

Psychometric Properties of the General Health Questionnaire-12 in a Sample of Hong Kong Employees

Abstract

The General Health Questionnaire-12 (GHQ-12) is a widely used instrument for measuring psychological strain, but the factor structure of the GHQ-12 is inconclusive. The present study examined one-factor, two-factor and three-factor models of the GHQ-12 using structural equations modelling in a longitudinal dataset of Hong Kong employees. The findings supported a two-factor model consisting of a 'Social Dysfunction' factor measured by three items, and an 'Anxiety/Depression' factor measured by four items. Implications and limitations are discussed.

Keywords: GHQ-12, Psychometric, Hong Kong, Employees, Validity

Introduction

The General Health Questionnaire is a self-administered measure assessing psychological strain of individuals (Goldberg & Williams, 1991), and the 12-item General Health Questionnaire (GHQ-12) is a popular version used in non-psychiatric settings due to its brevity (Kalliath, O'Driscoll & Brough, 2004). Originally, the GHQ-12 was developed as a unidimensional scale (Winefield, Goldney, Winefield & Tiggemann, 1989). However, alternative two- and three-factor models have also been proposed because these models may indicate different psychological problems encountered by individuals (Najarkolaei et al., 2014; Padrón et al., 2012). Werneke, Goldberg, Yalcin and Ustun (2000) showed that a two-factor model, consisting of 'Social Dysfunction' and 'Anxiety/Depression' factors, was supported. Based on Werneke et al.'s (2000) study, Kalliath et al. (2004) found that another two-factor model (GHQ-8) showed good model fit by deleting four items. Furthermore, Martin (1999) reported that a three-factor model, including 'Self-esteem', 'Stress' and 'Successful Coping' factors, yielded a better fit than the two-factor model. Similar results were also obtained by Graetz (1999).

In related Chinese research, a two-factor model has been supported for the factor structure of the GHQ-12 in clinical and educational settings (Ip & Martin, 2006; Li, Chung, Chui & Chan, 2009). However, very few studies have been conducted to

examine the factor structure of the GHQ-12 in work settings, although this measure has been adopted to assess psychological strain in employees (Chan, 2012; Wong & Lai, 2004). Therefore, this study used a longitudinal dataset to assess the adequacy of one-factor, two-factor and three-factor models for the GHQ-12 in a sample of Hong Kong employees. This approach is rarely adopted in previous Chinese studies, hence this study provides additional information on the further structure of the GHQ-12.

Method

Participants and Procedure

Full-time employees enrolled in part-time psychology programmes of three universities in Hong Kong completed a self-administered questionnaire twice, with a 10-month interval. At Time 1, seven hundred and fifty questionnaires were distributed, and 509 completed questionnaires were returned, yielding a response rate of 70.7 %. At Time 2, five hundred and nine questionnaires were distributed, and 208 completed questionnaires were returned, making a response rate of 40.9 %.

The same respondents completed questionnaires at Time 1 and Time 2. At Time 1, the sample included 309 females (60.7%), and more than half (74%) were non-managers. The mean age of the respondents was 31.86 years ($SD = 8.87$). The mean of tenure in the current organisation was 4.66 years ($SD = 5.30$), and the mean

of the working hours per week was 46.77 hours ($SD = 7.60$). Characteristics of the participants at Time 2 did not substantially differ from those at Time 1.

Measures

The Chinese version of the 12-item General Health Questionnaire (Lai & Yue, 2000) was used in the present study. It consists of six positively-worded items (e.g. “Felt capable of making decisions about things”), and six negatively-worded items (e.g. “Lost much sleep over worry”). Participants indicated whether they had experienced each symptom in the last month on a 7-point scale ranging from 1 = “less than usual” to 7 = “much more than usual”. Positively-worded items were recoded, so that high scores represented high levels of psychological strain.

Statistical Analysis

Internal consistency of the GHQ-12 items was examined using the Cronbach alpha coefficient. The criterion for acceptable Cronbach alpha coefficient was set at .70, as recommended by Kline (2000). Based on previous studies (Graetz, 1999; Kalliath et al., 2004; Martin, 1999; Politi et al., 1994; Winefield et al., 1989), the factor structure of the GHQ-12 was examined through confirmatory factor analysis on one-, two-, and three-factor models. Multiple fit indices, including the model chi-square (χ^2), the normed chi square value (χ^2/df), the standardised root mean square residual (SRMR), the root-mean-square error of approximation (RMSEA), the

goodness of fit index (GFI) and the Akaike information criterion (AIC), were examined to assess the goodness of fit of different models. Standardised factor loadings and factor correlations were also examined. The criterion for standardised factor loadings was set at .30, as recommended by Brown (2006). Factor correlations were calculated to assess whether different dimensions of the GHQ-12 were distinct factors. The criterion for acceptable factor correlations was .80, as suggested by Kline (2005).

