

## Hospital Anxiety and Depression (HAD) scale: factor structure, item analyses and internal consistency in a large population

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**Background** The Hospital Anxiety and Depression (HAD) rating scale is a commonly used questionnaire. Former studies have given inconsistent results as to the psychometric properties of the HAD scale.

**Aims** To examine the psychometric properties of the HAD scale in a large population.

**Method** All inhabitants aged 20–89 years ( $n=92\ 100$ ) were invited to take part in The Nord-Trøndelag Health Study, Norway. A total of 65 648 subjects participated, and only completed HAD scale forms ( $n=51\ 930$ ) formed the basis for the psychometric examinations.

**Results** Principal component analysis extracted two factors in the HAD scale that accounted for 57% of the variance. The anxiety and depression sub-scales shared 30% of the variance. Both sub-scales were found to be internally consistent, with values of Cronbach's coefficient ( $\alpha$ ) being 0.80 and 0.76, respectively.

**Conclusions** Based on data from a large population, the basic psychometric properties of the HAD scale as a self-rating instrument should be considered as quite good in terms of factor structure, intercorrelation, homogeneity and internal consistency.

**Declaration of interest** The Norwegian Research Council and Novo Nordisk Pharmaceuticals (Norway) supported this study.

The Hospital Anxiety and Depression (HAD) rating scale (Zigmond & Snaith, 1983) has been established as a much applied and convenient self-rating instrument for anxiety and depression in patients with both somatic and mental problems, and with equally good sensitivity and specificity as other commonly used self-rating screening instruments (Herrmann, 1997; Bjelland *et al*, 2001). According to these reviews, however, several psychometric issues of the HAD scale are in need of further clarification because most psychometric studies of the scale have been done on small ( $n<250$ ) and selected samples of patients with cancer or other somatic illnesses:

(a) *Factor structure of the HAD scale.* From a sample of 226 Belgian cancer patients, Razavi *et al* (1990) concluded that the HAD scale should be considered a unidimensional scale of mental distress. In contrast, Moorey *et al* (1991) found that principal component analysis (PCA) demonstrated two dimensions of the HAD scale in a sample of 568 British cancer patients. A two-factor solution on the scale using PCA is also reported in clinical samples by Sigurdardóttir *et al* (1993) (89 patients), Hammerlid *et al* (1999) (357 patients) and Savard *et al* (1998) (162 patients). In contrast, Lewis (1991) reported a three-factor model in a sample of 117 patients but it showed a poor 'goodness of fit'. On samples from general populations, both Spinhoven *et al* (1997) and Lisspers *et al* (1997) did PCA and found support for a bifactorial solution. Using confirmatory factor analysis, Dunbar *et al* (2000) reported empirical support for the tripartite model of Clark & Watson (1991).

(b) *Intercorrelation of the sub-scales.* Pearson's correlation coefficient between the HAD scale's anxiety and depression sub-scales (HAD-A and HAD-D) is reported to be 0.49–0.63 (Lewis,

1991; Moorey *et al*, 1991; Leung *et al*, 1993; Watson *et al*, 1995; Spinhoven & van der Does, 1997; Savard *et al*, 1998). A tendency towards higher correlations is reported in studies with more somatic pathology compared with healthy samples. Such values demonstrate a moderate intercorrelation between the anxiety and depression sub-scales that is in accordance with both clinical findings and theoretical viewpoints regarding the co-occurrence of such symptoms (Üstun & Sartorius, 1995; Mineka *et al*, 1998).

(c) *Homogeneity of the sub-scales.* Several studies have found that anxiety item 7 ('I can sit at ease and feel relaxed') loads higher on the depression sub-scale (Moorey *et al*, 1991; Lisspers *et al*, 1997; Savard *et al*, 1998; Hammerlid *et al*, 1999). With some exceptions (Lisspers *et al*, 1997; Savard *et al*, 1998), the other items have been found to load on their appropriate factors. The correlation between the score on each sub-scale item and the total sub-scale score is commonly reported as a reliability measure, but the correlations reported vary extensively between different studies (Leung *et al*, 1993; Savard *et al*, 1998; Hammerlid *et al*, 1999).

