

## **Screening for mental disorders in leprosy patients: comparing the internal consistency and screening properties of HADS and GHQ-12**

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### *Summary*

*Objective* The aim of the study was to investigate the internal consistency and screening properties of the General Health Questionnaire-12 (GHQ-12) and the Hospital Anxiety and Depression Scale (HADS) in Turkish patients with leprosy.

*Method* The two screening instruments and a fully structured diagnostic interview (CIDI) were administered to 65 people drawn from all leprosy inpatient units in Turkey between March and June of 2001. The scales were evaluated using Cronbach's alpha and Receiver Operating Characteristics (ROC) analyses. For each scale, criterion validity was assessed for any psychiatric disorder, depressive disorder and anxiety disorder.

*Results* The Cronbach alpha coefficients for the GHQ-12 and HADS were 0.84 and 0.81 respectively. For detecting any psychiatric disorder, the optimal cut-off for the GHQ-12 was 4/5 (sensitivity 0.82, specificity 0.62). The optimal cut-off for the HADS total score was 12/13 (sensitivity 0.80, specificity 0.77).

*Conclusion* The results indicate that the General Health Questionnaire-12 and Hospital Anxiety and Depression Scale have satisfactory internal consistency, and performed well to a similar extent for detecting psychiatric disorders in leprosy patients.

## **Introduction**

It has been estimated that 11–16 million people in the world are infected by *Mycobacterium leprae*,<sup>1</sup> and the number of new cases reported was 296,499 during 2005 according to

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statistics from 115 countries.<sup>2</sup> Although prevalence of the disease has been reduced during the last years, it has increased in several countries.

Although the disease of leprosy only affects a minority of *M. leprae* carriers, it has a major public health impact. Many people affected by leprosy have difficulty caring for themselves, because of deterioration of deformities.<sup>3</sup> Treatment is difficult because it must be continued for long periods, requires several drugs with adverse effects and nerve damage can occur after treatment.<sup>4,5</sup>

The prevalence of leprosy and the disability it causes have a high international impact; however only a few reports have investigated the link between leprosy and psychiatric morbidity.<sup>1,6-10</sup>

There are still little data on the prevalence of psychiatric morbidity in people with leprosy. One study, using the Cornell Medical Index found the prevalence of any psychiatric disorder was around 10% in leprosy patients, with depressive reaction the most common disorder.<sup>11</sup> In another study, using the Diagnostic and Statistical Manual of Mental Disorders 3rd Edition (DSM-III) 46% of leprosy patients were found to have an affective disorder.<sup>1</sup> Anxiety disorders have also been found to be increased in people with leprosy.<sup>12</sup>

A total of 3,319 leprosy patients were listed in the Registry of the Turkish Ministry of Health in 1991.<sup>13</sup> In a Turkish clinical population, Yazıcı *et al.*,<sup>6</sup> using the Present State Examination, found prevalence rates of psychiatric disorders of 25% for inpatients and 20% for outpatients with leprosy. In another study, 65% of hospitalised patients with leprosy were found to be clinically depressed using the Symptom Checklist-90-R, the Zung Depression Scale, and the Spielberger State-Trait Anxiety Inventory.<sup>7</sup> In addition, leprosy patients with psychiatric comorbidity were found to have high rates of disability assessed by the Brief Disability Questionnaire.<sup>14</sup>

Mental disorders in people with leprosy may result in higher medical health care costs because of increased service utilisation. Although there are particular difficulties associated with diagnosing psychiatric disorders in patients with somatic diseases (e.g. overlap of psychiatric criteria with symptoms of disease and side effects of treatment), sensitive and specific instruments are necessary to detect patients who need psychological and/or psychiatric intervention.<sup>15</sup> To that end, brief screening scales represent potentially time- and cost-saving devices.

The General Health Questionnaire (GHQ) is probably the most widely used screening scale for common mental disorders. It has been found to have high sensitivity and specificity for current mental status (including depression, dysthymia, agoraphobia, panic disorder, generalised anxiety disorder, somatization disorder, chronic fatigue and hypochondriasis) according to the Composite International Diagnostic Interview- Primary Health Care Version (CIDI-PCHV) in a variety of settings and cultures<sup>16</sup> including a validation study in Turkey.<sup>17</sup> It was designed to be a self-report instrument for the detection of anxiety and depressive disorders in community and primary care settings.<sup>18</sup> The shorter 12-item version excluded somatic orientated items: particularly important in the assessment of clinical populations. The Hospital Anxiety and Depression Scale (HADS) is another commonly used self-report instrument and includes 14 items, which are divided into depression and anxiety subscales.<sup>19</sup> It was developed specifically to determine the likelihood of anxiety and depressive disorders in patients with physical illness and to assess changes in the severity of such disorders.<sup>19</sup> It also excludes somatic symptoms such as sleep and appetite disturbance.

