three factor structure for each model. Faster loading of all items was above 0.6 except three items in item number 7, 8 and 10. Cronbach's alpha for all models of GHQ-12 range from 0.75 to 0.81. All of the items in GHQ-12 were more than 0.6, which demonstrated a reasonably excellent internal consistency.

Conclusion

This study found that the Malay version of GHQ-12 was reliable and valid to assess the general health among women with abnormal Pap smear results, whereby 12 items possess excellent internal consistency. It also helps to detect stress and depression among women with abnormal Pap smear results which will impact their general health.

Key Words

Reliability, factor analysis, abnormal pap smear result

What this study adds:

1. What is known about this subject?

GHQ-12 has been used for medical students, in health sciences, and other disciplines in order to study the impact on general health of current disease.

2. What new information is offered in this study?

It is suggested that GHQ-12 Malay version is a reliable

instrument with high internal consistency to be used among women with abnormal Pap smear results.

3. What are the implications for research, policy, or practice?

GHQ-12 Malay version can be utilised widely to detect and prevent psychological distress in common woman of Malaysia with abnormal pap smear.

Background

The General Health Questionnaire-12 (GHQ-12) is widely used to detect minor psychiatric and potential non-psychiatric disorders, and has been translated into many languages and validated for a variety of populations. GHQ-12 has been used for medical students, in health sciences, and other disciplines in order to study the impact on general health of current disease. GHQ-12 was introduced by Goldberg in the year 1978, whereby validity and reliability was assessed in a number of studies in Malaysia.¹⁻³ GHQ-12 is the shortest version compared to the longer versions such as GHQ-60, GHQ-30, and GHQ-28. The concise nature of the GHQ-12 is useful as respondents require relatively less time to answer the questionnaire, whereby, each item is accompanied by four responses, '0=Not at all', '1=No more than usual', '2=Rather more than usual', '3=Much more than usual'.⁴

Currently in Malaysia, due to changes in lifestyle and culture, women being exposed to their first sexual intercourse at an early age and having multiple sex partners are contributing factors to an increasing number of cervical cancers.⁵ Cervical cancers can be detected early, by Pap smear test, at a health clinic with procedures performed by a doctor or nurse. However, unfortunately, women frequently defaulted and refused to come to the clinic for regular Pap smear tests. The number of women with abnormal Pap smear results increases because of late detection and poor cooperation. Women with abnormal Pap smear results will be referred to tertiary hospitals for further investigation such as a colposcopy to detect types of abnormal Pap smear results, as an early action to prevent cervical cancer. In addition, women with abnormal Pap smear results face a psychosocial burden at the early stage of the disease, whereby, this condition poses a psychological trauma in the form of fear, guilt, shame, anxiety and other psychosocial stress.^{6,7} An abnormal Pap smear result will impact the quality of life of both patients and family.⁸ Moreover, the psychosocial burden has a negative impact on mental health and this makes the women more likely to fail to access treatment and to undergo further screening tests.^{6,9} Therefore, in this study

GHQ-12 was used as a screening instrument to detect abnormal Pap smear results and their impact on psychological disorders, in particular anxiety and depression. A previous study showed that the reliability of GHQ-12 was stable and validated to be used. GHQ-12 was tested among Pakistani University lecturers and Cronbach's alphas was found to be in the range of between 0.80 to 0.95.¹⁰ Others have demonstrated the reliability of GHQ-12 in their study, whereby Cronbach's alpha showed an excellent internal consistency of the scale of 0.94.¹¹ In Malaysia, the GHQ-12 was used among students in the Malay language, which showed that it is acceptable with Cronbach's alpha ranging from 0.61 to 0.82¹² and study among medical students in University Sains Malaysia showed that Cronbach's alpha for GHQ-12 was 0.85.¹ Moreover, GHQ-12 conducted among Malaysian patients with both urological and psychiatric disorders found that the Cronbach's alpha ranged between 0.37 to 0.79.⁴ Therefore, this study is novel as it used GHQ-12 as a tool to measure the general health among women with an abnormal Pap smear result, with psychiatric parameters. Furthermore, exploratory factor analysis for GHQ-12 items was conducted to create a theory or model from a set of items. The study which implemented GHQ-12 among Pakistani university teachers found that the results of exploratory factor analysis showed a loading factor ranged up to 0.90 and Eigenvalues for all the items was above 0.1.¹⁰ The study done among university students in Malaysia using GHQ-12, showed eigenvalues greater than 0.78.¹² In addition, a study examining a Spanish population found that GHQ-12 also was reliable and valid when analyzed using exploratory factor analysis. The results showed that eigenvalue greater than one for factor one, two and three, and factor loading were higher at 0.71.¹³ The purpose of this study is to determine the reliability and validity of GHQ-12 in Malay version among women with an abnormal Pap smear result. All subjects had completed a colposcopy procedure, at one of three different tertiary hospitals on the East Coast of Malaysia. In this study, GHQ-12 was used to measure the reliability and validity in assessing the general health among women due to abnormal Pap smear results.