(d) *Internal consistency.* It has been recommended that the internal consistency, as measured with Cronbach's coefficient  $\alpha$ , should be at least 0.60 for a self-report instrument to be reliable and at least 0.80 when used as a screening instrument (Nunnally & Bernstein, 1994). Several studies conclude that the HAD scale fulfils these criteria. Cronbach's  $\alpha$  has been found to be 0.78–0.93 for HAD-A and 0.82–0.90 for HAD-D (Moorey *et al*, 1991; El-Rufaie & Absood, 1995; Lisspers *et al*, 1997; Wettergren *et al*, 1997; Savard *et al*, 1998; Hammerlid *et al*, 1999; Stordal *et al*, 2001). The stability of the findings on the internal consistency of the HAD scale in various languages supports the robustness of the scale as a screening instrument.

The aim of the present study was to examine the factor structure, intercorrelation, homogeneity of sub-scales and internal consistency of the HAD scale based on data from a large population.

## METHOD

### Study population

The Nord-Trøndelag Health Study (HUNT) was conducted during 1995–1997 in Nord-Trøndelag County, which is one of 19 counties in Norway, containing 3% of the population. Based on updated population register lists, all inhabitants received a mailed questionnaire containing, among others, the Norwegian translation of the HAD scale. Sub-populations of participants were identified by the HUNT questionnaire.

According to the Central Population Register of Norway, 92 100 individuals aged 20–89 years were eligible for HUNT. Of those eligible, 65 648 took part in the study and the PCA was based on complete HAD forms only ( $n=51\,930$ ).

### Weighting procedures

Weighting according to the procedure used in the National Comorbidity Survey (Kessler *et al*, 1994) was performed to adjust for difference in response rate according to age and gender, and also age and gender differences between the population of Nord-Trøndelag County and the population of Norway.

### Statistics

Different sets of PCA were performed on the HAD scale, with varying criteria for the number of factors, and on both sub-scales as well as the total scale. Results using oblique rotation are reported because the sub-scales share 30% of the variance; analyses with orthogonal rotation also were performed, with basically the same results.

In order to test the stability of the factor structure obtained, we repeated the analyses according to gender (men:  $n=25\,197$ ; women:  $n=26\,733$ ) and in randomly split halves of the sample. We also repeated the factor analyses in the groups who reported mental problems ( $n=2098$ ) and chronic somatic problems ( $n=10\,954$ ). The analysis was carried out also in different age strata of 18–39 years ( $n=18\,736$ ), 40–59 years ( $n=21\,037$ ), 60–79 years ( $n=10\,804$ ) and 80–89 years ( $n=13\,53$ ) and according to the highest level of basic education: elementary school ( $n=16\,210$ ), high school ( $n=23\,426$ ) and college/university ( $n=11\,184$ ).

The internal consistency of the HAD sub-scales was calculated by Cronbach's coefficient  $\alpha$ . Pearson's correlation coefficients were calculated for estimation of the sub-scales' shared variance.

### Ethics

HUNT was approved by the National Data Inspectorate and the Board of Research Ethics in health region IV of Norway.

## RESULTS

### Factor structure of the HAD scale

In PCA with the number of factors limited to two, a two-factor solution emerged where the depression and anxiety items loaded on separate factors. This result was found in the total sample and in all the defined sub-samples, and also was confirmed in the analysis of randomly split halves of the samples. Eigenvalues for the anxiety and depression sub-scales were 4.06 and 3.87, respectively, in the total sample; accordingly, the two-factor solution explained 57% of the total variance. The explained variance was even higher in the subsamples with mental or chronic somatic problems: 70% and 62%, respectively (Tables 1 and 2).

When performing PCA with the number of factors defined by eigenvalues  $\geq 1.00$ , a three-factor solution emerged. The first

factor contained items 1, 3, 5, 9 and 13 (all anxiety items), the second factor contained items 2, 4, 6, 8, 10 and 12 (all depression items) and the third factor comprised items 7, 11 and 14. Eigenvalues in the rotated three-factor solution were 3.82, 3.60 and 1.87, respectively. In the subsamples we found this three-factor solution only in respondents aged 18–39 years and in the two subsamples with education from high school and college/university. In all other subsamples the two-factor solution emerged according to the original anxiety and depression sub-scales.

