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C. Kılıç · M. Rezaki · B. Rezaki · I. Kaplan · G. Özgen
A. Sağduyu · M.O. Öztürk

General Health Questionnaire (GHQ12 & GHQ28): psychometric properties and factor structure of the scales in a Turkish primary care sample

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Abstract The General Health Questionnaire is a widely used screening instrument. It detects a wide range of psychological disorders, mainly the anxiety/depression spectrum, and has been shown to be a valid and reliable instrument across cultures. This study reports the psychometric properties of the 12- and 28- item versions of the questionnaire among Turkish primary care attenders, focusing mainly on the factor structures. Both questionnaires were found to be reliable and they had factor structures consistent with the original studies.

Introduction

The General Health Questionnaire (GHQ) is successfully used in more than 30 languages throughout the world as a case finder in screening large populations (Goldberg and Williams 1988). It has been translated into Turkish and found to be valid and reliable in primary care attenders (Kılıç 1996 a). The majority of studies on the factorial structure of the GHQ28 have confirmed the original four-factor solution (Lobo et al. 1986; Medina-Mora et al. 1983; Romans-Clarkson et al. 1989; Weyerer et al. 1986),

which suggests a cross-cultural applicability. There are few studies (Graetz 1991; Worsley and Gribbin 1977; Burvill and Knuiman 1983; Politi et al. 1994; Gureje 1991) that attempt at factor analysing the 12-item version (GHQ12).

The present study investigated the psychometric properties and factor structure of the Turkish versions of the GHQ12 and GHQ28 in a semi-rural primary care setting near Ankara. This study was part of a larger, multicentre WHO collaborative study on “psychological problems in general health care” of which Hacettepe University, Department of Psychiatry in Ankara was one of the sites (Rezaki et al. 1995). The WHO Project on Psychological Problems in General Health Care is a transcultural investigation carried out in 15 settings in Brazil, Chile, Germany, France, Greece, India, Italy, Japan, the Netherlands, Nigeria, People’s Republic of China, Turkey, United Kingdom and the United States of America. It was designed to explore forms and rates of psychological disorders presenting in general health care settings in different cultures, to further develop methods for the study of characteristics of such disorders and their course in different settings and to lay scientific groundwork for future international research in the area.

Method

The study was conducted in the primary health care unit of a town near Ankara. All patients attending the primary care unit during the study month (1307 cases) and who were between 15 and 65 years of age were screened using the GHQ12; 400 cases were selected for further investigation by stratified random sampling [all of the high (GHQ > 4) scorers, 35% of the moderate (GHQ = 2 or 3) scorers and 10% of the low (GHQ = 0 or 1) scorers]. The 400 cases were asked to complete the combined version of the GHQ12 and GHQ28 (GHQ34; six items were common to both), along with a comprehensive clinical evaluation (see Rezaki et al. 1995). The GHQs were read aloud to the patients and the responses were recorded by psychologists or psychiatrists trained in the use of the GHQ.

C. Kılıç (✉) · M. Rezaki · M.O. Öztürk
Hacettepe University, Department of Psychiatry,
TR-06100 Ankara, Turkey

B. Rezaki
Sami Ulus Çocuk Hastanesi, Çocuk
Psikiyatrisi Kliniği, Ankara, Turkey

I. Kaplan
Sevgi Hastanesi, Ankara, Turkey

G. Özgen
Bakırköy State Psychiatric Hospital, Istanbul, Turkey

A. Sağduyu
Pamukkale University, Department of Psychiatry,
Denizli, Turkey

In scoring the GHQ, the four columns ranging from “not at all” to “much more than usual” are coded 0, 1, 2 or 3. An alternative scoring method offered by Goldberg and Williams is the “GHQ scoring method”, which transforms the scale into a yes/no scale by recoding 0 and 1 as 0, and 2 and 3 as 1. Since this method gives less normally distributed data, we used this method only in computing GHQ total scores to allow possible comparisons with the literature.

Results

GHQ12

A total of 1307 cases were screened for inclusion in the main study; 869 (66.5%) were female. The mean age was 33.9 (SD 13.5; range 15–65). The mean GHQ12 total score was 1.89 (SD 2.25; range 0–11, yes/no scale type scoring).