Results

The mean scores of the GHQ-12 were 3.20 ($SD = .84$) at Time 1, and 3.27 ($SD = .79$) at Time 2. The alpha coefficients across the GHQ-12 items were acceptable (.86 at both times). Concerning the factor structure, Table 1 presents that the one-factor model, the two-factor model suggested by Politi et al. (1994), and the three-factor model proposed by Martin (1999) yielded unacceptable fit statistics at Time 1 and Time 2. The results further show that the GHQ-8 (Kalliath et al., 2004) yielded better fit indices, but they were still not satisfactory. Similar results were also found for the three-factor model proposed by Graetz (1991). However, the AIC values for the GHQ-8 were smaller than Graetz's (1991) model at Time 1 and Time 2. Overall, these findings suggest that the GHQ-8, including the 'Social Dysfunction' and 'Anxiety/Depression' factors, had comparatively better fit than other models.

Another round of confirmatory factor analysis was conducted to examine factor loadings in the GHQ-8. This analysis suggested that a revised two-factor model (GHQ-7) composed of three items for the ‘Social Dysfunction’ factor and four items for the ‘Anxiety/Depression’ factor yielded the best fitting model. After deleting the item “Been feeling reasonably happy, all things considered”, Table 1 indicates that the GHQ-7 produced acceptable fit statistics at Time 1 and Time 2.

【Insert Table 1 About Here】

Figure 1 shows that the standardized factor loadings of all items for the GHQ-7 ranged from .62 to .91 at Time 1, and .56 to .93 at Time 2. These values were higher than .30. Correlations between the ‘Social Dysfunction’ and ‘Anxiety/Depression’ factors were .55 at Time 1, and .44 at Time 2. These values indicate that the ‘Social Dysfunction’ and ‘Anxiety/Depression’ factors were distinct factors although they were correlated. Cronbach alpha coefficients for the ‘Social Dysfunction’ factor were .74 at Time 1 and .87 at Time 2, while coefficients for the ‘Anxiety/Depression’ factor were .75 at Time 1 and .88 at Time 2. The results show an acceptable level of internal consistency for the GHQ-7 items.

【Insert Figure 1 About Here】

Discussion

This study supported that the GHQ-12 is not a unidimensional measure, and the three-factor model may also not fit for the factor structure of the GHQ-12 in Hong Kong employees. The findings showed that the GHQ-7, including ‘Social Dysfunction’ and ‘Anxiety/Depression’, yielded a good fit to the data at Time 1 and Time 2. Internal consistency of the GHQ-7 items was supported

It seems that the use of the GHQ-12 as a unidimensional measure may be problematic. Edwards (1993) argued that combining distinct factors into a single factor score may create conceptual ambiguity for the construct, and the combined score cannot provide a clear representation of multidimensional properties of the instrument because different factors may not equally contribute to the overall index.

The GHQ-7 is composed of three positively-worded items and four negatively-worded items. This is consistent with Andrich and Van Schoubroeck’s (1989) conceptualisation of the GHQ-12 that the two-factor model should include both positive and negative wording items. Furthermore, the present findings also collaborate with previous studies (e.g. Ip & Martin, 2006) that the two-factor model is appropriate to be used in the Chinese context. The GHQ-7 may be applicable for measuring psychological strain in Hong Kong employees.

This study had some limitations. Molina, Rodrigo, Losilla and Vives (2014) found that wording effects of the items should be controlled when analysing the factor structure of the GHQ-12, but these effects had not been assessed in this study. This issue should be further discussed when validating the present findings. Furthermore, predictive and discriminative validity of the GHQ-7 have also not been analysed, which in turn might negatively affect the adequacy of the GHQ-7. In summary, this study concluded that the two-factor seven-item model (GHQ-7) is the best factor structure of the GHQ-12, by deleting the item “Been feeling reasonably happy, all things considered” in Hong Kong employees. Future research is recommended to validate the present findings using data from other Chinese employees in order to assess the generalizability of the GHQ-7.