Principal component analysis done on each sub-scale separately, with the number of factors predefined by eigenvalues  $\geq 1.00$ , gave only single-factor solutions in the total sample and in all subsamples.

A one-factor solution for the total HAD scale, as suggested by Razavi *et al* (1990), accounted for only 35% of the total variance.

### Intercorrelation of the sub-scales

The anxiety and depression sub-scales shared 30% of the variance. The sub-scale

**Table 1** Principal component analysis of the Hospital Anxiety and Depression (HAD) scale

| HAD item                               | Whole sample |       | Mental problems |       | Chronic somatic problems |       |
|--|--------------|-------|-----------------|-------|--------------------------|-------|
|  | F1           | F2    | F1              | F2    | F1                       | F2    |
| <b>Anxiety sub-scale</b>               |              |       |                 |       |                          |       |
| 1                                      | 0.68         | 0.07  | 0.13            | 0.69  | 0.74                     | 0.04  |
| 3                                      | 0.61         | 0.12  | 0.01            | 0.71  | 0.68                     | 0.05  |
| 5                                      | 0.69         | 0.08  | 0.20            | 0.65  | 0.75                     | 0.05  |
| 7                                      | 0.53         | 0.23  | 0.33            | 0.52  | 0.58                     | 0.22  |
| 9                                      | 0.76         | -0.06 | 0.04            | 0.74  | 0.78                     | -0.01 |
| 11                                     | 0.64         | -0.13 | -0.12           | 0.68  | 0.66                     | -0.13 |
| 13                                     | 0.67         | 0.03  | -0.06           | 0.79  | 0.73                     | 0.01  |
| <b>Depression sub-scale</b>            |              |       |                 |       |                          |       |
| 2                                      | -0.03        | 0.81  | 0.84            | -0.04 | -0.03                    | 0.81  |
| 4                                      | 0.03         | 0.76  | 0.83            | -0.01 | 0.03                     | 0.77  |
| 6                                      | 0.28         | 0.48  | 0.68            | 0.13  | 0.30                     | 0.52  |
| 8                                      | 0.11         | 0.49  | 0.41            | 0.19  | 0.05                     | 0.43  |
| 10                                     | -0.14        | 0.60  | 0.61            | -0.06 | -0.14                    | 0.62  |
| 12                                     | 0.03         | 0.77  | 0.82            | -0.02 | 0.07                     | 0.76  |
| 14                                     | 0.08         | 0.42  | 0.62            | -0.01 | 0.08                     | 0.47  |
| Eigenvalue                             | 4.06         | 3.87  | 5.02            | 4.83  | 4.58                     | 4.08  |
| Explained variance                     | 29%          | 28%   | 36%             | 35%   | 33%                      | 29%   |
| <i>n</i>                               | 52 265       |       | 2098            |       | 10 954                   |       |
| Age (mean, s.d.)                       | 47.7 (18.3)  |       | 51.2 (15.9)     |       | 56.4 (17.4)              |       |
| Gender (females)                       | 51.3%        |       | 65.5%           |       | 56.4%                    |       |
| Sub-scale correlation, shared variance | $R^2=0.299$  |       | $R^2=0.429$     |       | $R^2=0.310$              |       |

**Table 2** Principal component analysis of the Hospital Anxiety and Depression (HAD) scale for men and women and for randomly selected split halves of total material