Previous studies have evaluated the performance of screening instruments for mental disorders in patients with a variety of common disorders: such as cancer, cardiovascular and

musculoskeletal diseases. However their utility has not been evaluated in people with leprosy. The aims of the study described here were to evaluate the GHQ-12 and HADS instruments (including the HADS depression and anxiety subscales) in a sample of people with leprosy, in terms of their internal consistency and screening properties (criterion validity) for any psychiatric disorder, depressive disorder and anxiety disorder as defined by a fully structured diagnostic interview.

## Methods

### SAMPLE

The sample for the study was drawn from all leprosy cases that were diagnosed and treated between March and June 2001 in the inpatient units of the Elazığ Skin-Venereal-Leprosy Hospital (46 patients), the Leprosy Research Centre at İstanbul University (22 patients) and the Leprosy Centre at Ankara University Medical School (6 patients). Of these cases, three were excluded due to severe cognitive dysfunction, one for not speaking Turkish, and five refused to participate. The study was conducted with 65 patients.

### INSTRUMENTS AND PROCEDURE

The study was carried out between March and June 2001. A senior psychiatrist (VS), previously trained in this, administered all research instruments. All 65 patients were assessed with four research instruments in total: the Sociodemographic and Clinical Information Form (SCI), the Composite International Diagnostic Interview- Primary Health Care Version (CIDI-PHCV), the GHQ-12, the HADS. The SCI was compiled as a result of a pilot study that was conducted on five leprosy patients treated in the inpatient unit of the Leprosy Centre at Ankara University Medical School. It is a questionnaire composed of 66 items that investigate the patient's sociodemographic characteristics, and history of physical and psychiatric illness.

The GHQ-12 is a widely used instrument designed both for case finding and severity measurement relating to common mental disorders in epidemiological research.<sup>18</sup> The 12-item form (score range 0-12) has mainly been used in large mental health studies in the community and in primary care.<sup>20</sup> The GHQ-12 has been translated into Turkish and found to be valid; sensitivity and specificity were 0.74 and 0.84 respectively (cut off point was 2 in primary care patients) and internally consistent (Cronbach's alpha 0.78) in primary care attenders when compared to Present State Examination as the 'gold standard'.<sup>17</sup>

The HADS consists of seven items for anxiety (HADS-A) and seven for depression (HADS-D). The items are scored on a four-point scale from zero (not present) to three (considerable). The item scores are added, giving subscale scores on the HADS-A and the HADS-D from zero to 21. This is one of the most frequently used scales to assess psychological distress in somatically ill patients (score range from 0-42) with good scaling properties such as sensitivity and specificity were reported 0.80 or higher and Cronbach's alpha scores of 0.80 and 0.81 respectively for the anxiety and depression subscales whereas several external criteria have been used as gold standards.<sup>21</sup>

The HADS was specifically developed on a population of physically ill patients, and its items exclude somatic symptoms of psychological distress. This is important because chronic pain patients can acquire clinically significant scores on many depression measures by endorsing items concerning sleep problems, fatigue, and reduced activity. In Turkish research

a validation study found HADS Cronbach's alpha coefficients of 0.85 and 0.77 respectively for the anxiety and depression subscales. In the study, the cut-off points of 10 (sensitivity 0.83 and specificity 0.81) and 7 (sensitivity 0.72 and specificity 0.68) were used to identify probable anxiety and depression disorders in each subscale respectively.<sup>22</sup>

