**Excessive negative affect and deficient positive affect in anxiety and depression:
balancing the valences in the Hospital Anxiety and Depression Scale (HADS)**

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Abstract
In the widely used Hospital Anxiety and Depression Scale (HADS) most of the items
forming the Depression subscale use terms for a pleasant state of mind, whereas most of the
items in the Anxiety subscale mention aversive states. Thus the constructs assessed may
relate respectively to absence of positive affect and presence of negative affect, rather than
to the different sorts of affect intended. In the present study this hypothesis was partly
supported by factor analyses of responses to the HADS in a healthy group and in a group
with the rheumatic disease Sjögren's syndrome. Re-analysis showed that it may be feasible
to create an 8-item instrument that distinguishes anxiety items from depression items while
having items with positive valence in equal number to items with negative valence in each
subscale. Patients' own descriptions and categorisations of such items should be used to
develop an affect-balanced and somatic-free inventory that then may be able to separate
anxiety from depression among healthy and physically ill populations.

Introduction

The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) is the most widely used instrument for assessments of degrees of subclinical and diagnosable depression and anxiety in people in physically poor health (Snaith, 2003) and is also popular for studies of healthy individuals (e.g., Gilbert & Meyer, 2004). Controversy exists over the factor structure of responses to this questionnaire. Several recent reports have concluded there are three components, two being aspects of depression and anxiety (corresponding at the highest scores to the psychiatric diagnoses of these mood disorders: American Psychiatric Association, 1994), but the third smaller factor being variously identified from items relating to positive outlook (Pincus, Williams, Vogel & Field, 2004), somatic well-being (Treharne, Lyons & Kitas, 2001) or general negative affect (Dunbar, Ford, Hunt & Der, 2000), the latter according with the tripartite model proposed by Clark and Watson (1991) that allows for respondents with mixed anxiety and depression.

These accounts neglect the impact that affective valence can have on the factor structure of inventories of depression (Dowdy, Dwyer, Smith & Wallston, 1996). When the composition of the two subscales of the HADS are examined, it is striking that six out of the seven items intended to assess anxiety refer to the experiencing of an adverse state, whereas five out the seven depression items mention good moods. Hence this inventory is at risk of confounding the valence of affect with its character, such as a difference between worry about the future and grief about the past. We therefore went back to the face meaning of the items in the HADS and other inventories used in our recent work and tested if a distinction can be made between anxiety and depression when the absence of positive affect is assessed as often as the presence of negative affect in each subscale.

In addition, a particular challenge for health psychology is to distinguish somatic symptoms of anxiety or depression from symptoms of physical disease. Somatic symptoms are necessarily aversive and so items interpreted as physical can only represent negative affectivity. Thus an effort was also made to identify negative affect in anxiety and in depression that is purely cognitive.

Method

Participants

This report presents new analyses of data collected by Bowman, Booth, Platts and the UK Sjögren's Interest Group (2004) from two of their samples, 132 women diagnosed as having primary Sjögren's syndrome (PSS) and 97 healthy women, all Caucasian. Ages and durations of PSS are given in Table 1 and further disease data on the PSS sample are detailed by Bowman *et al*. (2004). The hallmarks of PSS are oral and ocular dryness but depression and anxiety are common (Valtysdottir, Gudbjornsson, Lindqvist, Hallgren & Hetta, 2000); these patients are therefore an ideal group for testing the performance of the HADS inventory in people with a physical disease.

Insert Table 1 about here

Procedure

The patients with PSS were recruited from 12 rheumatology centres around the UK. The healthy controls were recruited from GPs' clinics in Birmingham, UK. Participants completed questionnaires (described below) at one time point. Written consent was obtained and participants were issued with questionnaires and a postage-paid envelope for return. The study had been approved by a Multi-centre Research Ethics Committee.

Measures

The HADS (Zigmond & Snaith, 1983; see also Snaith, 2003) was employed to measure levels of anxiety and depression. Each item of this questionnaire asks the respondent to select one of four phrases describing intensity or frequency of a particular affective state over the previous week; seven of the items relate to anxiety (one in terms of positive affect) and seven relate to depression (five with terms for clearly positive affect). Higher HADS subscale totals indicate greater depression or anxiety.

The mental health (MH) subscale of the Medical Outcomes Study (MOS) Short Form-36 (SF-36; Ware & Sherbourne, 1992) was also used to measure psychological well-being. This is a 5-item subscale with two questions assessing anxiety (one positively worded) and three assessing depression (one positively worded). Each question is answered by marking one of six categories of frequency, from 'All of the time' to 'None of the time'.

Statistics

Principal components factor analyses with varimax rotation were carried out separately for the PSS and healthy samples. As each group had more than five respondents per item, the samples were adequate in size (Tabachnick & Fidell, 1996).

Results

Depression and anxiety scores on the HADS

Mean levels and prevalences of both anxiety and depression were greater in the group of patients with PSS than those in healthy controls (Table 1).