| HAD scale item                         | Men         |       | Women       |       | Total sample, split half 1 |       | Total sample, split half 2 |       |
|--|-------------|-------|-------------|-------|----------------------------|-------|----------------------------|-------|
|  | FI          | F2    | FI          | F2    | FI                         | F2    | FI                         | F2    |
| <b>Anxiety sub-scale</b>               |             |       |             |       |                            |       |                            |       |
| 1                                      | 0.68        | 0.06  | 0.65        | 0.10  | 0.66                       | 0.09  | 0.69                       | 0.05  |
| 3                                      | 0.58        | 0.15  | 0.60        | 0.13  | 0.60                       | 0.13  | 0.62                       | 0.11  |
| 5                                      | 0.68        | 0.07  | 0.68        | 0.09  | 0.68                       | 0.08  | 0.69                       | 0.07  |
| 7                                      | 0.53        | 0.23  | 0.54        | 0.22  | 0.54                       | 0.23  | 0.52                       | 0.23  |
| 9                                      | 0.75        | -0.05 | 0.77        | -0.06 | 0.77                       | -0.06 | 0.76                       | -0.06 |
| 11                                     | 0.64        | -0.16 | 0.71        | -0.16 | 0.65                       | -0.15 | 0.63                       | -0.12 |
| 13                                     | 0.62        | 0.05  | 0.69        | 0.03  | 0.67                       | 0.03  | 0.67                       | 0.03  |
| <b>Depression sub-scale</b>            |             |       |             |       |                            |       |                            |       |
| 2                                      | 0.04        | 0.75  | 0.02        | 0.79  | -0.03                      | 0.82  | -0.04                      | 0.81  |
| 4                                      | 0.04        | 0.74  | -0.01       | 0.79  | 0.03                       | 0.76  | 0.03                       | 0.75  |
| 6                                      | 0.28        | 0.48  | 0.28        | 0.47  | 0.27                       | 0.49  | 0.28                       | 0.47  |
| 8                                      | 0.12        | 0.49  | 0.05        | 0.53  | 0.11                       | 0.49  | 0.12                       | 0.48  |
| 10                                     | -0.14       | 0.58  | -0.09       | 0.61  | -0.13                      | 0.59  | -0.14                      | 0.61  |
| 12                                     | -0.04       | 0.81  | -0.03       | 0.82  | 0.03                       | 0.77  | 0.03                       | 0.77  |
| 14                                     | 0.09        | 0.39  | 0.12        | 0.40  | 0.09                       | 0.40  | 0.08                       | 0.44  |
| Eigenvalue                             | 3.83        | 3.67  | 4.24        | 4.14  | 4.03                       | 3.85  | 4.05                       | 3.89  |
| Explained variance                     | 27%         | 26%   | 30%         | 30%   | 29%                        | 28%   | 29%                        | 28%   |
| <i>n</i>                               | 25 197      |       | 26 733      |       | 25 965                     |       | 25 965                     |       |
| Sub-scale correlation, shared variance | $R^2=0.278$ |       | $R^2=0.334$ |       | $R^2=0.298$                |       | $R^2=0.305$                |       |

correlation was elevated in the subsample with mental problems (43%).

### Homogeneity of the sub-scales

The anxiety items loaded more on the anxiety factor than on the depression factor,

and corresponding results were found for the depression items. This homogeneous pattern was found in the total sample as well as in the subsamples. However, items 6 ('I feel cheerful') and 7 ('I can sit at ease and feel relaxed') diverged to some extent from this homogeneous pattern by loading

substantially also on the other sub-scales (Tables 3 and 4).

### Internal consistency

The internal consistency of the HAD scale, as calculated by Cronbach's  $\alpha$ , was satisfactory in all the evaluated samples (values of 0.73–0.85) (Table 4).

**Table 3** The Hospital Anxiety and Depression (HAD) scale item numbers and texts

| Scale/item number | Item text   |
|-------------------|---|
| A/1               | I feel tense or wound up  |
| A/3               | I get a sort of frightened feeling as if something awful is about to happen |
| A/5               | Worrying thoughts go through my mind  |
| A/7               | I can sit at ease and feel relaxed  |
| A/9               | I get a sort of frightened feeling like 'butterflies' in the stomach        |
| A/11              | I feel restless as if I have to be on the move                              |
| A/13              | I get sudden feelings of panic  |
| D/2               | I still enjoy the things I used to enjoy                                    |
| D/4               | I can laugh and see the funny side of things                                |
| D/6               | I feel cheerful   |
| D/8               | I feel as if I am slowed down   |
| D/10              | I have lost interest in my appearance                                       |
| D/12              | I look forward with enjoyment to things                                     |
| D/14              | I can enjoy a good book or TV programme                                     |

Questions are answered on a four-point scale from 0 to 3. Items 2, 4, 6, 7, 12 and 14 are reversed before summation.

