

## GENERAL HEALTH QUESTIONNAIRE-28: PSYCHOMETRIC EVALUATION OF THE SLOVAK VERSION\*

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*Abstract:* The EUROpean Research on Incapacitating Diseases and Social Support (EURIDISS) is an international longitudinal study focused on patients with Rheumatoid Arthritis (RA). It elaborates on the impact of the chronic disease on patients' daily lives. Rheumatoid arthritis, social support and quality of life are the central concepts within the project. Goldberg and Hillier's 28-item scaled version of the General Health Questionnaire (GHQ-28) was used to measure the psychological aspect of quality of life. The scale is frequently used in Western Europe, but rarely in Central and Eastern Europe. Slovakia, a Central European country, joined the EURIDISS project in 1994. Therefore, the question emerged whether the psychometric properties of the Slovak version of the GHQ-28 are adequate to measure the psychological component of quality of life. In the current study the reliability and validity of the GHQ-28 in Slovak RA-patients are evaluated and the outcomes are discussed in the light of Western European (WE) results. The study examines the internal consistency and the factor structure of the instrument. In general, as far as the reliability figures and the intercorrelations of the scales are concerned, the results indicate that the psychometric qualities of the GHQ-28 in Slovakia are satisfactory. However, when taking into consideration the factor structure of the scale, as pointed out by the Principal Component Analysis, this reveals several differences. At least six out of the twenty-eight items appear to fit better to a different subscale from the original one. Especially, general health ratings, such as 'felt recently ill', initially attributed to subscale somatic symptoms, appear to be more closely associated with subscale anxiety/insomnia. More research on GHQ-28 in CEE countries is therefore recommended.

*Key words:* GHQ-28, psychometrics, psychological well-being, Slovakia, rheumatoid arthritis

### INTRODUCTION

A longitudinal study on Rheumatoid Arthritis (RA) patients, the EURIDISS

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project, began by the end of 1990. The study concentrates on the course and impact of this chronic disease on patients' everyday lives. The research project describes the way people cope with their incapacitating disease and the role of psychosocial factors in this coping process. The study started in Western Europe, and in 1994 it was expanded to Central Europe, i.e. to Slovakia. Currently, the project participants are France, Germany, the Netherlands, United Kingdom, Norway, Slovakia and Sweden. Quality of life is considered an important outcome variable

within the project (EURIDISS, 1990). According to the literature, the concept 'quality of life' comprises several dimensions (Doeglas, 2000; Krol et al., 1993; Spilker, 1990). The most commonly evaluated are the physical, the psychological and the social dimensions of quality of life. The physical dimension refers to the patient's physical condition as a consequence of the disease or the treatment. The social aspect reflects the patient's satisfaction with participation in social roles and social activities. The psychological aspect refers to the emotional evaluation of a particular situation and is frequently operationalized as anxiety and depression (Krol et al., 1993; Pincus, Callahan, 1993; Blalock et al., 1989). Within the EURIDISS study the psychological component of quality of life is considered as an outcome measure. In order to assess the psychological aspect of quality of life the 28-item version of the General Health Questionnaire (GHQ-28) can be used. The General Health Questionnaire-28 is frequently used as an indicator of psychological well-being and this latter construct resembles the psychological dimension of quality of life (Krol et al., 1994; EURIDISS, 1990; Sanderman, Stewart, 1990; Goldberg, Hillier, 1979). The GHQ as a self-report instrument was designed for detection and assessment of individuals with an increased likelihood of current psychiatric disorder (Goldberg, Williams, 1988; McDowell, Newell, 1987; Goldberg, Hillier, 1979). The original questionnaire consists of 60 items from which shorter versions of 30, 28, 20 and 12 items were developed. The GHQ-28 scale was derived by factor analysis of the original 60-item version and prepared mainly for research purposes. However, as already mentioned, the scale is often used as a measure of psychological well-being also

