

Validation of the *General Health Questionnaire (GHQ-12)* adapted to a work-related context

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ABSTRACT

Introduction: the aim of this study is to test the factorial structure and the internal consistency of the 12-items General Health Questionnaire adapted to work-related psychological distress (GHQW). **Methods:** a validated French version of the GHQ-12 was used and transformed to remind of the occupational context. A sample of 1014 workers completed the GHQW. Internal consistency was assessed by Cronbach's α coefficient. The factorial structure was extracted with an exploratory factorial analysis (EFA). **Results:** the EFA run on the data yield to a one-factor structure explaining 60.5% of the total variance of the scale. The Cronbach's alpha showed a very good internal consistency of the scale ($\alpha = 0.94$). **Conclusion:** the findings support that the GHQW is a reliable and valid instrument for measuring work-related psychological distress in workers. This work-related version could find some applications in epidemiological research at work, in the study of psychosocial risk factors and in the occupational health physician's daily activity.

Keywords: Occupational Health; Mental Health; Questionnaires; Factor Analysis; Statistical; General Health Questionnaire; Validity

1. INTRODUCTION

The 12-item General Health Questionnaire (GHQ-12) is a self-report measure of psychological morbidity, intended to detect psychiatric disorders in community settings and non-psychiatric settings [1]. It is widely used in clinical practice, epidemiological research and for research in psychology [2-4].

The original GHQ is composed of 60 items. However, different shortened validated versions of this instrument

are currently available (e.g., 30, 28, and 12-items).

The 12-items version, due to its brevity, is probably the most popular and so, has been extensively evaluated in terms of its validity and reliability as a one-dimensional indicator of the severity of psychological morbidity [5-9].

Respondents had to indicate, on a -points scale anchored with 1) less than usual, 2) no more than usual, 3) rather more than usual, 4) much more than usual how frequently they experienced recently the different symptoms listed on the scale. The general version of the scale does not precise to participants any context in which the symptoms have been experienced. Each item is rated on a four-point scale, using one of two most common scoring methods: dichotomous (0-0-1-1) or Likert-like type (0-1-2-3).

The GHQ-12 is a well-known instrument for measuring minor psychological distress and has been translated into a variety of languages. If the GHQ-12 is not a tool for indicating a specific diagnosis (e.g. depression, anxiety, etc.), it is more useful and adapted in the work context in the way that it can serve as a general indicator of distress and/or potential problems.

The GHQ-12 was designed and is used routinely as an unidimensional measure of psychological morbidity. Many studies, however, have reported that the GHQ-12 is not unidimensional, but instead assesses psychological morbidity in two (positive and negative items) or three dimensions ("anxiety and depression", "social dysfunction" and "loss of confidence") [10-19].

Considering the GHQ-12 to be a brief, simple and easy to complete instrument, and the fact that its application in research settings as a screening tool is well documented, we decided to check its psychometric properties in a work-related version.

This version could find some applications in epidemiological research at work, in the study of psychosocial risk factors and in the occupational health physician's daily activity.

2. MATERIALS AND METHODS

2.1. Participants

One thousand and fourteen workers were randomly selected in an occupational health center (In the French occupational health organization, every workers have a systematic medical examination annually or biennially).

At their arrival at the center, the authors, after having informed the participants about the study objectives, ask for their voluntary and anonymous participation in the study, précising that they could withdraw at any time. Both oral and written instructions were given to ensure that the items were understood, and participants were reassured that their responses were confidential.

2.2. Instrument

A modified version of the GHQ-12 validated French scale was used [12]. The first modification was made on the instructions, which (orally and written) asked whether the participants experienced recently *at work* the symptoms and/or behaviors listed on the scale. The second modification was made on the items of the scale. For each item is now précised the work context. For example: "Felt constantly under strain at work". The occupational context was reminded in the items. Each item is rated on a four-point scale (less than usual, no more than usual, rather more than usual, or much more than usual). The Likert scoring method (0-1-2-3) was used for this study. A higher score indicates a greater degree of psychological distress.