**Table 4** Internal consistency of the Hospital Anxiety and Depression (HAD) scale sub-scales using Cronbach's  $\alpha$ 

| Samples                  | Depression sub-scale | Anxiety sub-scale |
|--------------------------|----------------------|-------------------|
| Whole sample             | 0.76                 | 0.80              |
| Mental problems          | 0.83                 | 0.85              |
| Chronic somatic problems | 0.78                 | 0.84              |
| Men                      | 0.75                 | 0.78              |
| Women                    | 0.78                 | 0.81              |
| Age 18–39 years          | 0.73                 | 0.77              |
| Age 40–59 years          | 0.78                 | 0.82              |
| Age 60–79 years          | 0.75                 | 0.82              |
| Age 80 years and more    | 0.73                 | 0.81              |

**Table 5** Factor structure of the Hospital Anxiety and Depression (HAD) scale in different studies

| HAD scale items   | Savard <i>et al</i> (1998) |          | Lisspers <i>et al</i> (1997) |          | Moorey <i>et al</i> (1991) |          | Unpublished <sup>1</sup> |          |
|-------------------|----------------------------|----------|------------------------------|----------|----------------------------|----------|--------------------------|----------|
|                   | Factor 1                   | Factor 2 | Factor 1                     | Factor 2 | Factor 1                   | Factor 2 | Factor 1                 | Factor 2 |
| <b>Anxiety</b>    |                            |          |                              |          |                            |          |                          |          |
| 1                 | 0.44                       | 0.57     | 0.70                         | 0.07     | 0.13                       | 0.71     | 0.68                     | 0.07     |
| 3                 | 0.11                       | 0.82     | 0.77                         | -0.07    | 0.09                       | 0.77     | 0.61                     | 0.12     |
| 5                 | 0.39                       | 0.70     | 0.78                         | 0.00     | 0.17                       | 0.72     | 0.69                     | 0.08     |
| 7                 | 0.48                       | 0.53     | 0.36                         | 0.45     | 0.51                       | 0.30     | 0.53                     | 0.23     |
| 9                 | 0.35                       | 0.66     | 0.76                         | 0.00     | -0.10                      | 0.86     | 0.76                     | -0.06    |
| 11                | -0.16                      | 0.49     | 0.60                         | 0.16     | -0.07                      | 0.66     | 0.64                     | -0.13    |
| 13                | 0.31                       | 0.72     | 0.76                         | -0.05    | -0.01                      | 0.83     | 0.67                     | 0.03     |
| <b>Depression</b> |                            |          |                              |          |                            |          |                          |          |
| 2                 | 0.72                       | 0.13     | -0.14                        | 0.74     | 0.78                       | -0.02    | -0.03                    | 0.81     |
| 4                 | 0.68                       | 0.35     | 0.07                         | 0.69     | 0.74                       | -0.06    | 0.03                     | 0.76     |
| 6                 | 0.72                       | 0.23     | 0.16                         | 0.66     | 0.76                       | -0.01    | 0.28                     | 0.48     |
| 8                 | 0.63                       | 0.06     | 0.31                         | 0.53     | 0.51                       | 0.14     | 0.11                     | 0.49     |
| 10                | 0.59                       | 0.17     | -0.04                        | 0.62     | 0.49                       | 0.07     | -0.14                    | 0.60     |
| 12                | 0.71                       | 0.32     | 0.00                         | 0.84     | 0.79                       | 0.01     | 0.03                     | 0.77     |
| 14                | 0.68                       | 0.06     | 0.02                         | 0.53     | 0.65                       | -0.08    | 0.08                     | 0.42     |
| Eigenvalue        | 4.05                       | 3.30     | 5.90                         | 1.40     | -                          | -        | 4.06                     | 3.87     |
| %Total variance   | 28.9                       | 23.6     | 42.2                         | 10.0     | -                          | -        | 29%                      | 28%      |

1. Unpublished data: further details available from the author upon request.

## DISCUSSION

### Factor structure of the HAD scale

This large population-based study gave support to the bidimensional factor structure of the HAD scale, tapping the separate but related dimensions of anxiety and depression. We have found a considerably higher explained variance in the subsample with mental problems (70%) compared with the general population (57%) and the subsample with chronic somatic problems (62%). In contrast, factor solutions with more than two factors suggested in the literature typically fail to explain more than 55% of the variance. This explained variance indicates that quite a few individual response patterns in the HAD scale are unique, in the sense that they diverge from both conventional and alternative factor structures. The two-factor solution of the scale is valid in more individuals in subsamples with a high mental problems symptom level.