(Krol et al., 1994; EURIDISS, 1990; Goldberg, Williams, 1988). The GHQ-28 incorporates four subscales: somatic symptoms, anxiety and insomnia, social dysfunction and severe depression. The existence of four subscales permits analyses within the subscales and this is an additional advantage of the GHQ-28 scale over the other versions (Bowling, 1992; Goldberg, Hillier, 1979). Although the GHQ was developed in the United Kingdom during the 1960s and 1970s, there have consequently been many applications in other countries as well. In 1988 Goldberg and Williams reported that the GHQ had been translated into about 38 languages, and over 50 validity studies have been published. However, these validity studies were conducted mainly in Western European countries and the USA (Krol et al., 1994; Sanderman, Stewart, 1990; Goldberg, Williams, 1988; Banks, 1983). Some publications exist which refer to the utilization of the GHQ in Central and Eastern Europe (CEE), particularly in Belarus, Croatia, Hungary, Poland and Yugoslavia (Havenaar et al., 1996; Havenaar, van den Brink et al., 1996; Kulenovic et al., 1995; Rathner et al., 1995; Sprusinska, 1994; Erik et al., 1988; Radovanovic et al., 1988; Radovanovic, Erik, 1983). Nevertheless, the number of published articles is remarkably small, i.e. only one or two publications from each country. Moreover, apart from Yugoslavia and Belarus the studies are not specifically directed at the psychometric evaluation of the GHQ scales (Havenaar et al., 1996; Radovanovic et al., 1988; Radovanovic, Erik, 1983). In addition, only one of the above-mentioned CEE publications deals with the 28-item version of the GHQ (Sprusinska, 1994). On the other hand, as was stated earlier, the GHQ-28 is a frequently used measure of psychological

well-being in Western Europe and it has proven to be a valid and reliable instrument for comparisons among patients from different countries (Krol et al., 1994; Goldberg, Williams, 1988). Since Slovakia is one of the participating countries of the earlier mentioned international research project (EURIDISS), and since there are nearly no GHQ psychometric studies from Central and Eastern Europe, the question about the psychometric properties of the Slovak version of the GHQ-28 emerged. The purpose of the present study was to determine whether the GHQ-28 can be applied as a measure of psychological well-being also in Central European country or whether there are some differences. The present study is thus directed to the evaluation of the validity and reliability of the GHQ-28 in Slovakia.

## METHOD

### *Procedure and sample*

The results of the current investigation are based on the first wave data of the EURIDISS project. The study with its longitudinal design follows recently diag-

nosed RA-patients during a four-year-period. The data from the patients are obtained once a year. The total sample in the present study consists of 160 RA-patients from Slovakia, selected according to the international research protocol (EURIDISS, 1990). Due to missing data 12 patients were excluded. Out of the remaining 148 respondents 124 were women and 24 men. Seventy-eight percent of the patients was married and 14% was living alone. The mean age of the respondents was 48.2 years (range 22-70) and the mean disease duration was 22.8 months (range 0-55). Between males and females one significant ( $p \leq .05$ ) difference was found in demographic variables, the percentage of married patients in males was significantly higher than in females. Table 1 illustrates additional demographic characteristics of the Slovak and Western European EURIDISS samples.

### *Measures*

In the GHQ-28 the respondent is asked to compare his/her recent psychological state with his/her usual state. For each item four answer possibilities are available (1 - not at all, 2 - no more than usual, 3 - rather

Table 1. Demographic characteristics of the EURIDISS samples

	Slovakia	France	The Netherlands	Norway	Sweden
Number of subjects	148	116	292	186	98
Age in years (SD)	48.2 (12.0)	53.2 (11.3)	53.5 (11.9)	51.5 (13.1)	47.8 (12.4)
Females (%)	83.8	69.8	64.1	72.6	78.6
Married (%)	77.7	84.5	77.9	69.9	72.6
Living alone (%)	13.5	8.6	14.8	22.0	20.4
Disease duration in months (SD)	22.8 (16.0)	31.2 (16.8)	22.5 (14.4)	32.4 (12.0)	58.8 (55.2)

Note: the source of Western European result: Krol et al., 1994

more than usual, 4 - much more than usual). In the study the Likert scoring procedure (1, 2, 3, 4) is applied and the total scale score ranges from 28 to 112. The higher the score the poorer the psychological well-being of the patient.