Method

A cross-sectional study, which selected respondents based on the universal sampling technique was conducted. This involved three tertiary hospitals on the East coast of Malaysia which included the Raja Perempuan Zainab II Hospital (HRPZ II) in Kelantan, Tengku Ampuan Afzan Hospital (HTAA) in Pahang and Sultanah Nur Zahirah Hospital (HSNZ) in Terengganu. Women with abnormal Pap smear results which had completed their colposcopy

procedure were selected to answer the questionnaire. The inclusion criteria were Malaysians with no psychiatric problems, able to read in the Malay language and who gave written consent to participate in the study. The recommendation for sample size calculation was based on 12 items with the subject ratio of 5 which corresponds to 60 with an extra allowance of 10. Thus a total of 70 respondents were recruited.¹⁴

Instrument: The GHQ-12 in Malay version adapted from a study among medical students in University Sains Malaysia, which was validated in the Malay language was selected.¹ GHQ-12 has twelve items regarding general health which was related to the current condition.¹⁵

Face Validation: The process of face validation was conducted to assess the GHQ-12 from ten respondents, which provided information regarding the ability to understand the sentences. Based on the subjective suggestions by respondents, only some parts of the sentences needed correction due to difficulty in comprehending the sentences.

Data Collection: Data was collected using a questionnaire consisting of two sections; the sociodemographic profile and GHQ-12 in Malay version. Respondents who fulfil the inclusion criteria were selected. A total of 70 (100 per cent) respondents were assessed with the self-administered questionnaire, with 15 minutes given to complete the questionnaire. Data collection was completed over three months.

Statistical analysis: SPSS version 22 was used to analyse the sociodemographic of respondents using descriptive study. Exploratory factor analysis and Cronbach's alpha were used to measure the reliability of the items and internal consistency GHQ-12.¹⁶ Exploratory factor analysis (EFA) is a complex, multi-step process to validate measures such as items in GHQ-12. It is a cyclical process of continually refining and comparing solutions until the most meaningful solution is reached.¹⁷ EFA was able to provide more accurate results when each factor is represented by multiple measured variables during the analysis.¹⁸ The purpose of factor analysis is to summarize the data so that it can be easily interpreted. Thereafter, regrouping variables into a limited set of clusters based on shared variance was conducted.¹⁹ Therefore, factor analysis was conducted to reveal any latent variables that cause the manifested variables to co-vary.¹⁴ The Varimax Rotation was performed to analyse the data and the Eigenvalue greater than 1.0 was the reference to the number of factors extracted.^{20,21}

Then, Kaiser-Meyer Olkin (KMO) ranges between 0.5 to 1 is considered good. Bartlett's test of Sphericity ($p < 0.05$) is considered significant.²² Item communalities of more than 0.3 indicate the acceptable percentage of variance for each item. Then, factor loading was used to identify items with low correlation of individual with rotated factor for further analysis. The items factor loading of greater than 0.4 under one component was acceptable to be used.^{16,19} The Cronbach's alpha in this study was used to measure the reliability of items which are used worldwide by researchers.²³ Cronbach's alpha is influenced by the numbers of items and inclusion of parallel items; therefore, high alphas indicate good psychometric scale.²⁴ A good item has Cronbach's alpha of 0.6 or higher. However, if the result of Cronbach's alpha is lower than 0.6, it should be referred to the mean for inter-item correlations and researchers must make sure that the value is > 0.2 , which means that the items is still reliable to be used in the study.¹⁶

Ethical Considerations: Ethical approval was obtained from the Medical Research and Ethics Committee (NMRR-14-938-21672) and the Ethical Committee Faculty of Medicine, UniSA. The GHQ-12 in Malay Version was used with permission from the adapted author.¹