The factor structure of the HAD scale extracted with eigenvalues  $\geq 1.00$  as a criterion identified a third factor with a lower eigenvalue than the other two factors. In accordance with Leung *et al* (1993), we

found support for this dimension in non-clinical samples only and we suggest that this factor can be named 'restlessness'.

### Intercorrelation of the sub-scales

Our results are in accordance with others, who have reported a shared sub-scale variance of 24–36%. We find higher sub-scale correlation in the subsample with mental problems.

### Homogeneity of the sub-scales

Our finding that item 7 does not discriminate well between the two factors is in accordance with studies of general populations (Lisspers *et al*, 1997) and clinical samples (Moorey *et al*, 1991) (Table 5). In our study we also have loadings on both factors in item 6. These findings suggest that items 6 and 7 are not unique in either anxiety or depression.

### Internal consistency

The internal consistency of the HAD scale was found to be satisfactory in our general population and somewhat higher in sub-populations with mental problems in our study, in accordance with others.

Significant aspects of the syndromes of anxiety and depression are not covered by the HAD scale. Somatic symptoms have been omitted in order to prevent false-positive cases in somatic hospital settings. However, other important components of depression, such as hopelessness, guilt and low self-esteem, are not assessed because the HAD-D focuses mainly on anhedonia (Silverstone, 1991; Herrmann, 1997; Bjelland *et al*, 2001). This somewhat narrow concept of depression may be one reason for the robustness of the factor structure in the HAD scale.

In HUNT, non-participants were more prevalent among men and among those aged 40–69 years. We presume that non-responders are more prone to have a history of mental disorders (Eaton & Kessler, 1981). However, the stability of the factor structures of the HAD scale across different subsamples indicates that selection bias due to non-attendance is of limited importance.

Psychometric analyses are more valid and reliable when based on large materials. Our results support the HAD scale as an instrument with good psychometric properties in terms of factor structure, intercorrelation, homogeneity and internal consistency.

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## REFERENCES

- Bjelland, I., Neckelmann, D., Tangen Haug, T., et al (2001)** A review of validation studies of the Hospital Anxiety and Depression Scale. *Journal of Psychosomatic Research*, in press.
- Clark, L. A. & Watson, D. (1991)** Tripartite model of anxiety and depression: psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology*, **100**, 316–336.
- Dunbar, M., Ford, G., Hunt, K., et al (2000)** A confirmatory factor analysis of the Hospital Anxiety and Depression scale: comparing empirically and theoretically derived structures. *British Journal of Clinical Psychology*, **39**, 79–94.
- Eaton, W.W. & Kessler, L. G. (1981)** Rates of symptoms of depression in a national sample. *American Journal of Epidemiology*, **114**, 528–538.
- El-Rufaie, O. E. F. & Absood, G. H. (1995)** Retesting the validity of the Arabic version of the Hospital Anxiety and Depression (HAD) scale in primary health care. *Social Psychiatry and Psychiatric Epidemiology*, **30**, 26–31.
- Hammerlid, E., Ahlner-Elmqvist, M., Bjordal, K., et al (1999)** A prospective multicentre study in Sweden and Norway of mental distress and psychiatric morbidity in head and neck cancer patients. *British Journal of Cancer*, **80**, 766–774.
- Herrmann, C. (1997)** International experiences with the Hospital Anxiety and Depression Scale – a review of validation data and clinical results. *Journal of Psychosomatic Research*, **42**, 17–41.
- Kessler, R., McGonagle, K., Zhao, S., et al (1994)** Lifetime and 12-month prevalence of DSM–III–R psychiatric disorders in the United States: results from the National Comorbidity Survey. *Archives of General Psychiatry*, **51**, 8–19.
- Leung, C. M., Ho, S., Kan, C. S., et al (1993)** Evaluation of the Chinese version of the Hospital Anxiety and Depression Scale. A cross-cultural perspective. *International Journal of Psychosomatics*, **40**, 29–34.
- Lewis, G. (1991)** Observer bias in the assessment of anxiety and depression. *Social Psychiatry and Psychiatric Epidemiology*, **26**, 265–272.
- Lisspers, J., Nygren, A. & Söderman, E. (1997)** Hospital Anxiety and Depression Scale (HAD): some psychometric data for a Swedish sample. *Acta Psychiatrica Scandinavica*, **96**, 281–286.
- Mineka, S., Watson, D. & Clark, L. A. (1998)** Comorbidity of anxiety and unipolar mood disorders. *Annual Review of Psychology*, **49**, 377–412.
- Moorey, S., Greer, S., Watson, M., et al (1991)** The factor structure and factor stability of the Hospital Anxiety and Depression Scale in patients with cancer. *British Journal of Psychiatry*, **158**, 255–259.

