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PSYCHOMETRIC ANALYSIS OF GENERAL HEALTH QUESTIONNAIRES-12 IN MALAYSIAN BANKING CONTEXT

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ABSTRACT- *The 12-item General Health Questionnaire is widely used as a screening tool in non-psychiatric setting. GHQ-12 was employed as a unidimensional and multidimensional measures to detect psychological distress. In Malaysia, the best factor structure of the GHQ-12 is still unclear, especially in the working population. The current intended to study the validity and reliability of GHQ-12, and testing the single factor, two-factor and three-factor models among banking employees in Malaysia. This study involves 306 employees who work in a domestic bank in Malaysia. Confirmatory factor analysis was performed using AMOS 22 to analyse the construct validity of the GHQ-12. In this study, the GHQ-12 was tested as a single, two- and three-factor model. The finding of this study indicated that the two-factor model fitted the data better than the other two models. The two-factor model yielded a good fit, high reliability and satisfactory construct validity. The two factors were Anxiety/depression and Social dysfunction with consisted of six items each. The study findings showed that the Malaysian version of the GHQ-12 is a reliable and valid instrument that can be used for measuring psychological work-related psychological distress in Malaysia, specifically in banking context.*

Keywords: General Health Questionnaire; GHQ-12; factor structure

1.0 INTRODUCTION

Mental health has gained attention in the literature of psychological well-being since mental illnesses cause an expensive cost for both individual and society (e.g. [1-2]). In addition, mental health research is prominent since mental illnesses might contribute to various problems in or outside the workplace, including social problems. The General Health Questionnaire (GHQ) is widely used to measure mental health status especially in detecting minor psychiatric disorders in community and non-psychiatric setting. The Diagnostic and Statistical Manual of Mental Disorders is the prominent tool to detect the symptoms of mental illness in clinical setting. This tool is not suitable to measure minor psychiatric symptoms such as anxiety, minor depression and psychological distress [3]. Hence, General Health Questionnaire was introduced by Goldberg [4] for the purpose of detecting general health including mental health in various setting. The GHQ was used in clinical, epidemiological, organizational and general psychological research [5-6-7-8].

The initial GHQ was composed of 60 items [4]. Shorter versions of the GHQ have been developed, including GHQ-30, GHQ-28 and GHQ-12. The shortest version of GHQ consists of 12 items that measure general psychological distress. The GHQ-12 was most widely employed in previous literature [9-6-7]. Being utilized in different contexts, GHQ-12 has been translated into various languages including Japanese [10], Chinese [11] and Malay [12]. Furthermore, the GHQ-12 is brief, understandable and straightforward to complete.

Despite its extensive use in distinct settings, the factor structure of the GHQ-12 is still under debate. GHQ-12 was first developed as unidimensional. Various studies have confirmed the single factor model of GHQ-12 [5-13]. Nevertheless, many studies have shown that GHQ-12 is multidimensional [14-15]. The GHQ-12 has been tested and applied as two-factor and three-factor models. The three factors of GHQ-12 were known as anhedonia (i.e. sleep disturbance), loss of confidence, and social performance. The two-factor model of GHQ have also been proposed and replicated in distinct research settings. The alternative for the two factors of GHQ-12 are dysphoria and social dysfunction [16-17]; anxiety/depression and social dysfunction [15-18]; and social dysfunction and psychological distress [6]. Meanwhile, the three-factor model of GHQ has been proposed by Worsley & Gribbin [19].The three-factor model of GHQ-12 has also been confirmed in other samples [20]. In addition, more recent researches examined different factor structures of the three-factor models which consists of stress factor, self-esteem factor, and successful coping factor [21]; anxiety/depression factor, social dysfunction factor, and loss of confidence factor [14]; and psychological distress, social dysfunction, and happiness [10].

This research intends to investigate the reliability and validity of the Malay version GHQ-12. Specifically, there are two objectives to be achieved in the current study. The first objective is to verify the factor structure of the single factor, two-factor and three-factor models of GHQ-12. The second objective is to examine the reliability of GHQ-12 in Malaysian working context specifically in banking population by analyzing the internal consistency. This study examines the three model of GHQ-12 by referring to the factor structures in previous research including single factor model [4], two-factor model [15] and three-factor model [14]. Table 1 demonstrated the items representing the single, two-, and three-factor structure of the GHQ-12 scale.