#### *Statistical methods*

In the following sections relationships between demographics and the level of psychological well-being will be presented. Then, the subscale correlations, internal consistency figures, and the results from Principal Component Analysis (PCA) follow. The analyses were performed by using the Statistical Package for Social Sciences, SPSS/PC+ (Nie et al., 1975).

## RESULTS

#### *Demographic variables and the GHQ-28*

In the sample no relation was found between age and disease duration on the one hand and psychological well-being as measured by the GHQ-28 on the other hand. Generally, on the GHQ-28 no significant differences were found between the married versus not married patients,

neither between patients living alone versus not alone. Considering gender, men differed from women on the subscale somatic symptoms, women scored significantly higher. This indicates that women experience significantly more somatic symptoms than men do.

#### *Intercorrelations between the subscales and the GHQ-28 total scale*

Table 2 illustrates the correlation coefficients between the GHQ-28 subscales and the total scale.

The intercorrelations between the subscales are rather high, with the mean correlation being about 0.52 (range 0.40-0.62). This outcome implies that the subscales are not independent of each other. The correlation coefficients between the subscales and the GHQ-28 total scale, ranging from 0.75 (severe depression) to 0.89 (anxiety and insomnia), indicate the unidimensionality of the scale. The correlation coefficient between the subscale anxiety/insomnia and the GHQ-28 total scale is similar to figures previously reported by Goldberg and Hillier (1979) and supports the assumption that anxiety is a core phenomenon of psychological distress.

Table 2. Intercorrelations between the GHQ-28 subscales and total scale in the Slovak sample

	Somatic symptoms	Anxiety and insomnia	Social dysfunction	Severe depression
Somatic symptoms	-			
Anxiety/insomnia	.62	-		
Social dysfunction	.47	.60	-	
Severe depression	.40	.58	.50	-
GHQ-28 total scale	.80	.89	.76	.75

Note:  $p \leq .001$  for all correlation coefficients

Table 3. Reliability figures, means, and standard deviations (SD) of the GHQ-28 total scale and subscales in Slovakia and Western European countries participating within the EURIDISS

	Somatic symptoms	Anxiety and insomnia	Social dysfunction	Severe depression	GHQ-28 total scale
<b>Slovakia (N = 148)</b>					
Cronbach's alpha	.83	.87	.76	.83	.92
i-i correlation	.40	.50	.32	.41	.29
Mean	15.99	14.87	16.14	9.74	56.74
SD	12.24	4.33	4.56	2.91	3.30
<b>France (N = 115)</b>					
Cronbach's alpha	.82	.88	.85	.90	.92
i-i correlation	.40	.52	.46	.56	.35
Mean	14.76	14.5	15.62	10.46	55.51
SD	4.65	5.10	3.03	4.42	14.09
<b>The Netherlands (N = 290)</b>					
Cronbach's alpha	.82	.83	.86	.88	.93
i-i correlation	.39	.42	.48	.53	.33
Mean	13.07	12.09	15.54	8.99	49.7
SD	3.99	4.02	2.84	3.21	11.6
<b>Norway (N = 184)</b>					
Cronbach's alpha	.79	.84	.89	.89	.94
i-i correlation	.36	.44	.53	.61	.35
Mean	14.46	13.84	15.27	9.70	53.22
SD	3.80	4.01	3.36	3.67	11.87
<b>Sweden (N = 98)</b>					
Cronbach's alpha	.83	.82	.85	.88	.91
i-i correlation	.40	.39	.44	.55	.28
Mean	14.27	12.46	15.08	9.00	51.22
SD	4.14	4.30	3.14	3.34	11.44

Note 1: i-i means inter-item correlation

Note 2: the source of Western European result: Krol et al., 1994

### Reliability

The internal consistency figures, inter-item correlations, means and standard deviations of the Slovak version of the GHQ-28 in comparison with earlier findings are depicted in Table 3.