## CLINICAL IMPLICATIONS

- Our results support the Hospital Anxiety and Depression (HAD) scale as an instrument with good psychometric properties in terms of factor structure, sub-scale intercorrelation, homogeneity and internal consistency.
- The properties of the HAD scale are found to be robust across a wide spectrum of subsamples, including groups with somatic problems, mental problems and different strata defined by age, education and gender.
- The explained variance of the two-factor solution is still higher when the HAD scale is used in groups of individuals with mental problems.

## LIMITATIONS

- No factor solution explains more than 57% of the variance in the HAD scale in a general population (and 70% in a subsample with mental problems), leaving quite a few individual patterns of responses in the scale unexplained.
- The issue of the HAD scale as a case-finder is not addressed because there was no interview part of the HUNT study.
- The HAD scale version studied is the Norwegian translation.

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**Nunnally, J. C. & Bernstein, I. H. (1994)** *Psychometric Theory* (3rd edn). New York: McGraw-Hill.

**Razavi, D., Delvaux, N., Farvacques, C., et al (1990)** Screening for adjustment disorders and major depressive disorders in cancer in-patients. *British Journal of Psychiatry*, **156**, 79–83.

**Savard, J., Laberge, B., Gauthier, J. G., et al (1998)** Evaluating anxiety and depression in HIV-infected patients. *Journal of Personality Assessment*, **73**, 349–367.

**Sigurdardóttir, V., Bolund, C., Brandberg, Y., et al (1993)** The impact of generalized malignant melanoma on quality of life evaluated by the EORTC questionnaire technique. *Quality of Life Research*, **2**, 193–203.

**Silverstone, P. H. (1991)** Is anhedonia a good measure of depression? *Acta Psychiatrica Scandinavica*, **83**, 249–250.

**Spinhoven, P. H. & van der Does, A. J. W. (1997)** Somatization and somatosensory amplification in psychiatric outpatients: an explorative study. *Comprehensive Psychiatry*, **38**, 93–97.

—, Ormel, J., Sloekers, P. P. A., et al (1997) A validation study of the Hospital Anxiety and Depression Scale (HADS) in different groups of Dutch subjects. *Psychological Medicine*, **27**, 363–370.

**Stordal, E., Bjartveit Krüger, M., Dahl, N. H., et al (2001)** Depression in relation to age and gender in the general population: the Nord-Trøndelag Health Study (HUNT). *Acta Psychiatrica Scandinavica*, **104**, 210–216.

**Üstun, T. B. & Sartorius, N. (1995)** *Mental Illness in General Health Care*. Chichester: Wiley.

**Watson, D., Clark, L. A., Weber, K., et al (1995)** Testing a tripartite model: I. Evaluating the convergent and discriminant validity of anxiety and depression symptom scales. *Journal of Abnormal Psychology*, **104**, 3–11.

**Wettergren, L., Langius, A., Björholm, M., et al (1997)** Physical and psychosocial functioning in patients undergoing autologous bone marrow transplantation – a prospective study. *Bone Marrow Transplantation*, **20**, 497–502.

**Zigmond, A. S. & Snaith, R. P. (1983)** The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica*, **67**, 361–370.