Results

The total number of respondents was 70, all of whom had completed the colposcopy procedure. There were 37 (52.9 per cent) respondents with age greater than 45 years and 33 (47.1 per cent) with age less than 45 years old. The mean age of respondents was 44.79 years old. The majority of respondents were Malay (84.3 per cent) and Muslim (88.6 per cent). Furthermore, 39 (55.7 per cent) were from rural areas and 44 (62.9 per cent) had a secondary education. Among respondents, 60 (85.7 per cent) were married women, half of them (57.1 per cent) were housewives with mean family income per month of RM 2209.24 and all respondents were non-smokers (100 per cent).

Exploratory factor analysis of GHQ-12 in this study produced five models as shown in Table 1. Faster loading of all items was above 0.6 except three items, namely item number 7- 'Felt you could not overcome your difficulties', 8- 'Been feeling reasonably happy, all things considered' and 10- 'Been feeling unhappy or depressed'. In model 1, there were three problematic items detected, and were removed one by one and analysed to produce a further four models of GHQ-12 named Model 2, Model 3, Model 4 and Model 5. In GHQ-12 (Model 5) all three problematic items were removed and factor loading for all items in it were above

0.6. Cronbach's alpha value for all models of GHQ-12 range from 0.75 to 0.81.

The Cronbach's alpha coefficient for all GHQ-12 items was excellent with internal consistency 0.814 (Table 2). The corrected Item-total correlation was lowest for item 11 (0.296) and 12 (0.154). However, other items were over 0.400; therefore, all items were maintained and used in this study because they are able to measure the general health of women with an abnormal Pap smear result. The results demonstrated that higher excellent internal consistencies were for item 12 'Been thinking of yourself as a worthless person?' (0.821) and item 11 'Been losing confidence in yourself?' (0.813). However, the lowest internal consistency was recorded for the item 'Been feeling reasonably happy, all things considered?' (0.785) and 'Been able to enjoy your normal daily activities?' (0.791). Overall reliability demonstrated a reasonable excellent internal consistency, whereby, all of the items were more than 0.6. It suggested that this was a reliable instrument with high internal consistency to be used among women with abnormal Pap smear results.

Discussion

This study was conducted at three different tertiary hospitals on the East Coast of Malaysia (HTAA, HSNZ, and HRPZ II) and the reliability of the Malay version of the GHQ-12 questionnaire among women with abnormal Pap smear results was tested. Face validation was done to measure the understanding of respondents in answering the questionnaires. Ten respondents were selected for face validation. After completing the questionnaire, respondents were asked verbally and subjectively regarding their understanding of the questionnaire by each sub-topic and improvements made to make the sentences simpler. Reliability of GHQ-12 items among Malaysian women with an abnormal Pap smear result was measured by Cronbach' alpha for internal consistency.¹⁶ The original version of GHQ-12 which is GHQ-12 (Model 1) in this study, demonstrated that the reliability of all items was excellent with internal consistency of $\alpha=0.81$. An internal consistency for 12 items was demonstrated as excellent within the range of 0.79 to 0.82. All five models of GHQ-12 show good reliability with Cronbach's alpha value ranging from 0.75 to 0.81. However, only GHQ-12 (Model 5) had no problematic items and had factor loadings for all items above 0.6. Items in GHQ-12 (Model 5) were distributed nicely in domain 1, 2 and 3 according to factor loading for each item. The findings were contrasted with a study done in Germany, whereby all five models of GHQ-12 in the study have no problematic items and the factor loading of all items was around 0.6 and

above.²⁵ Based on Cronbach's alpha value of all five models of GHQ-12, the tool had good reliability and was reliable to measure the general health of women with abnormal Pap smear results. Another study also reported similar results with Cronbach's alpha value for GHQ-12 ranging from 0.78 to 0.95.¹⁵