In the Slovak sample the Cronbach's alpha coefficients of reliability of the subscales vary around 0.82 and the internal consistency of the total scale is 0.92. The mean inter-item correlations, which can be regarded as an indicator of the homogeneity of the scale were also computed. In the Slovak sample the mean inter-item correlations are rather high. The highest is for subscale anxiety/insomnia ( $i-i = 0.50$ ). Based on these figures it can be concluded that the Slovak results are comparable with those from Western European countries.

### Principal Component Analysis

In order to examine the empirical validity of the GHQ-28, Principal Component Analysis (PCA) with varimax rotation and a forced four-factor solution was carried out. PCA is a procedure, which explains the variables by reducing

them to a limited number of components. Summarizing the variables can be more technically expressed in terms of variance accounted for (Kiers, 1990). As was mentioned earlier, the 28 items of the GHQ total scale can be divided into four subscales (7 items in each). In the current study the four factors explained 54% of the variance. When comparing the percentage of explained variance in Slovakia with findings from the Western European countries participating within the EURIDISS, the Slovak figures are slightly lower (Table 4), but are in correspondence with the results of the original scale (Goldberg, Hillier, 1979).

Table 5 presents loadings (item-component correlations) of the 28 items in the sample as obtained by PCA. Below, the factorial matrix (Table 5) will be discussed in more detail in terms of 'incorrect' or 'suspect' items. An item is considered 'incorrect', if the highest loading is not on the predicted component, but on another, not predicted component. The item is considered 'suspect', when it contains a high loading on the predicted component, together with a relatively high loading on another, not predicted component (Krol et al., 1994).

Table 4. Percentages of explained variance by separate PCA in the five countries participating within the EURIDISS

	Number of components			
	1	2	3	4
Slovakia (N = 148)	33.0	41.6	48.2	54.0
France (N = 115)	37.7	46.3	54.1	59.7
The Netherlands (N = 290)	36.4	45.1	51.8	56.9
Norway (N = 181)	36.7	47.2	54.5	59.4
Sweden (N = 93)	32.6	43.2	52.4	58.9

Note: the source of Western European result: Krol et al., 1994

Table 5. Loadings (item-component correlations) of the 28 items in the Slovak sample (N = 148) as obtained by PCA

	Components			
	1	2	3	4
item 1	.78	-.02	.02	.09
item 2	.76	.21	.09	.07
item 3	.68	.17	.24	.31
item 4	.71	.01	.08	.27
item 5	.22	.19	.06	.77
item 6	.20	.11	.22	.75
item 7	.27	-.02	.22	.64
item 8	.51	.33	.28	.22
item 9	.53	.23	.39	.14
item 10	.42	.44	.24	.02
item 11	.58	.40	.23	-.14
item 12	.44	.35	.42	.19
item 13	.39	.58	.24	.14
item 14	.57	.24	.41	.05
item 15	-.25	.20	.18	.31
item 16	.31	.01	.57	.23
item 17	.10	.14	.69	.10
item 18	.28	.06	.70	.13
item 19	.02	.19	.77	.25
item 20	.15	.21	.62	.10
item 21	.20	.40	.47	-.24
item 22	.09	.61	.38	.27
item 23	.20	.82	.04	.14
item 24	.10	.78	-.05	.19
item 25	-.09	.50	.32	-.11
item 26	.26	.60	.15	.13
item 27	.16	.60	.07	.21
item 28	-.01	0.58	0.25	-0.23

Note: items 1-7 somatic symptoms, 8-14 anxiety/insomnia, 15-21 social dysfunctioning, 22-28 severe depression