Structure of responses to the HADS

Factor analyses of responses to the 14 HADS items (Table 2) gave a two-factor solution with loadings over 0.5 for six of the HADS anxiety items on Factor 1 in the patients with PSS and for five items on Factor 2 in the healthy women. However, one of these five items, feeling tense or 'wound up', also had a loading over 0.5 on Factor 1 (mostly depression items). One of the two items on the HADS anxiety subscale with a low loading on Factor 2 in the healthy women had a loading of 0.55 on Factor 1. This is the only item included in the anxiety subscale that avows pleasant states (sitting at ease and feeling relaxed). This left only four highly loading 'pure' anxiety items (all negatively worded), three of which refer to somatic symptoms ('butterflies in the stomach' and 'feeling[s]' of 'fright…' or 'panic').

The sole affectively positive item in the HADS anxiety subscale ('sit at ease / feel relaxed') loaded heavily on the factor including most depression subscale items (Factor 2 in the patients with PSS and Factor 1 in the healthy women) and not at all on the factor of other anxiety subscale items.

Factor 2 in the patients with PSS had loadings over 0.5 for five of the seven HADS depression items, while Factor 1 in the healthy women had six. The exception in both groups was the state of 'loss of interest in appearance' that loaded on the expected factors but only weakly. In patients with PSS, 'feeling slowed down' also loaded less than 0.5 among the depression subscale items. People suffering from the chronic fatigue associated with this and other rheumatic diseases are unlikely to regard reduced mobility in the way that depressed people conceptualise motor retardation (see also Treharne *et al*., 2001).

A similar structure (not reported here) was found in responses to the HADS from two smaller groups of Caucasian women of the same age range from the study of three

rheumatic diseases by Bowman *et al.* (2003), 65 women with systemic lupus erythematosus and 71 with rheumatoid arthritis.

Insert Table 2 about here

Valence-balanced anxiety and depression subscales

From these initial factor analyses of the HADS, we selected nine of the 14 items (see Table 3) and added three items from the SF-36-MH (because there were insufficient positive affect anxiety items and negative affect depression items in the HADS), creating a 12-item affect-balanced scale (albeit longer for depression because of the greater number of issues covered and items available). The original responses to these 12 items were then subjected to further factor analyses for the patients with PSS and healthy women.

The two positive and two negative anxiety items loaded above or close to 0.5 on Factor 1 in the two-factor solutions in both groups (Table 3). However, the item referring to lack of ability to 'sit at ease / feel relaxed' had the lowest loading of these four and loaded slightly more heavily on Factor 2 (mostly depression items) in the patients with PSS.

The patterns of loadings in two-factor solutions were more complex for the eight depression items (Table 3). The two (negative) items for depression from the SF36 loaded strongly on Factor 1 with anxiety items for both the PSS and healthy samples. Therefore they were not discriminantly valid, at least when administered within the SF-36, and so may be unsuited to valence-balanced assessment of depression.

In both groups, the highest loading four depression items on a factor separate from anxiety items were generally the two negative items and two of the five positive items from the HADS depression subscale, 'looking forward with enjoyment' and 'enjoy a good book [etc.]'. 'Feeling cheerful' and 'enjoyment of what used to be enjoyed' did not load as strongly for healthy controls. Since enjoyment is mentioned again, and in more complex terms, we considered it more appropriate to take cheerfulness as the second positive item for a depression subscale.

'Feeling slowed down' and 'loss of interest in appearance' loaded only moderately with the other depression items. Therefore, if more clearly aversive states of depression can be identified (also without the potentially somatic connotations of 'slowed down' in the absence of a qualifying reference to thinking or some other cognitive process), they would be better to include as affectively negative items in a depression-specific subscale.

Insert Table 3 about here

Discussion

The re-analysis presented here justifies testing of the validity of an 8-items version of the HADS, adding one anxiety item from the MOS SF-36-MH to a construct-validated selection of 7 of the 14 items in the original HADS.

This proposal uses a quadripartite categorisation, crossing negative and positive affect with anxiety and depression. It would also be appropriate for studies of physical well-being to separate out somatic and cognitive aspects of adverse states (Bowman *et al.*, 2004). This implies a six-factor structure but that further breakdown requires a greater variety of affective terms and larger numbers of respondents.

When measuring affect, it may be better to avoid physical connotations such as 'butterflies in the stomach' and to validate an instrument with four subscales of purely mental states of anxiety or depression. More distinctive somatic symptoms of depression,

such as a tendency to weep (Beck, 1970), could be substituted for 'feeling slowed down' for testing in future studies.

Some extra items could be obtained from the HADS by avoiding pairs of phrases in the same item: these may reflect different affective states and thus be invalid as a single question. Thus, for instance, 'frightened feeling' (which recurs with 'butterflies in my stomach') could be deleted from 'something awful is about to happen', to give 'I fear that something awful is about to happen' to go alongside 'worrying thoughts go through my mind' for negative cognitive anxiety (in comparison to the two purely somatic negative anxiety items suggested in Table 3). In a similar way, for the negative valence of cognitive depression, the item 'loss of enjoyment' might be used along with 'loss of interest in appearance' that is in the suggested 8-item scale. The latter item performed poorly, however, perhaps because it mentions what may be a positive 'interest in appearance.'