The most common assessment of mental well-being is the GHQ, which was developed as a tool to detect those likely to have or be at risk of developing psychiatric disorders which may be due to current disease, such as in this study (related to abnormal Pap smear result).²⁶ Abnormal Pap smear results tend to lead to gynaecological disease such as cervical cancer. GHQ-12 is also used among patients with a urological problem to detect any depression and psychiatric issues.⁴ Similarly, a study done in Pakistan was reliable for GHQ-12 as confirmed by Cronbach's alpha and exploratory factor analysis found that the result was in the range of $\alpha=0.8$ to 0.95, and inter-items Correlations range from 0.60 to 0.90.¹⁰ It demonstrated that the GHQ-12 was reliable and valid to be used worldwide, with respondents of different backgrounds. Consistent with a study conducted in Malaysia at University Putra Malaysia, Cronbach' alpha demonstrated an excellent internal consistency of $\alpha=0.84$ respectively and inter-item consistency ranging from 0.61 to 0.82.¹² Furthermore, a study in India used the Sinhala version of GHQ-12, and demonstrated that the Cronbach's alpha total was 0.88, which is excellent, and corrected for item-total correlation coefficients were above 0.40. This showed that GHQ-12 is also reliable to be used among Indian populations in assessing psychiatric disorder.²⁰

Conclusion

GHQ-12 was reliable to be used among women with abnormal Pap smear results to assess and detect stress and depression due to current diagnosis, which show that the reliability of the items demonstrated excellent internal consistency. Therefore, GHQ-12 can be used in future for assessing the impact of general health among women with abnormal Pap smear results which is important due to the increasing number of cervical cancer cases in Malaysia. Suggestion for further study should include all populations in Malaysia, which have a variety of cultures and backgrounds. Preferably the larger the population the more generalizable the study will be.

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PEER REVIEW

Not commissioned. Externally peer reviewed.

CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

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ETHICS COMMITTEE APPROVAL

The Ethical Committee Faculty of Medicine, UniSZA and National Medical Research Register (NMRR-14-938-21672).

Table 1: Exploratory Factor Analysis and Cronbach's Alpha value of five models of GHQ-12

GHQ-12 items	Factor loading														
	Model 1			Model 2			Model 3			Model 4			Model 5		
	F1	F2	F3	F1	F2	F3	F1	F2	F3	F1	F2	F3	F1	F2	F3
1. Lost much sleep over worry?		0.83			0.82			0.84			0.83			0.83	
2. Felt constantly under strain?		0.82			0.85			0.85			0.82			0.88	
3. Been able to concentrate on what you are doing?		0.65			0.66			0.65			0.65			0.67	
4. Felt that you are contributing a useful part in things?	0.67			0.66			0.68			0.69			0.68		
5. Been able to face your problems?	0.89			0.89			0.9			0.89			0.91		
6. Felt capable of making decisions in case of problems?	0.8			0.82			0.82			0.81			0.84		
7. Felt you could not overcome your difficulties?	0.2	0.39	0.54	-	-	-	0.2	0.36	0.55	0.19	0.4	0.55	-	-	-
8. Been feeling reasonably happy, all things considered?	0.52	0.52	0.17	0.54	0.51	0.11	-	-	-	0.52	0.53	0.17	-	-	-
9. Been able to enjoy your normal daily activities?	0.72			0.72			0.71			0.7			0.68		
10. Been feeling unhappy or depressed?	0.48	0.24	0.33	0.49	0.25	0.33	0.48	0.22	0.34	-	-	-	-	-	-
11. Been losing confidence in yourself?			0.89			0.88			0.89			0.9			0.9
12. Been thinking of yourself as a worthless person?			0.8			0.87			0.8			0.8			0.87
Cronbach's alpha value	0.81			0.8			0.79			0.8			0.75		

Table 2: Reliability Analysis for General Health Questions.

No	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q1	Lost much sleep over worry?	0.478	0.803
Q2	Felt constantly under strain?	0.489	0.8
Q3	Been able to concentrate on what you are doing?	0.484	0.799
Q4	Felt that you are contributing a useful part in things?	0.445	0.803
Q5	Been able to face your problems?	0.549	0.795
Q6	Felt capable of making decisions in case of problems?	0.565	0.793
Q7	Felt you could not overcome your difficulties?	0.446	0.802
Q8	Been feeling reasonably happy, all things considered?	0.651	0.785
Q9	Been able to enjoy your normal daily activities?	0.557	0.791
Q10	Been feeling unhappy or depressed?	0.497	0.798
Q11	Been losing confidence in yourself?	0.296	0.813
Q12	Been thinking of yourself as a worthless person?	0.154	0.821
Total Cronbach's Alpha = 0.814			