Sex differences

Women scored higher than men on total GHQ12 scores (means: 1.98 vs 1.71, $P < 0.05$). Each GHQ12 item was compared to see if any item discriminated between men and women. Of the 12 items, 7 were significantly different between the groups. Women scored higher than men on GHQ1 (lost sleep over worry, $P < 0.01$), GHQ2 (constant strain, $P < 0.05$), GHQ7 (overcome difficulties, $P < 0.001$), GHQ10 (unhappy, $P < 0.05$), GHQ11 (losing confidence, $P < 0.05$) and GHQ12 (worthless, $P < 0.05$). Men scored higher than women on GHQ5 (face up to problems, $P < 0.001$).

Reliability

The internal consistency of the scale as measured by Cronbach's alpha was 0.78 (identical to that of a previous study; Kılıç 1996 b). Split-half reliability was found to be 0.78 (Spearman–Brown).

Correlations

GHQ12 scores correlated significantly with the overall health self-rating ($r: 0.35$, $P < 0.001$); (Table 1). GHQ12 scores did not correlate with severity of physical disorder [as rated by the general practitioner (GP)] and had a low correlation with severity of psychological disorder (as rated by the GP). Age had a low but significant correlation with severity of physical disorder ($r: 0.23$, $P < 0.001$) and had no correlation with either the mean GHQ score or severity of psychological disorder. The correlation between severity of physical and psychological disorder was almost zero.

Factor analysis ($n = 1307$)

A principal components analysis with varimax rotation revealed two factors explaining 44% of the variance (Table 2). The first factor (anxiety/depression factor) loaded high on anxiety/depression items and the second factor (social dysfunction factor) loaded high on items related to work and social performance plus one item tapping the overall level of happiness.

Factor analysis in patients selected for further investigation ($n = 400$)

Factor analysis was repeated for the 400 cases selected for the second interview. The factor structures were almost identical to those of the previous sample.

Factor scores

During the principal components analysis the rotated factor scores for each subject were computed and saved for further analyses. Although the first factor (anxiety/depression) discriminated between men and women, the second factor (social dysfunction) did not. The first factor, compared to the second factor, had higher correlations with overall health self-rating and severity of psychological disease.

GHQ28

A subset of 400 cases was selected for second-stage interviewing; 277 (69%) were female. The mean age was 33.9 years (SD: 13.5; range 15–65). The mean GHQ28 score was 6.4 (SD: 6.0; range 0–25).

Sex differences

Women had higher scores than men (means 6.9 vs 5.4, $P < 0.05$).

Reliability

The internal consistency (alpha) was 0.92 and the Spearman–Brown split-half reliability was 0.84.

Correlations

The correlations of the GHQ28 scores with other variables were very similar to those of the GHQ12 (Table 1). The GHQ28 had a high correlation with overall health rating (patient rated). It did not correlate

Table 1 Correlations of General Health Questionnaire (GHQ) scores with other clinical variables (GP general practitioner)

| | GHQ28 score | GHQ12 score | Overall health self-rating | Age | Severity of physical disorder (GP) |
|---|-------------|-------------|----------------------------|---------|------------------------------------|
| Overall health self-rating | 0.4297* | 0.3525* | | | |
| Age | 0.0204 | 0.0158 | 0.0593 | | |
| Severity of physical disorder (GP) | 0.0027 | 0.0603 | 0.0551 | 0.2280* | |
| Severity of psychological disorder (GP) | 0.3029* | 0.2522* | 0.2736* | 0.0643 | 0.0694 |