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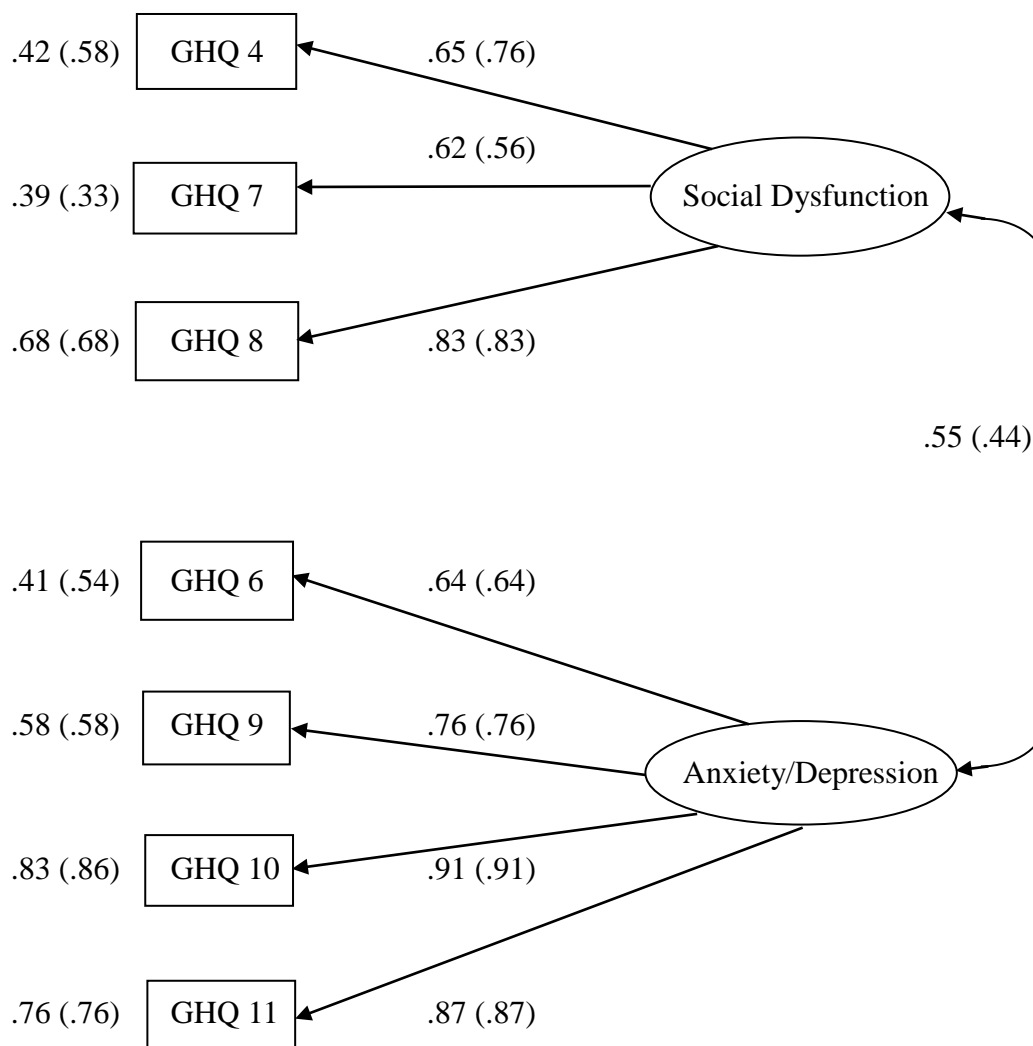
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Table 2 Fit statistics for one-, two-, and three-factor models of the GHQ-12 at Time 1 and Time 2

Tested models	Number of items	χ^2	df	χ^2/df	GFI	SRMR	RMSEA	AIC
One-factor model	12	888.79 (391.57)	54 (54)	16.46 (7.25)	.72 (.71)	.13 (.13)	.17 (.17)	936.79 (439.57)
Two-factor models								
Politi et al. (1994)	12	375.64 (170.47)	53 (53)	7.08 (3.21)	.88 (.87)	.07 (.08)	.11 (.10)	425.64 (220.47)
Kalliath et al. (2004)	8	143.83 (80.48)	19 (19)	7.57 (4.23)	.93 (.91)	.05 (.07)	.11 (.12)	177.83 (114.48)
Three-factor models								
Greatz (1991)	12	329.58 (154.18)	51 (51)	6.46 (3.02)	.90 (.88)	.07 (.07)	.10 (.10)	383.58 (208.18)
Martin (1999)	12	616.20 (262.60)	51 (51)	12.08 (5.15)	.79 (.80)	.12 (.14)	.17 (.17)	666.19 (312.63)
GHQ-7	7	64.98 (29.23)	13 (13)	4.99 (2.25)	.97 (.96)	.03 (.05)	.08 (.07)	94.98 (59.23)

Note. Time 2 values are provided in parentheses

Figure 1 General Health Questionnaire-7 (GHQ-7): Two-factor seven-item model



Note. The values presented in the diagram from left to right are standardised values: 1. Error terms, 2. Path coefficients of indicators, 3. Correlations between the 'Social Dysfunction' and 'Anxiety/Depression' factors. Time 2 values are presented in parentheses