The CIDI-PHCV is a fully-structured diagnostic instrument developed by the World Health Organization and in widespread international use.<sup>23</sup> The version designed for primary health care has been translated into Turkish, and investigation in Turkey has shown good test-retest reliability with interviewer-observer coefficients of 0.92 for the scale overall and ranging from 0.81–1.0 for individual items.<sup>24</sup> The CIDI-PHCV contains sections on sociodemographic characteristics, somatoform disorders, neurasthenia, anxiety and depressive disorders, cognitive dysfunction, and alcohol use disorders. Every item is scored between 1 and 6, and psychiatric diagnoses according to the International Classification of Diseases-10 (ICD-10)<sup>25</sup> are generated by a computerised algorithm. The main advantage of this procedure is the high objectivity and inter-rater reliability (kappa: 0.82–0.98).<sup>26</sup>

#### STATISTICAL ANALYSES

All statistical analyses were conducted with STATA 7.0. Chi-square and t-tests were used to compare categorical variables and continuous variables, respectively. In a scale, the each item correlates to greater or lesser extent with the total score. For the whole scale these individual correlations can be summarised by a single statistic; the Cronbach's alpha coefficient, which varies between 0–1. In this study, internal consistency was measured using this statistic,<sup>27</sup> with scores above 0.8 taken as indicating high internal consistency.<sup>28</sup> Concurrent validity of GHQ-12 and HADS against CIDI-PHCV was expressed in terms of sensitivity (the proportion of true cases correctly identified by screening instrument according to the gold standard) and specificity (the proportion of non-cases correctly identified by screening instrument according to the gold standard).<sup>29</sup>

Receiver operating characteristics (ROC) analysis<sup>30</sup> was used to evaluate the diagnostic accuracy of the HADS and the GHQ-12 to detect cases with psychiatric diagnoses in leprosy patients. The ROC-curve expresses the relationship between sensitivity and specificity over the full range of potential cut-off points and represents an index of the overall ability of the instrument to discriminate between cases and non-cases.<sup>30</sup> The estimation of the area under the ROC curve (AUROC) quantifies this accuracy. Values range is from 0.5 (no discriminatory ability) to 1.0 (perfect discrimination).<sup>31</sup> Four ROC-analyses were performed. The psychiatric diagnoses from CIDI-PHCV (4 week prevalence) were used as case definition (criterion). In the first two analyses, all participants with any current psychiatric diagnosis or with current depressive disorders, respectively, were used as cases. For the third analysis, all patients with current anxiety disorders were referred to as cases. Finally, the subscales (HADS depression and HADS anxiety) were analysed separately to compare their screening performances for depressive and anxiety disorders. AUROC coefficients for the different screening scales were compared using the algorithm proposed by De Long *et al.*<sup>32</sup> The optimal cut-off point was chosen by the criteria of maximum specificity without allowing it to exceed sensitivity; this implicitly places equal priority upon the avoidance of false positive and false negative categorisations.

## Results

### SAMPLE CHARACTERISTICS:

A total of 65 leprosy patients were assessed with clinical interview (CIDI-PHCV). Characteristics of the sample are displayed in Table 1. Most were male; the mean age was 55.5 years within a 21–77 year range. Seventeen percent of the patients were actively working, and 9% had never worked in their life.

*Mycobacterium leprae* was detected in 9% of the cases at the time of study, and 17% of them were receiving anti-leprosy therapy. Ninety-three percent of the patients had visible physical deformity, and 49% of the patients had severe deformities, such as blindness, amputated finger, and nose deformities. Forty-six percent of the patients had a family history of leprosy.

The mean and Standard Deviation (SD), scores for the HADS and GHQ-12 scales were 10.9 (6.45) and 4.4 (3.53) respectively. Twenty-two patients (33.8%) had at least one ICD-10 diagnosis (based on symptoms over the previous four weeks).

### INTERNAL CONSISTENCY AND CRITERION-VALIDITY OF GHQ-12 AND HADS

For the participant group, the GHQ-12 and the HADS showed good internal consistency with Cronbach's alpha scores of 0.84 and 0.81 respectively. Receiver operating characteristics

**Table 1.** Sample Characteristics (N = 65)

Sociodemographics	
Sex (% female)	27.7
Age (mean, SD, range) (years)	55.5 (14.8) (21–77)
Employment (% actively working)	17
Leprosy treatment (% currently treated)	17
Leprosy-related deformity (% visible)	93
GHQ-12 (median, interquartile range)	4 (1–7)
HADS (median, interquartile range)	10 (7–14)
HADS-D (median, interquartile range)	6 (3–9)
HADS-A (median, interquartile range)	4 (3–6.5)
Prevalence of ICD-10 diagnosis (%)	
Patients with at least one ICD-10 diagnosis	33.8
Current depressive episode	12.3
Recurrent brief depressive episode	8.9
Generalised anxiety disorder	12.3
Persistent somatoform pain disorder	12.3

(ROC) analyses are displayed in Figs. 1, 2 and 3. In summary, the GHQ-12 and HADS discriminated well between those with and without mental disorders and with and without depressive disorder but only moderately well between those with and without anxiety disorder.