* $P < 0.001$ **Table 2** Rotated factor matrix (varimax rotation) of GHQ12

| | Anxiety/depression | | Social dysfunction | |
|-----------------------------|--------------------|-----------|--------------------|-----------|
| | $n = 1307$ | $n = 400$ | $n = 1307$ | $n = 400$ |
| Lost sleep over worry | 0.56193 | 0.64979 | 0.09175 | 0.08942 |
| Under strain | 0.58743 | 0.76793 | 0.18667 | 0.13225 |
| Able to concentrate | 0.22229 | 0.21044 | 0.67757 | 0.76218 |
| Play useful part | 0.03564 | 0.10937 | 0.76217 | 0.68033 |
| Face up to problems | 0.08417 | 0.38934 | 0.73610 | 0.60978 |
| Capable of making decisions | 0.60060 | 0.54468 | 0.09156 | 0.34527 |
| Overcome difficulties | 0.63828 | 0.62617 | 0.13975 | 0.38371 |
| Overall happiness | 0.18104 | 0.54013 | 0.62961 | 0.41131 |
| Enjoy daily activities | 0.17598 | 0.25990 | 0.69092 | 0.76686 |
| Unhappy and depressed | 0.53521 | 0.63885 | 0.13993 | 0.31053 |
| Losing confidence | 0.70985 | 0.74629 | 0.14127 | 0.24066 |
| Worthlessness | 0.62304 | 0.64536 | 0.05428 | 0.20516 |
| Eigen value | 3.64 | 5.2 | 1.65 | 1.1 |
| % Variance | 30.4 | 43.4 | 13.8 | 9.2 |

with age or severity of physical disease (as rated by the GP). The GHQ28 scores had a positive correlation with severity of psychological disease (as rated by the GP).

Factor analysis

The factor analysis of the GHQ28 in the second sample of 400 revealed five factors explaining 56% of the total variance. After varimax rotation, it was observed that the fifth factor had high loadings only on two items. Therefore, the analysis was repeated limiting the number of factors to be extracted to four. That dropped the explained variance to 52.1%. The final four-factor-rotated solution was very similar to the original four-factor solution of Goldberg and Hillier (1979); the same items were grouped together to form anxiety (factor I), somatic symptoms (factor II), social dysfunction (factor III) and depression (factor IV) factors (Table 3). The exceptions were one item (can't do anything because of nerves) of factor IV that had a higher loading on factor I, and another item (hopelessness) that loaded high on both factor I and factor IV.

Factor scores

When factor scores were analysed separately, the only factor that discriminated between men and women was the fourth (depression) factor. Women had higher scores than men on that factor. Age had significant but weak correlations with the third and fourth factor scores. Age correlated negatively with the third (social dysfunction) and positively with the fourth (depression) factors. Although all factors had significantly positive correlations with self-rated overall health, the highest correlation was with factor IV (depression).

Discussion

Reliability

Reliability figures for the GHQ12 and GHQ28 were satisfactory and very similar or identical to our original study done on the same site with a similar sample. A literature search on reliability studies on the GHQ showed that studies done in English-speaking countries report higher reliability figures. This should alert the

Table 3 Rotated factor matrix (varimax rotation) of GHQ28 ($n = 400$)