Table 1 Items for one-, two-, and three-factor structure of the GHQ-12 scale.

Items	1-factor	2-factor	3-factor
Been able to concentrate on what you are doing	PS	SD	SD
Lost much sleep over worry	PS	AD	AD

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Felt you are playing a useful part in things	PS	SD	SD
Felt capable of making decision about things	PS	SD	SD
Feel constantly under strain	PS	AD	AD
Felt you couldn't overcome your difficulties	PS	AD	AD
Been able to enjoy your normal day –to-day activities	PS	SD	SD
Been able to face up your problem	PS	SD	SD
Been feeling unhappy or depressed	PS	AD	AD
Been losing confidence in yourself	PS	AD	LC
Been thinking of yourself as a worthless person	PS	AD	LC
Being feeling reasonably happy, all things considered	PS	SD	SD

Note. AD = Anxiety/depression; SD = Social dysfunction; and LC = Loss of confidence

2.0 METHODOLOGY

2.1 Samples and Procedure

This research was conducted quantitatively. The samples in this research were 306 bank tellers working in a banking institution in Malaysia. The samples were selected through simple random sampling method. Research questionnaires consisted of the GHQ-12 were distributed to the respondents.

The demographic background of the respondents reported that 49.3% of the, were male while 50.7% of them were female. The ages of the respondents were between 22 to 39 years old (mean = 30.5, SD = 3.8). In terms of religion, most of them whereby 92.8% were Muslim, 3.3% were Hindu, 2.6% were Buddhist and 1.3% was Christian. Majority of the respondents of them were married (74.5%) while 24.2% of them were single and 1.3% of them were divorced. Their academic qualification recorded that majority of them obtained STPM (42.8%), followed by Diploma holder (32.7%), SPM (23.2%) and Degree holder (1.3%). In terms of job tenure, 66.0% of the respondents have been working for more than five years, 16.3% of them have been working for three to five years, 14.4% of them have been working for one to three years, and 3.3% of them have been working for less than 1 year. Finally, 66.7% of the respondents received salary that ranged from RM2000 to RM2999; followed by 33.3% of them received salary that ranged from RM1000 to RM1999.

2.2 Research Instrument

The research instrument consists of the 12-item of GHQ. Respondents were asked to evaluate the situations associated to their psychological well-being over the past three months. A six-point likert scale was used to measure the response to each ite. The scale ranges from 1 representing 'never' to 6 representing 'all the time'. The employment of the six-point response scale for the items of GHQ-12 are considered appropriate and efficacious to be analysed by structural equations modelling. The total scores ranged from 12-72 where higher scores imply higher level of distress. The GHQ-12 is comprised of six positive items (e.g. 'Been able to enjoy your normal day –to-day activities') and six negative items (e.g. 'Been thinking of yourself as a worthless person').

Because this study was conducted in a Malay-speaking context, the instrument was translated into Malay-version using back-to-back translation method. This method is done to ensure transcription equivalence of the questionnaire after being translated [22]. The back-to-back translation is done by translating the English version questionnaire into Malay language. Then, the translated questionnaires are translated back into English. The items of the English and Malay version of GHQ-12 are shown in table 2.

Table 2: The Items of English and Malay Version of GHQ-12

GHQ-12: English Version	GHQ-12: Malay Version
Been able to concentrate on what you are doing	Mampu untuk menumpukan perhatian pada perkara yang anda sedang lakukan.
Lost much sleep over worry	Kurang tidur apabila risau akan sesuatu.
Felt you are playing a useful part in things	Berasa bahawa anda mempunyai peranan penting dalam sesuatu perkara.
Felt capable of making decision about things	Berasa mampu untuk membuat keputusan tentang suatu perkara.
Feel constantly under strain	Sentiasa berada dalam keadaan tertekan.
Felt you couldn't overcome your difficulties	Berasa bahawa anda tidak mampu untuk menangani kesulitan.
Been able to enjoy your normal day –to-day activities	Mampu menikmati aktiviti harian anda yang normal.
Been able to face up your problem	Mampu berdepan dengan masalah anda.
Been feeling unhappy or depressed	Berasa sedih dan murung.
Been losing confidence in yourself	Berasa kurang keyakinan pada diri anda
Been thinking of yourself as a worthless person	Berasa bahawa diri anda tidak berguna.
Being feeling reasonably happy, all things considered.	Berasa agak gembira dengan semua perkara di sekeliling anda.