Screening characteristics for different cut-off points are displayed in Tables 2 and 3. The optimal cut-off points were 4/5 and 5/6 for GHQ-12, and 11/12 and 12/13 for HADS according to the case-criteria. The optimal cut-off for the HADS provided a better general balance between sensitivity and specificity than that for the GHQ-12, both for any psychiatric disorder and depressive disorder. However there was no statistically significant difference between the AUROC scores for the two scales with respect to any of the three criteria.

Additionally, the HADS subscales (HADS anxiety and HADS depression) were compared regarding their ability to identify cases with depressive and anxiety disorders. The cut-off point for depression subscale of the HAD was 8/9 and the sensitivity and specificity were 0.66, 0.76 respectively. The cut-off point for anxiety subscale of the HAD was 4/5. Using this cut-off point, the sensitivity and specificity were 0.75 and 0.61 respectively. For depressive disorders, the AUROC value for the HADS depression subscale (0.82; 95% Coincidence Interval, CI: 0.69–0.95) was superior to the HADS anxiety subscale (0.70; 95% CI: 0.52–0.88), although the difference was not statistically significant ( $\chi^2$ : 1.08;  $P = 0.29$ ). For anxiety disorders, there was little difference between the HADS anxiety and depression subscales, AUROC values 0.73 (95% CI: 0.51–0.94) and 0.72 (95% CI: 0.53–0.91) respectively.

## Discussion

We sought to investigate the internal consistency and criterion validity of two commonly used screening instruments, the HADS and the GHQ-12, for the detection of psychiatric

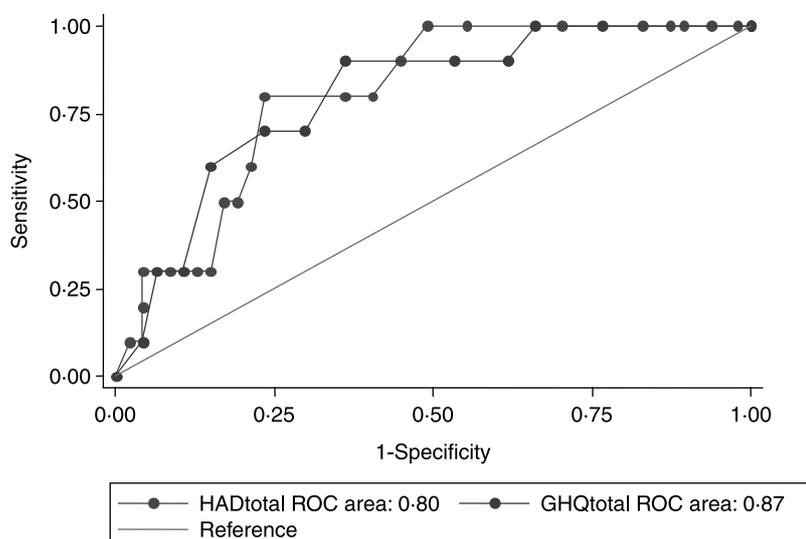


Figure 1. ROC curves for the detection of any mental disorder.

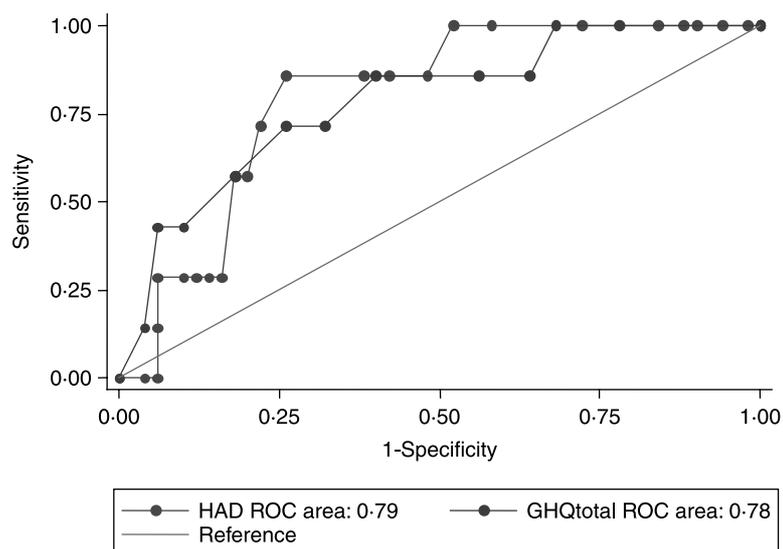


Figure 2. ROC curves for the detection of depressive disorder.

