RESEARCH PAPER

Somatic symptom count scores do not identify patients with symptoms unexplained by disease: a prospective cohort study of neurology outpatients

Alan J Carson,[1,2] Jon Stone,[2] Christian Holm Hansen,[3] Rod Duncan,[4] Jonathon Cavanagh,[5] Keith Matthews,[6] G Murray,[7] Michael Sharpe[8]

For numbered affiliations see end of article.

Correspondence to
Dr Alan Carson, Royal Edinburgh Hospital, Tipperlin Road, Edinburgh EH10 5HF, UK; a.carson@ed.ac.uk

ABSTRACT

Objective Somatic symptoms unexplained by disease are common in all medical settings. The process of identifying such patients requires a clinical assessment often supported by clinical tests. Such assessments are time-consuming and expensive. Consequently the observation that such patients tend to report a greater number of symptom has led to the use of self-rated somatic symptom counts as a simpler and cheaper diagnostic aid and proxy measure for epidemiological surveys. However, despite their increasing popularity there is little evidence to support their validity.

Methods We tested the score on a commonly used self-rated symptom questionnaire- the Patient Health Questionnaire (PHQ 15) (plus enhanced iterations including an additional 10 items on specific neurological symptoms and an additional 5 items on mental state) for diagnostic sensitivity and specificity against a medical assessment (with 18 months follow-up) in a prospective cohort study of 3781 newly attending patients at neurology clinics in Scotland, UK.

Results We found 1144/3781 new outpatients had symptoms that were unexplained by disease. The patients with symptoms unexplained by disease reported higher symptoms count scores (PHQ 15: 5.6 (95% CI 5.4 to 5.8) vs 4.2 (4.1 to 4.4) p<0.0001). However, the PHQ15 performed little better than chance in its ability to identify patients with symptoms unexplained by disease. The findings with the enhanced scales were similar.

Conclusions Self-rated symptom count scores should not be used to identify patients with symptoms unexplained by disease.

INTRODUCTION

Patients who present with somatic symptoms unexplained by identifiable organic disease are commonly encountered in all medical settings. Despite the lack of a disease explanation these patients are frequently, disabled and distressed.[1] The symptoms are referred to by many names including functional symptoms/disorders, medically unexplained symptoms, somatisation and somatoform symptoms; in this paper we will use the term 'symptoms unexplained by disease (SUD)' as it maps most closely to the methodology used in our study.

Patients who have symptoms unexplained by disease often have multiple somatic symptoms. This multiplicity has been recommended as being a useful clue to making the diagnosis.[2] Hence it has been proposed that high scores on self-rating scales of somatic symptoms will identify patients likely to have symptoms unexplained by disease. A widely used example of such a scale is the Patient Health Questionnaire (PHQ 15)[3]; higher numbers of somatic symptoms on this scale have been consistently found to correlate with poorer outcomes, higher healthcare use and higher rates of depression and anxiety.[4]

The PHQ15 was initially introduced as diagnostic screening test for symptoms unexplained by disease.[5] Later it was suggested that it performed better as "a measure of somatic symptom severity rather than a diagnostic instrument".[6] However, despite this caution from its original authors it is still being widely used as a diagnostic screening test (see table 1).

It is therefore important to know if a high count on a self-rated somatic symptom scale is valid as an indicator of symptoms unexplained by disease. If it is, this would simplify clinical practice and epidemiological research because self-rated scales are quick, cheap and easy to use and avoid the need for a specialist medical assessment. However if it isn't, the use of such scales may lead to misdiagnosis as well as to misleading prevalence data. A review of the published literature indicates that we have little data to determine the validity of a self-rated somatic symptom scale when compared with the gold standard of a specialist medical examination.[8 27 34]

We therefore set out to test the diagnostic accuracy of several self-rated symptom scales using the data set derived from The Scottish Neurological Symptoms Study (SNSS).[1] This was a prospective cohort study of 3781 newly attending patients to neurology clinics. All patients were medically assessed and had an 18 month follow-up to ensure diagnostic accuracy.[45] A third (1144/3781) of these patients were judged to have symptoms that were either 'not at all' or only 'somewhat' explained by disease.

The aims of this paper are to: (A) describe the relative prevalence of different somatic symptoms in the sample; (B) test the hypothesis that neurology patients who in the opinion of the assessing physician had symptoms unexplained by disease reported a greater number of symptoms than patients whose symptoms were regarded as 'explained by disease'; (C) to assess the validity of the total symptom count score on self-rated scales as a method of discriminating between these groups.

Table 1 Studies using PHQ-15 symptoms count*

Purpose of study	Number of studies	Study (listed by reference)	Total number of patients studied
Screening	4	5 7–9	2422
Diagnostic	18	10–27	43 360
Quasi-diagnostic†	7	6 28–33	17 016
Severity	12	16 34–44	17 037

*Based on systematic review of the MEDLINE database between 1 January 1999 and 31 January 2014 using the search terms 'PRIME MD', 'Patient Health Questionnaire' and 'PHQ-15'.
†Quasi-diagnostic refers to use of PHQ 15 to denote a group of patients for study as patients who have 'high symptom counts'.
PHQ, Patient Health Questionnaire.