2.3 Statistical Analysis

The psychometric properties of the GHQ-12 were examined by performing confirmatory factor analysis in structural equation modelling (SEM). The CFA was performed through AMOS 22 to examine three measurement models of GHQ-12. The measurement model demonstrates correlation between a specific construct and its latent indicators. In other words, the measurement model represents the number of dimensions (i.e. factors) and the items that load on each dimension in the model. The CFA measures three type of validity namely convergent validity, construct validity and discriminant validity of three measurement model of GHQ-12.

In addition, the reliability of the GHQ-12 items was examined through the Cronbach alpha coefficient. The

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common definition of reliability is "the degree to which measurements of individuals on different occasions, or by different observers, or by similar or parallel tests, produce the same or similar results" (Streiner & Norman, 1995, p.6) [23]. Internal consistency refers to a dimension of reliability which regards the homogeneity of the items within a scale [24]. Internal consistency involves the correlations among the items that measure the same construct. Cronbach alpha value is one of the most common indicators of the internal consistency of a measure [25]. The Cronbach alpha should be considered as the first test to determine the reliability of a measure [26].

3.0 RESULTS

3.1 Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) was conducted to analyze the psychometric properties of GHQ-12. The convergent validity, construct validity and discriminant validity was assessed in the CFA. The convergent validity refers to extent to which the items share a high proportion of variance in common. In this study, the convergent validity was tested by examining the factor loading of the items. As recommended by Hair et al. [27], the factor loading of each item in this study should be greater than 0.5.

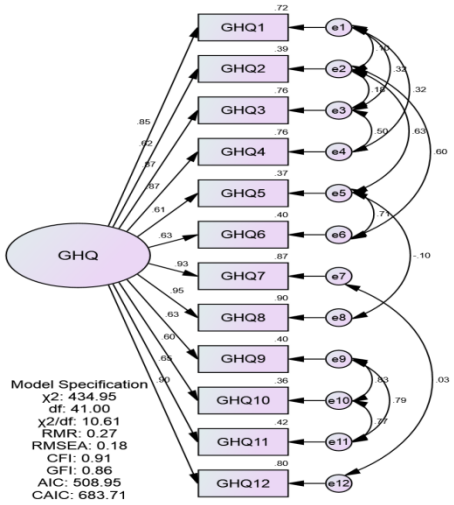

Figure 1 Single Factor Model of General Health Questionnaire-12

Besides that, the researchers also verified the convergent validity through the Average Variance Extracted (AVE). The AVE value refers to the individual items' squared multiple correlations [28]. In this study, the AVE is considered acceptable when the value is greater or equal to 0.5.

The construct validity refers to the extent to which a set of measured items actually reflect the theoretical latent construct they are designed to measure. This validity is achieved when the measurement yield a good fit. There are three categories of fitness to be considered to reflect a good fit of a model which are absolute fit, incremental fit and parsimonious fit. The current study covered the three categories of fitness by considering multiple indices as suggested by Kline [29]. The researcher reported the model chi-square ($\chi 2$), the rootmean-square error of approximation (RMSEA) with 90% confidence interval, the Bentler comparative fit index (CFI), the root mean square residual (RMR), the normed chi square value (i.e. ratio of chi square to df; $\chi 2$/df), the GFI index, the Akaike information criterion (AIC) and the Consistent AIC (CAIC). The acceptance levels of each fitness index in this research are presented in Table 2. The smaller value of AIC and CAIC indicates better fit.

Table 2 The Acceptance Level of Fitness Indices

Name of Indices	Acceptance Level
Chi Square/Degrees of Freedom ($\chi 2$/df)	Between 1.0 and 5.0 (Schumacker & Lomax, 1996)
Comparative Fit Index (CFI)	Greater than 0.90 (Hu & Bentler, 1999)
Goodness of Fit Index (GFI)	Greater than 0.90 (Kline, 2005)
Root Mean-square Error of Approximation (RMSEA)	Smaller than 0.08 (Brown & Cudeck, 1993)
Root Mean-square Residual (RMR)	Smaller than 0.10 (Kline, 2005)

The discriminant validity refers to the extent to which a construct is truly distinct from other constructs. This validity is achieved when the constructs in a measurement model are free from redundant items. In this study, the discriminant validity was assessed by examining the factor correlations (i.e. correlation among the latent constructs). The factor correlation that exceeds 0.80 defines poor discriminant validity [29-30].