disorder in Turkish patients with leprosy. The study had the advantage of gold standard diagnoses derived from standardised fully structured interviews using the CIDI-PHCV. This is the first time, as far as we are aware, that the GHQ has been evaluated together with the HADS in a leprosy population, allowing an explicit test of the assumption that physical-specific psychiatric assessments are necessary to ensure validity and reliability in such contexts.

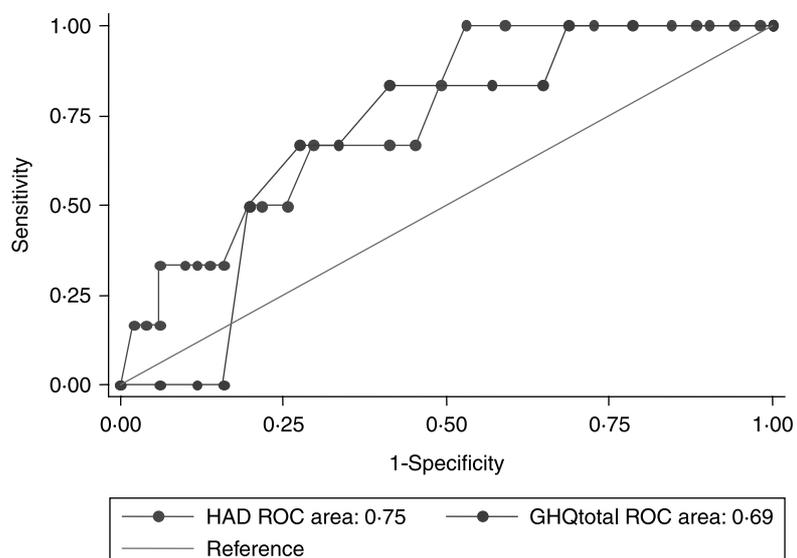


Figure 3. ROC curves for the detection of anxiety disorder.

**Table 2.** Cut-off points with sensitivity and specificity for GHQ-12 and HADS

Cut-off points	HADS			Cut-off points	GHQ-12		
	Psychiatric Disorders Sens/Spec*	Depressive Disorders Sens/Spec	Anxiety Disorders Sens/Spec		Psychiatric Disorders Sens/ Spec	Depressive Disorders Sens/ Spec	Anxiety Disorders Sens/ Spec
10/11	0.88/0.58	0.85/0.58	0.83/0.50	3/4	0.81/0.46	0.85/0.45	0.71/0.43
11/12	0.88/0.69	0.85/0.68	0.66/0.58	4/5	0.81/0.62	0.85/0.59	0.71/0.57
12/13	0.80/0.76	0.85/0.74	0.50/0.62	5/6	0.60/0.68	0.71/0.68	0.71/0.57
13/14	0.77/0.66	0.57/0.82	0.50/0.70	6/7	0.60/0.75	0.71/0.75	0.57/0.73

\*Sens = sensitivity; Spec = specificity.

The internal consistency for the HADS and the GHQ-12 was as high as in other studies carried out for different illnesses,<sup>33</sup> in different settings<sup>34,18</sup> and in different cultures.<sup>35,36</sup> For example, Cronbach's alpha scores were 0.89 and 0.82 for the HAD anxiety and depression scales respectively in head and neck cancer patients.<sup>33</sup>