2.3. Statistical Analysis

We performed exploratory factor analysis (EFA) to explore the structure of the instrument, with the principal components method. The cutoff of factor loading adopted was >0.5 [20].

The reliability of the measure was examined in relation to the instrument's internal consistency by calculating the Cronbach's α coefficient and the homogeneity of the scale (mean inter-item correlations). A Cronbach's α coefficient of 0.70 or greater and mean inter-item correlations situated in a 0.20 to 0.40 range were considered as satisfactory [21]. The means and the variances of all items were computed with 95% confidence limits.

3. RESULTS

3.1. Descriptive Statistics

One thousand and fourteen workers, aged 18 - 63 years (Mean = 41.5; SD = 10.3) entered the study. Fifty three percent were male. Demographics of workers who

responded to our questionnaire, and comparison with the French working population are shown in **Table 1**.

Table 2 presents the mean scores (m), standard deviation (SD), and correlations between items of the General Health Questionnaire at Work (GHQW). The item's means range from 0.50 (item 11) to 1.20 (items 1 and 5). The means inter-item correlations of the total set of items was ranged from 0.42 (items 7 and 4) to 0.79 (item 10 and 9).

3.2. Factor Structure

Table 2 presents the factor loading produced by the EFA with the principal component method. This analysis identified a single factor model (factor loadings ranging from 0.68 to 0.89), explaining 60.5% of the total variance of the scale.

3.3. Homogeneity and Reliability

The 12 items of the GHQW showed good homogeneity. The average inter-item correlation was 0.57. The items-total correlations were ranged from 0.62 to 0.86 indicating a good contribution to the total score.

The internal consistency of the questionnaire was measured using the Cronbach's α coefficient. This coefficient was found to be 0.94.

4. DISCUSSION

The current study aimed at exploring the structure and reliability of the GHQ-12 adapted to a work-related context (GHQW). We have tried to adapt the GHQ-12, the shorter version of the GHQ, to a work-related context. It could be a very helpful tool in the field of occupational psychology.

There are significant difference between the subjects and French workers. The ratio of the youngest workers is more important in our sample. In fact, there is some differences in the different parts of France. Whatever, there is no influence on the validation. Most of the validation studies was done with samples of students. We prefer an

Table 1. Demographics of subjects and comparison with the French workers.

	Subjects (n = 1014)	French workers* (n = 27,600,000)	p
Age			
(mean,(SD))	41.5 y (10.3)	40.2 y	ns
<30 years	19.8%	13.5%	<0.01
30 - 39 y	26.3%	31.9%	<0.01
40 - 49 y	28.1%	27.6%	ns
>49 y	25.7%	27%	ns
Gender			
male	53%	53.6%	ns

*According the «institut national de la statistique et des études économiques»; ns: $p > 0.05$.

Table 2. Means (m), Standard Deviation (SD) and correlations between items, item-total correlations, and exploratory factorial analysis (EFA) of the General Health Questionnaire at Work (GHQW).

	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item-total correlations*	EFA: Factor I
Item 1	1.00												0.72	0.77
Item 2	0.59	1.00											0.74	0.78
Item 3	0.52	0.47	1.00										0.62	0.71
Item 4	0.56	0.40	0.54	1.00									0.62	0.69
Item 5	0.55	0.66	0.46	0.43	1.00								0.74	0.78
Item 6	0.59	0.70	0.50	0.51	0.67	1.00							0.81	0.84
Item 7	0.46	0.43	0.51	0.42	0.51	0.48	1.00						0.62	0.68
Item 8	0.58	0.52	0.49	0.56	0.48	0.59	0.48	1.00					0.68	0.74
Item 9	0.62	0.71	0.56	0.52	0.73	0.77	0.56	0.58	1.00				0.86	0.89
Item 10	0.66	0.66	0.55	0.56	0.63	0.75	0.47	0.60	0.79	1.00			0.84	0.87
Item 11	0.55	0.56	0.54	0.50	0.58	0.66	0.44	0.52	0.69	0.78	1.00		0.75	0.80
Item 12	0.53	0.51	0.56	0.46	0.57	0.54	0.65	0.50	0.66	0.58	0.56	1.00	0.71	0.76
Mean score	1.20	1.00	1.11	0.99	1.20	0.83	1.17	1.14	0.79	0.64	0.50	1.15		60.5%**
SD	0.62	0.98	0.73	0.65	0.95	0.94	0.68	0.65	1.01	0.96	0.88	0.68		