Positive states lacking in anxiety also need creating in addition to 'sitting at ease / feeling relaxed'. This could include constructs of safety and security as well as feeling in control (akin to self-efficacy). An alternative strategy would be to test items referring to a relaxed attitude in addition to the positively valenced depression item 'looking forward with enjoyment to things'.

In any case, experiences of worry, anxiety disorder, sadness and/or major depression should be investigated by eliciting people's own wordings for affective states and then asking informants to cross-categorise each others' verbal expressions with the wordings from the existing inventories of anxiety and of depression. A similar approach has been implemented for fatigue and discomfort (Bowman *et al.,* 2004).

We shall therefore be seeking to confirm the 4-factor theory via the wordings used by various groups in good and poor physical health. We also urge that mental health professionals validate high scores on such quadripartite scaling on patients with clear diagnoses of anxiety disorder or of major depression.

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Table 1. Descriptive statistics of the demographics and anxiety/depression scores for the patients with primary Sjögren's syndrome (PSS) and healthy controls.

		PSS	Healthy controls
Sample size		132	97
Mean age (SD)		59.0 (11.7)	57.0 (12.3)
Mean disease duration (SD)		5.4 (5.0)	-
HADS scores			
Anxiety	Mean (SD)	7.01 (4.31)	5.48 (3.91)
	Possible case (8-10)	16%	16%
	Probable case (11-21)	24%	13%
Depression	Mean (SD)	5.13 (3.24)	2.80 (2.83)
	Possible case (8-10)	12%	5%
	Probable case (11-21)	11%	4%

Table 2. Loadings of HADS items after varimax rotation of two factors in primary Sjögren's syndrome (PSS) and in healthy controls. Bold: loading ≥ 0.5.

Item	Subscale and valence	Item description	PSS		Healthy controls	
			Factor 1	Factor 2	Factor 1	Factor 2
HADS1	Anxiety -	Tense or 'wound up'	**0.65**	0.31	**0.51**	**0.53**
HADS3	Anxiety -	Frightened feeling*	**0.77**	0.19	-0.02	**0.81**
HADS5	Anxiety -	Worrying thoughts*	**0.74**	0.10	0.38	**0.69**
HADS7	Anxiety +	Sit at ease/feel relaxed	0.41	**0.61**	**0.55**	0.30
HADS9	Anxiety -	'Butterflies in the stomach'	**0.86**	0.10	0.17	**0.84**
HADS11	Anxiety -	Feel restless*	**0.55**	0.17	0.40	0.35
HADS13	Anxiety -	Sudden feelings of panic*	**0.81**	0.20	0.34	**0.77**
HADS2	Depression +	Still enjoy things	0.22	**0.61**	**0.68**	0.33
HADS4	Depression +	Can laugh*	0.15	**0.68**	**0.77**	0.16
HADS6	Depression +	Feel cheerful	0.22	**0.73**	**0.64**	0.38
HADS8	Depression -	Slowed down	0.19	0.46	**0.54**	0.44
HADS10	Depression -	Lost interest in appearance	0.09	0.43	0.36	0.35
HADS12	Depression +	Look forward with enjoyment	0.15	**0.78**	**0.83**	0.09
HADS14	Depression +	Enjoy a good book etc.	-0.01	**0.57**	**0.50**	0.03
		Variance explained (R^2)	*0.36*	*0.13*	*0.43*	*0.10*

* Items not included in the re-analysed combination of items from the HADS and SF-36 (Table 3).

Table 3. Varimax loadings on and variance explained by valance-balanced anxiety or depression factors in primary Sjögren's syndrome (PSS) and in health. Bold: loading ≥ 0.5.

Item	Subscale and valence	Item description	PSS		Healthy controls	
			Factor 1	Factor 2	Factor 1	Factor 2
HADS 7	Anxiety +	Sit at ease/feel relaxed	0.48	**0.50**	**0.51**	0.37
SF-36 9D	Anxiety +	Calm and peaceful	**0.68**	0.37	**0.69**	0.34
HADS 1	Anxiety -	Tense or 'wound up'	**0.74**	0.17	**0.81**	0.18
HADS 9	Anxiety -	Frightened feeling	**0.58**	0.21	**0.69**	0.25
HADS 2	Depression +	Still enjoy things*	0.23	**0.63**	**0.59**	0.48
HADS 6	Depression +	Cheerful	0.45	**0.59**	**0.56**	**0.50**
HADS 12	Depression +	Look forward to things	0.24	**0.79**	0.44	**0.64**
HADS 14	Depression +	Enjoy a good book etc.*	0.05	**0.55**	-0.09	**0.75**
HADS 8	Depression -	Slowed down	0.14	**0.56**	0.31	**0.61**
HADS 10	Depression -	Lost interest in appearance	-0.02	**0.55**	0.18	**0.61**
SF-36 9C	Depression -	Down in the dumps*	**0.73**	0.08	**0.78**	0.15
SF-36 9F	Depression -	Downhearted and low*	**0.76**	-0.02	**0.80**	-0.03
		Variance explained (R^2)	*0.36*	*0.12*	*0.44*	*0.11*

* Items not included in the eight items suggested for use in valence-balanced scales.