The researchers performed the CFA for three measurement model of GHQ-12 (single, two-, three-factor model). The convergent validity, construct validity and discriminant validity were verified in each measurement model by examining the model fit, factor loading and average variance extracted (AVE) of the items, as well as the factor correlation of the constructs. The CFA results of the three measurement models are discussed below.

Single Factor Model

The single factor model consists of all items of GHQ-12. As illustrated in Figure 1, this model yielded a poor fit (X^2=434.95, df,: 41.00, X^2/df=10.61, RMR=0.27, RMSEA= 0.18, CFI= 0.91, GFI= 0.86, AIC= 508.95, CAIC=683.71). All items showed acceptable factor loading ranging from 0.60 to 0.95. However, the results reported unsatisfactory AVE value for six items (i.e. GHQ2, GHQ5, GHQ6, GHQ9, GHQ10 and GHQ11). Hence, the items failed to achieve convergent for this unidimensional model.

Two-factor Model

Referring to previous research by Kalliath et al. [15], the researchers investigated the two-factor model of GHQ-12 by dividing the items into two distinct factors (i.e. anxiety/depression and social dysfunction). As presented in Figure 2, this model showed an acceptable fit (X^2=135.46, df: 47.00 X^2/df=2.88, RMR=0.05, RMSEA= 0.08, CFI= 0.98, GFI= 0.93, AIC= 197.46, CAIC=343.89). All of the items loaded well in both anxiety/depression and social dysfunction factors ranging from 0.81 to 0.95. The AVE values of all items ranged from 0.66 to 0.90 conclude that the six items (GHQ1, GHQ3, GHQ4, GHQ7, GHQ8, GHQ12) share a high proportion of variance for the *anxiety/depression* factor while

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the other six items (GHQ2, GHQ5, GHQ6, GHQ9, GHQ10, GHQ11) share a high proportion of variance for the *social dysfunction* factor. Hence, the convergent validity was achieved. In terms of the distinction of the two factors, the factor correlation between *anxiety/depression* factor and *social dysfunction* factor was smaller than .80 indicating the achieving of discriminant validity

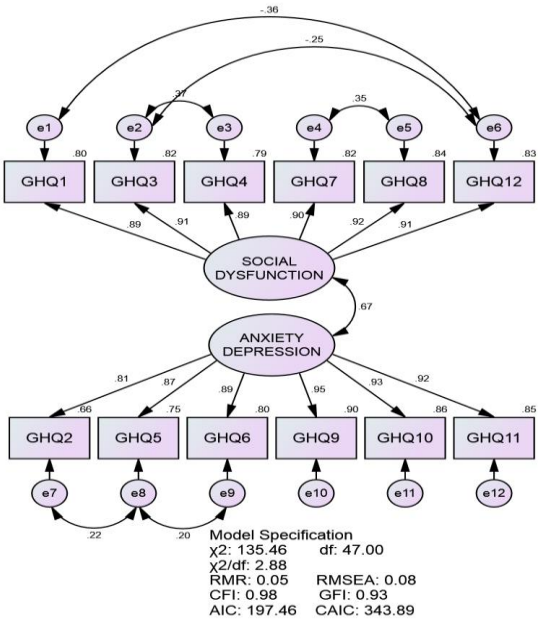

Figure 2 Two-factor Model of General Health Questionnaire-12

. ***Three-factor Model***

The three-factor model of GHQ-12 was examined by dividing the items according to three different factors known as anxiety/depression, social dysfunction and loss of confidence [31-14]. Referring to Figure 3, the model yielded a good fit (X^2=136.80, df: 57.00 X^2/df=2.91, RMR=0.06, RMSEA= 0.08, CFI= 0.98, GFI= 0.93, AIC= 198.80, CAIC=345.23). The factor loading of all items were high ranging 0.82 to 0.95. The AVE values of the twelve items were reported high ranging from 0.66 to 0.90. The factor correlations between social dysfunction and the other two factors were smaller than 0.80. However, anxiety/depression factor and loss of confidence factor reported high correlation; suggesting poor discriminant validity between these two factors.

3.2 Reliability Test

The researchers tested the reliability of the three GHQ-12 models through the Cronbach Alpha Coefficients of the items. Overall, GHQ-12 show high internal consistency regardless its factor structures. The Cronbach Alpha Coefficient for overall GHQ, anxiety/depression, social dysfunction and loss of confidence are 0.96, 0.96, 0.96 and 0.92 respectively.