*Average inter-item correlation: 0.57; Cronbach's α coefficient: 0.94, **total variance of the scale explained by the one factor structure.

“ecological” validation with a worker sample. There is some differences in age structure but our sample is near the French workers' one.

4.1. Factor Structure

Although the GHQ-12 was designed as a unidimensional scale, two- and three-factor models have been frequently reported. Currently, the factor structure of the GHQ-12 remains under debate. The World Health Organization study of psychological disorders in general health care in 15 different centers indicated that there is substantial factor variation between centers for the GHQ-12 [22].

The inconsistent findings might be partly due to the statistical methods used (principle component analysis with varimax rotation or confirmatory factor analysis), and wording effects (positively and negatively worded items) [23].

But the context might be an important cause of these inconsistent findings. The factor structure of the GHQ-12 is often explored in various and specific population, such as elderly adults, students, or physician population. These specific populations refer to their own environment to answer to this questionnaire. An item or a set of items of the GHQ-12 have probably not the same meaning in elderly adults, unemployed population, or students. Moreover, each of these populations can refer to different life events (whether occupational, whether private) for the meaning of the items.

In this study, the structure and reliability of the GHQ-12 is explored in a large and almost representative population of French workers, and the items remind the reference context. This work-related version induces a more homogeneous meaning of the set of items, and so probably contributes to the single factor structure and the

high reliability of the GHQW.

We use an EFA because we do not have strong theory about the construct underlying responses to our measures in an occupational context. A second study could follow up with a Confirmatory Factor Analysis (CFA) to confirm the factor structure of the GHQW. This CFA cannot be done using the same data set. Whatever, a CFA performed in a large sample of workers is useful.

The high factor loading and its homogeneity consolidate the use of the GHQW as a unidirectional measure. The score of the GHQW can be the sum of the items, without weighting some items.

4.2. Reliability

In general, the most research findings throughout the world show satisfactory reliabilities. Cronbach's alpha in our study was 0.94. The internal consistency of the GHQW is over the original French translation of the GHQ-12. (0.78), and close to two French GHQ-28 item alpha, respectively 0.91 and 0.95 [24,25].

We have data from more than 80 subjects for every measured variable in the model, which is widely over the 10 subjects recommended per variable [26]. This large sample provides a good reliability in our parameter estimates.

The specific context of work-related psychological context increases the homogeneity of the GHQW. The findings reported in the current study support the psychometric appropriateness of the GHQW.

We have study the possibility to provide a shorter version of the GHQW. But the good homogeneity of the item-total correlations does not allow it (Table 2).

5. CONCLUSIONS

The current study provides some evidences that the

GHQW is a reliable version (Cronbach's α coefficient: 0.94) and valid instrument for measuring work-related psychological distress. The findings reported support a single factor structure, as in the original Goldberg's version.

This version could find some applications in epidemiological research at work, in the study of psychosocial risk factors and in the occupational health physician's daily activity.

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APPENDIX: LIST OF THE ITEMS OF THE GHQ-12

- 1- Able to concentrate
- 2- Lost sleep over worry
- 3- Play useful part in things
- 4- Capable of making decisions
- 5- Constantly under strain
- 6- Could not overcome difficulties
- 7- Enjoy day-to-day activities
- 8- Face up problems
- 9- Feeling unhappy and depressed
- 10- Losing confidence in self
- 11- Thinking of self as worthless
- 12- Reasonable happy