By performing PCA we tried to retrieve the original factor structure of the scale which was found by Goldberg and Hillier (1979). In Slovakia the factor structure of the scale reveals some differences. The items of the subscale somatic symptoms have a tendency to fall apart in two dimensions. The first four items (1 - feeling well, 2 - feeling in need of a good tonic, 3 - run down, 4 - feeling ill) contain low loadings on the predicted component, i.e. subscale somatic symptoms and high loadings on a not predicted component, i.e. subscale anxiety/insomnia. The remaining three items of the original subscale somatic symptoms (items: 5, 6, and 7 - headaches and hot or cold spells) contain high loadings on the predicted component, i.e. subscale somatic symptoms. Apart from the above-mentioned four items, two other items are incorrect (items: 10 - felt under strain, and 13 - found everything getting on top of you). They contain high loadings on subscale severe depression instead of subscale anxiety/insomnia. Besides, two items are suspect since they contain high loadings on the predicted component, together with a relatively high loading on another, not predicted component (items: 12 - getting scared or panicky for no good reason, 21 - able to enjoy your normal day-to-day activities). Item 12 has high loading on subscale social dysfunctioning and item 21 on subscale severe depression. Finally, item 15 is questionable since it has low loadings on each of the components (item 15: 'Have you recently been managing to keep yourself busy and occupied'). For more detailed information on items of the GHQ-28 see the Appendix.

#### DISCUSSION

The current study was directed at the evaluation of the GHQ-28 scale in RA-

patients from Slovakia. The objective of the study was to investigate whether the Slovak version of the scale has satisfactory psychometric properties. The question seems to be relevant when considering the scarce studies about the psychometric qualities of this research instrument in Central and Eastern Europe.

The rather strong correlations between the subscales, indicating the inter-relatedness of the subscales, are in line with existing publications on the GHQ-28 (Krol et al., 1994; Sanderman, Stewart, 1990; Goldberg, Williams, 1988). The same holds true for the high correlations between the subscales and the GHQ-28 total scale, indicating the unidimensionality of the instrument (Goldberg, Hillier, 1979). The discrepancies in the scoring of the GHQ-28 scale due to gender were also not surprising. According to Goldberg and Williams (1988) the scoring on the GHQ-28 is not influenced by age, marital status and living situation, as opposed to gender. Women usually score higher on the GHQ-28 scale than men (Goldberg, Williams, 1988). So far, the results of the correlational analyses and the figures of internal consistency support the presumption about adequate psychometric properties of the scale in Slovakia.

PCA was carried out in order to re-examine the factor structure of the scale. The four-factor solution accounted for 54% of the variance. These results are satisfactory and comparable to those of the original scale (Goldberg, Hillier, 1979). However, a more detailed inspection of the item-scale correlations (loadings) does present several differences. The items of the subscale somatic symptoms have a tendency to fall apart in two dimensions. The first four questions, which may be described as general illness ratings, contain high loadings on the not



predicted component, i.e. subscale anxiety/insomnia, whereas the questions five, six and seven (headaches and hot or cold spells) have high loadings on the predicted component, i.e. subscale somatic symptoms. A number of considerations may explain these results. To a certain extent the higher percentage of females in the sample may account for this finding. Women have a tendency to score significantly higher on the subscale somatic symptoms of the GHQ-28 (Krol et al., 1994; Goldberg, Williams, 1988). However, the separate PCAs for men and women do not confirm this consideration. Another explanation might be the possible criterion contamination, i.e. the fact that the scale is used in RA-patients with a higher level of somatic symptoms because of the disease. Also the findings of Sanderman and Stewart (1990) with the Dutch version of the GHQ-28 are in line with these considerations. According to their results two out of the first four items of the subscale somatic symptoms are incorrect (items 2 and 3) with high loadings on the subscale anxiety/insomnia and one is suspect (item 1) with high loading on the subscale social dysfunctioning. However, the criterion contamination explanation seems to be not satisfactory since, interestingly, similar results were found when the Turkish version of the GHQ-28 in a community sample of Turkish speaking emigrants in Melbourne was evaluated: "... and general illness ratings, such as 'not feeling perfectly well' were not uniquely associated with somatic symptoms" (Stuart et al., 1993, p. 274). All in all, the results concerning the validity and reliability of the scale are encouraging, however the question associated with subscales somatic symptoms and anxiety/insomnia still has to be answered. More detailed investigations, especially concentrating on the

problem with the first subscale (somatic symptoms) may shed more light on this frequently registered difficulty.