| | Anxiety | Somatic symptoms | Social dysfunction | Depression |
|-------------------------------------|---------|------------------|--------------------|------------|
| Well & good health | 0.0855 | 0.7001 | 0.2687 | 0.1933 |
| In need of tonic | 0.1075 | 0.6340 | 0.1919 | 0.1051 |
| Run down | 0.4148 | 0.5269 | 0.2815 | 0.1847 |
| Feeling ill | 0.1604 | 0.7280 | 0.2157 | 0.1506 |
| Pain in head | 0.2824 | 0.5323 | 0.0431 | 0.0576 |
| Tightness in head | 0.2923 | 0.5975 | 0.0632 | 0.0268 |
| Hot or cold spells | 0.1966 | 0.5477 | 0.1782 | 0.0096 |
| Lost sleep over worry | 0.5733 | 0.3503 | 0.0685 | 0.1475 |
| Difficulty staying asleep | 0.5389 | 0.4300 | 0.0120 | 0.1200 |
| Felt under strain | 0.5612 | 0.3062 | 0.2607 | 0.1242 |
| Feeling edgy | 0.4506 | 0.4986 | 0.0572 | 0.0961 |
| Scared or panicky | 0.6439 | 0.0701 | 0.0455 | 0.0849 |
| Everything getting on top of you | 0.5925 | 0.2030 | 0.2517 | 0.1689 |
| Nervous and strung up | 0.5367 | 0.3918 | 0.1593 | 0.2098 |
| Keep yourself busy | 0.2720 | 0.2229 | 0.6488 | 0.0192 |
| Things take longer to do | 0.3739 | 0.2251 | 0.4926 | 0.0648 |
| Doing things well on the whole | 0.1573 | 0.2080 | 0.7550 | 0.0119 |
| Satisfied with carrying out task | 0.0721 | 0.1628 | 0.7795 | 0.0517 |
| Play a useful part | 0.0497 | 0.0359 | 0.6573 | 0.1286 |
| Capable of making decisions | 0.4789 | 0.2040 | 0.3475 | 0.1763 |
| Enjoy daily activities | 0.1540 | 0.1935 | 0.6150 | 0.2164 |
| Worthlessness | 0.5052 | 0.0551 | 0.3700 | 0.2327 |
| Hopelessness | 0.5187 | 0.0497 | 0.2138 | 0.4403 |
| Life not worth living | 0.4804 | 0.0815 | 0.1695 | 0.6129 |
| Thought of suicide | 0.0968 | 0.0994 | 0.0602 | 0.8479 |
| Can't do anything because of nerves | 0.4687 | 0.3637 | 0.2415 | 0.1029 |
| Wishing to be dead | 0.3567 | 0.1971 | 0.1252 | 0.6846 |
| Constant thought of suicide | 0.1051 | 0.1075 | 0.0579 | 0.8564 |
| Eigen value | 9.36 | 2.18 | 1.8 | 1.24 |
| % Variance | 33.4 | 7.8 | 6.4 | 4.4 |

researcher to the possible influences of the translation and wording of items. In the earlier study, we showed that rewording four items in the GHQ12 resulted in significant increases in the reliability coefficients.

Factor structure of the GHQ12

The majority of the factor analytic studies have resulted in two-factor solutions for the GHQ12; this was also the case in our study. We had the chance to repeat the factor analysis for the GHQ12 in a large subsample. An almost identical two-factor solution resulted, confirming the stability of those factors. The same number of factors with very similar factor loadings were obtained in our previous study in the same setting four years ago (Kılıç 1996 b). The first factor elicited by rotation included items tapping symptoms of anxiety, depression and sleep problems. The second factor had items relating to problems with social functioning. Differences in studies are mainly on whether anxiety/depression or social dysfunction factors explain more variance.

Factor structure of the GHQ28

The rotated factor structure of the GHQ28 was quite a neat replication of the original four-factor (Goldberg and Hillier 1979) solution, with few items showing loadings that were different from the original four-factors. Most of the factor analytic studies have resulted in four-factor solutions for the GHQ28. Although Goldberg and Hillier state that the subscales of the GHQ28 are not independent, that was probably so in their original study and not in the many replicated factor analytic studies.

Value of using factor scores

The anxiety/depression factor of the GHQ12, compared to the social dysfunction factor, had higher correlations with overall health self-rating and severity of psychological disease. This finding was repeated in the GHQ28, where overall health had the highest correlations with the depression factor of the GHQ28. These findings showed that using the mean total scores may not always be sufficient, and subscores (or factor scores)

may reflect some aspects of psychopathology more accurately.

Although both questionnaires showed sex effects (women scored higher) on total scores, factor scores showed a different picture. The only factors that discriminated between men and women were the depression factor of the GHQ28 and the anxiety/depression factor of the GHQ12; women had higher scores on those factors than men. It is reasonable to conclude that women do not have a general attitude of over-responding, but they score higher than men specifically on items tapping depressive symptoms. This finding is in line with many epidemiological studies showing higher prevalence figures for depression among women.

Conclusion

The GHQ is a valuable tool to assess general psychopathology and to screen for potential cases. Both versions have been shown to be reliable and to have stable factor structures across cultures and across time. The factor scores can sometimes reveal more than a total score. The GHQ28 has been used in many studies for its subscales. We propose that the use of the GHQ12 factor scores, in addition to the total score, can help answer important research questions.

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