METHODS

The SNSS study was a prospective, multicentre study of a representative cohort of consecutive neurology outpatients. Ethical approval for the study was granted by a Multi-centre Research Ethics Committee.

Participating clinics

The majority of neurological services in Scotland are provided by a publically funded National Health Service. Thirty-six of the 38 consultant neurologists working in Scotland participated. Patients were recruited from their general neurology clinics (including their supervised trainee clinics) in the main Scottish neurological centers—Aberdeen, Dundee, Edinburgh and Glasgow and some of their associated peripheral clinics in Airdrie, East Kilbride, Falkirk, Inverness, Perth, Stirling, Vale of Leven and Wishaw—in the period December 2002 to February 2004. The clinics sampled took mainly general practice referrals with patients allocated by medical records staff according to availability of appointment. Tertiary clinics, where patients required a specific diagnosis to attend (such as acute neurovascular and multiple sclerosis clinics) were excluded as were 'urgent case' emergency clinics.

Patients

All newly referred patients at the participating neurology outpatient clinics were potentially eligible for inclusion. The exclusion criteria were: age less than 16 years, cognitive or physical impairment of a degree that precluded informed consent, inability to read English, or if the neurologist identified the patient as unsuitable for the study (eg, too distressed, terminally ill). New patients included patients with existing neurological diagnoses who had been referred again from primary care. After complete description of the study to the subjects, written informed consent was obtained.

Procedure

Patients were sent information about the study prior to their appointment with the neurologist. After the consultation they were invited by their neurologist to speak to a research assistant. Consent was obtained from patients willing to participate.

Measures

Physician reported

The neurologists were asked in each case to address the question: 'To what extent do you think this patient's clinical symptoms are explained by organic disease?' Responses were made on a 4-point Likert-type scale: 'not at all', 'somewhat', 'largely' or 'completely'.[46] Operational criteria were provided to guide the neurologists' ratings.[45]

Patient reported

A questionnaire was administered immediately after the initial consultation and collected data on demographics and symptoms. Symptoms were measured using the PHQ-15 checklist of the 15 most common physical symptoms[47] that patients present to primary care (excluding upper respiratory tract infections) and with the sexual and menstrual items removed to leave 13 items. We used the original dichotomous version, which asked patients if they had 'been bothered a lot' by each of the symptoms over the last month. The scale items referred to stomach pain; back pain; pain in your arms, legs or joints; headaches; chest pain; dizziness; fainting spells; feeling your heart pound or race; shortness of breath; constipation, loose bowels or diarrhoea; nausea, gas or indigestion; feeling tired or having low energy; trouble sleeping. The choice of the original version was pragmatic as we already had pilot data on its performance[46] which predated the release of the updated version in 2002.

In order to see if the inclusion of additional neurological symptoms made a difference we made a second list based on the 10 most common 'neurological' symptoms.[48] These are paralysis or weakness; double or blurred vision; difficulty swallowing or lump in throat; difficulty speaking or slurred speech; loss of sensation, numbness or tingling; problems with your memory or concentration; partial or total loss of vision; partial or total loss of hearing; lack of co-ordination or balance; seizure or fit.

Finally, we created a third list of psychological symptoms taken from the Prime MD Questionnaire[47] to see if adding psychological symptoms to the scale improved its accuracy. The scale items were: worrying about a lot of different things; 'nerves' or feeling anxious or on edge; feeling down, depressed or hopeless; little interest or pleasure in doing things; an anxiety attack (suddenly feeling fear or panic).

Analysis

In order to maximise the numbers of patients in each category for analysis we dichotomised the neurologists' ratings of symptoms into 'unexplained' ('not at all' or only 'somewhat' explained by disease) and 'explained' ('largely' and 'completely' explained by disease).

We then compared these groups on: (A) frequency of each individual symptom and (B) three different symptom count measures using (1) the standard PHQ 15 somatic symptoms, (2) the PHQ 15 somatic symptoms plus the additional neurological symptoms, (3) the PHQ 15 somatic symptoms plus the additional neurological plus the psychological symptoms.

Then, in order to determine the ability of symptom counts to discriminate between patients with 'unexplained symptoms' and 'explained symptoms' we plotted receiver operating characteristic (ROC) curves for each.

Finally, in order to see if the amalgamation of the neurologists' ratings into two categories had blurred differences between the individual categories, we repeated the analysis using all four neurologist ratings.