The optimal cut-off points of HADS and GHQ-12 were higher than those found in general practice<sup>37</sup> but lower than those found in patients with cancer, cardiovascular and musculoskeletal disorders.<sup>38,39</sup> However, validity coefficients for both scales are similar to those found derived from general practice research<sup>16,37</sup> but lower than those found in patients with specific physical illnesses.<sup>38,39</sup> The relatively lower cut-off points and their validity coefficient are perhaps explained by the different criteria used to choose them. In our study, high specificity that does not exceed the sensitivity was chosen for minimising the number of false negative cases at the sacrifice of some false positive cases. Two other studies that compared the HADS and GHQ-12<sup>38,39</sup> did not apply this criterion. We also found that the HADS and the GHQ-12 performed better as screening instruments for depressive compared to anxiety disorders, consistent with other research in patients with severe physical diseases.<sup>38,39</sup>

Based on the ROC analysis, the HADS and the GHQ-12 did not differ significantly in their ability to discriminate between those with and without psychiatric disorder, depressive

**Table 3.** Scores of area under receiver operating curve (AUROC) and optimal cut-off points with sensitivity and specificity for GHQ-12 and HADS according different case-criteria

	HADS			GHQ-12		
	Psychiatric Disorders	Depressive Disorders	Anxiety Disorders	Psychiatric Disorders	Depressive Disorders	Anxiety Disorders
Optimal cut-off point	12/13	12/13	11/12	4/5	5/6	4/5
Sensitivity	0.80	0.85	0.66	0.81	0.71	0.71
Specificity	0.76	0.74	0.58	0.62	0.68	0.57
AUROC	0.80	0.79	0.75	0.73	0.78	0.69
CI 95% of AUROC	0.68–0.92	0.66–0.93	0.56–0.93	0.55–0.90	0.61–0.96	0.38–0.84

AUROC comparison with HADS and GHQ-12 for different case-criteria: Psychiatric disorders:  $\lambda^2 = 0.002$ ,  $p = 0.96$ ; Depressive disorders:  $\lambda^2 = 0.011$ ,  $p = 0.91$ ; Anxiety disorders:  $\lambda^2 = 0.145$ ,  $p = 0.70$ .

disorder or anxiety disorders according to the areas under the fitted curves. This is consistent with the findings of previous studies in people with musculoskeletal diseases.<sup>38</sup> Some evidence has been suggested for superiority of the HADS when cancer and cardiovascular disorders are included.<sup>39</sup> Our findings did suggest some superiority of the HADS in terms of the overall sensitivity and specificity values obtained. The lack of statistical significance with respect to AUROC differences should be treated with caution, since the sample size was relatively small.

### Implications of the study findings

In these Turkish leprosy patients the performances of the GHQ-12 and the HADS (AUROC area) were both reasonable, although the HADS seem to have slightly better validity coefficients. Tentatively, we suggest that the GHQ-12 might be preferred where assessment of overall psychological morbidity is required in leprosy patients, because it is probably the most widely used screening scale for mental disorders and will more readily allow comparisons between different settings and populations. Like other studies carried out in patients with severe physical illness, both instruments appeared to identify depressive disorders better than anxiety disorders, demonstrating that the latter symptoms might be more difficult to be recognised in this group.

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## Appendix

1 GHQ-12

2 HADS

THE GHQ-12 MUST NOT BE REPRODUCED WITHOUT PERMISSION

### Appendix-1 . General Health Questionnaire (GHQ-12)

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Have you recently:				
1-been able to concentrate on whatever you're doing?	Better than	Same as usual	Less than usual	Much less than usual
2-lost much sleep over worry?	Not at all	No more than usual	Rather more than usual	Much more than usual
3-felt that you are playing a useful part in things?	More so than usual	Same as usual	Less useful than usual	Much less usual
4-felt capable of making decisions about things?	More so than usual	Same as usual	Less so than usual	Much less capable
5-felt constantly under strain?	Not at all	No more than usual	Rather more than usual	Much more than usual
6-felt you couldn't overcome your difficulties?	Not at all	No more than usual	Rather more than usual	Much more than usual
7-been able to enjoy your normal day to day activities	More so than usual	Same as than usual	Less so than usual	Much less than usual
8- been able to face up to your problems?	More so than usual	Same as usual	Less so than usual	Much less able
9-been feeling unhappy and depressed?	Not at all	No more than usual	Rather more than usual	Much more than usual
10-been losing confidence in yourself?	Not at all	No more than usual	Rather more than usual	Much more than usual
11-been thinking of yourself as a worthless person?	Not at all	No more than usual	Rather more than usual	Much more than usual
12-been feeling reasonably happy, all things considered?	More so than usual	About same as usual	Less so than usual	Much less than usual

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**Appendix 2** . 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.