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## DOTAZNÍK VŠEOBECNÉHO ZDRAVIA-28: PSYCHOMETRICKÉ VYHODNOTENIE SLOVENSKEJ VERZIE

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*Súhrn:* Európsky výskum invalidizujúcich chorôb a sociálna podpora (EURIDISS) je longitudinálny projekt zameraný na pacientov s reumatoidnou artritídou. Projekt monitoruje vplyv chronickej choroby na každodenný život pacientov, pričom jeho kľúčovými pojmami sú reumatoidná artritída, sociálna podpora a kvalita života. Dvadsaťosem-položková verzia škály General Health Questionnaire (GHQ-28, Všeobecný dotazník zdravia) autorov Goldberg a Hilliera (1979) je nástrojom vhodným na meranie psychologického aspektu kvality života. Škála je často používaná v západnej Európe a USA, je však pomerne neznáma v krajinách strednej a východnej Európy. Nakoľko v rámci EURIDISS projektu je Slovensko jedinou zúčastnenou krajinou z bývalého východného bloku, overenie adekvátnosti psychometrických charakteristík škály v našich podmienkach bolo nevyhnutnosťou. Aktuálna štúdia sa venuje vnútornej konzistencii a faktorovej štruktúre nástroja, pričom validita a reliabilita slovenskej verzie GHQ-28 je porovnávaná s výsledkami zo západoeurópskych krajín. Koeficienty vnútornej konzistencie ako aj interkorelácie medzi subškálami a celkovou škálou poukazujú na skutočnosť, že psychometrické kvality GHQ-28 ako celku sú adekvátne. Výsledky PCA (analýzy primárnych komponentov) však naznačujú určité odlišnosti. Najmenej šesť z 28 položiek prináleží k inému komponentu než v pôvodnej verzii. Predovšetkým všeobecné hodnotenia zdravia ako napríklad "cítim sa v súčasnosti chorý", pôvodne priradené k subškále "somatické symptómy", užšie súvisia so subškálou "anxieta/insomnia". Tento problém, pravidelne sa objavujúci v reumatologickej literatúre, si vyžaduje intenzívnejšiu pozornosť výskumníkov najmä v krajinách strednej a východnej Európy.

## APPENDIX

The 28-items of the scaled version of the GENERAL HEALTH QUESTIONNAIRE  
(Goldberg, Hillier, 1979)

## HAVE YOU RECENTLY:

1. Been feeling perfectly well and in good health?
2. Been feeling in need of a good tonic?
3. Been feeling run down and out of sorts?
4. Felt that you are ill?
5. Been getting any pains in your head?
6. Been getting a feeling of tightness or pressure in your head?
7. Been having hot or cold spells?
8. Lost much sleep over worry?
9. Had difficulty in staying asleep once you are off?
10. Felt constantly under strain?
11. Been getting edgy and bad-tempered?
12. Been getting scared or panicky for no good reason?
13. Found everything getting on top of you?
14. Been feeling nervous and strung-up all the time?
15. Been managing to keep yourself busy and occupied?
16. Been taking longer over the things you do?
17. Felt on the whole you were doing things well?
18. Been satisfied with the way you've carried out your task?
19. Felt that you are playing a useful part in things?
20. Felt capable of making decisions about things?
21. Been able to enjoy your normal day-to-day activities?
22. Been thinking of yourself as a worthless person?
23. Felt that life is entirely hopeless?
24. Felt that life isn't worth living?
25. Thought of the possibility that you might make away with yourself?
26. Found at times you couldn't do anything because your nerves were too bad?
27. Found yourself wishing you were dead and away from it all?
28. Found that the idea of taking your own life kept coming into your mind?