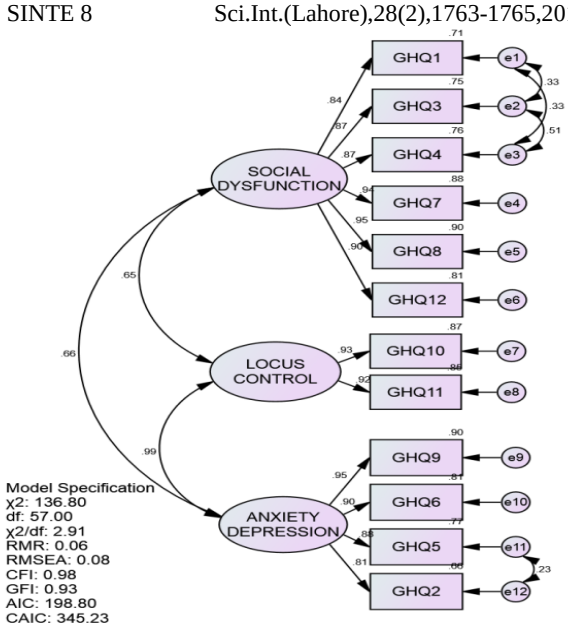

Figure 3 Three-factor Model of General Health Questionnaire-12

4.0 DISCUSSION AND CONCLUSION

The current study aimed to study the psychometric properties of the Malay version General Health Questionnaire-12 (GHQ-12). The findings confirmed that GHQ-12 is not unidimensional. The single factor model of GHQ-12 yielded poor fit although all of the items showed acceptable factor loadings. Both two-factor and three-factor model of GHQ-12 reported good fitness indices. However, the three-factor model failed to achieve discriminant validity as the factor correlation between loss of confidence and anxiety/depression was too high. The two-factor model appeared as a better fitting model since it has smaller value of Akaike information criterion (AIC) and the Consistent AIC (CAIC). In addition, the two-factor model reported moderate factor correlation between anxiety/depression and social dysfunction. The moderate factor correlations imply that great affinity exists among the factors, although they are two different constructs [15].

The current finding substantiated the previous research finding that found GHQ-12 better fitted as a two-factor model. Confirmatory factor analysis in a study conducted by Rajabi and Sheykhshabani [6] among public employees also yielded a two-factor model of GHQ-12. In Malaysian context, research in various settings has established the GHQ-12 as two-factor scale. For example, Panatik et al. [32] confirmed the anxiety/depression and social dysfunction as the two factors of Malay version GHQ-12 to measure psychological strain among technical workers. In addition, Panatik et al. [9] also found that the two-factor of GHQ-12 was well-fitted among Malaysian academician. However, the current finding did not corroborate the research conducted by Talwar and

Abd Rahman [12] among undergraduates that concluded the three-factor model of GHQ-12 as the best fit compared to the other two models

This study contributes to the literature by confirming the factor structure of GHQ-12. The current finding supports the multidimensional properties of GHQ-12 as an instrument. This suggested that the finding might be questionable if GHQ-12 is applied and analysed as a unidimensional instrument in a research. Merging conceptually distinct items into a single group or factor may violates the measurement and mislead the interpretation [33]. In addition to the factorial aspects, this study also showed that GHQ-12 Malay version is reliable. Although most of the previous research found satisfactory reliabilities, the current finding reported high internal consistency of GHQ-12. This study also provides insight regarding the factor of GHQ-12 in Eastern context specifically Malaysia. The finding in Western context might not be generalizable to Eastern population since they differ in substantial ways such as culture. Furthermore, this study indicates that GHQ-12 is an effective measure in working population. The findings might be different in other population (e.g. students, patients, and elderly) as different population might have different thoughts and refer to different life events [34]. Future research should be conducted to test the psychometric properties of GHQ-12 in other settings.

To conclude, this research reveals that the Malay version GHQ-12 is valid and reliable to screen and investigate psychological strain. Three measurement models of GHQ-12 (i.e. single, two-, three-factor) were examined and the two-factor model was found to be the best fitted model. The two factors are known as anxiety/depression and social dysfunction. This study also suggests that the Malay version GHQ-12 was internally reliable to measure psychological distress.

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