RESULTS

Recruitment and follow-up

Patient recruitment took place between December 2002 and February 2004 and is described in figure 1. Of the patients, 3781 participated in the study representing 91% (3781/4161) of those available for recruitment. Neurologists rated 1144 of these patients (30% of the total) as having symptoms 'not at all'

Figure 1 Flow chart of patient recruitment into study.
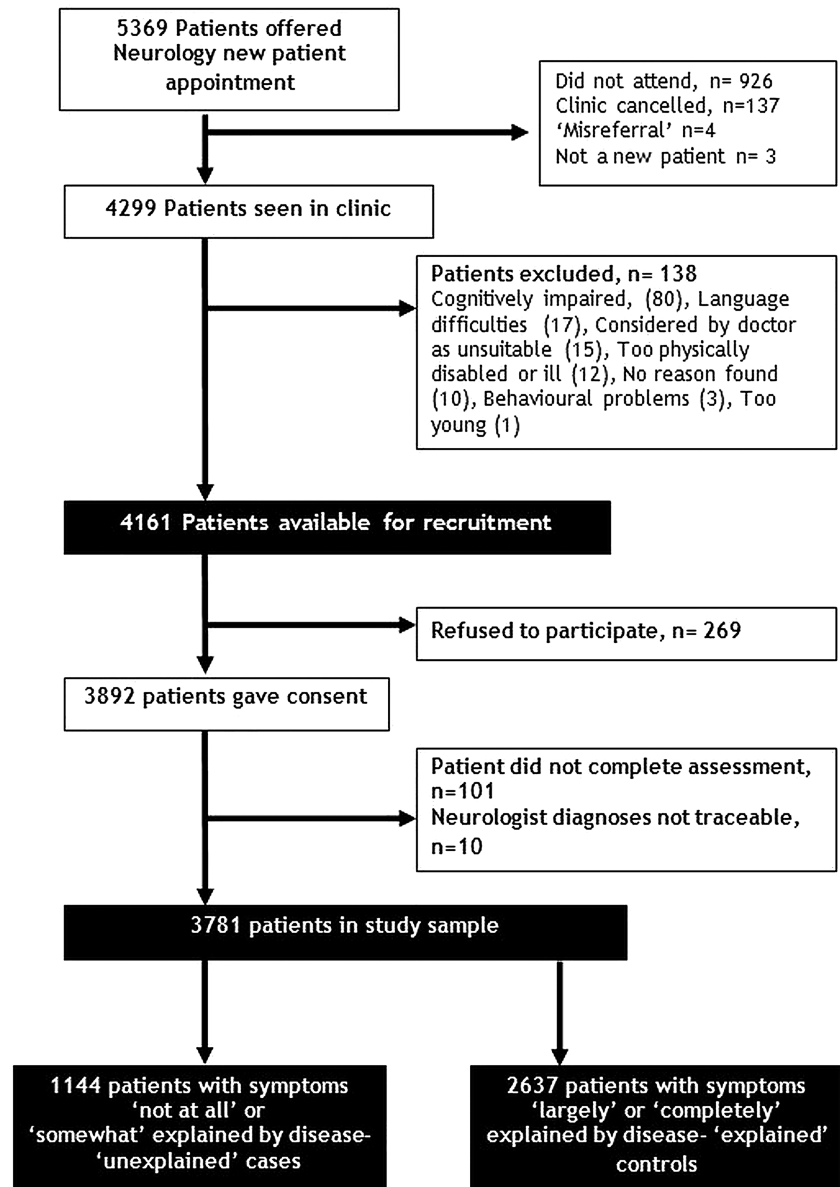
(446/3781; 12%) or 'somewhat' (698/3781; 18%) explained by disease.

The frequency of individual symptoms is described in figure 2. Fatigue, headache, 'pain in arms legs and joints' and 'loss of sensation numbness or tingling' were the most common. Patients with symptoms unexplained by disease had more symptoms of all types except 'seizures or fits'.

The total symptom count was greater for patients with symptoms unexplained by disease regardless of which combination of symptoms was included in the count (table 2). However, there was substantial overlap in the IQRs (figure 3). This suggests that while the total symptom count was greater in patients with unexplained symptoms, symptom count does not discriminate well between the groups. This poor discrimination was confirmed when we plotted ROC curves. These indicated sensitivities and specificities only just above chance, irrespective of which symptoms were counted or where 'cut-offs' were set (figure 4).

The analysis was repeated using the four categories of how explained the symptoms were by disease. Although this approach does not allow ROC curves to be plotted, it can be

clearly seen from the box plots in figure 5 that there were not substantive differences between the subcategories of 'unexplained symptoms' and 'explained symptoms'

DISCUSSION

In this large, prospectively recruited sample of new patients attending neurology clinics we found that 'fatigue', 'headache', 'pain in arms, legs or joints' and 'loss of sensation, numbness and tingling' were the most common self-reported symptoms.

As hypothesised, patients whose symptoms were regarded by the assessing neurologists as being unexplained by disease reported more symptoms on average, than patients whose symptoms were considered to be explained by disease. This relationship was similar for all the different types of symptoms included in the symptom counts and was highly statistically significant.

However, when we examined the diagnostic value of these symptoms counts in identifying patients who had been rated by neurologists as having symptoms unexplained by disease we found that their sensitivities and specificities were poor, in fact little better than chance. That is, the use of symptom counts did not allow us to separate patients with symptoms unexplained by
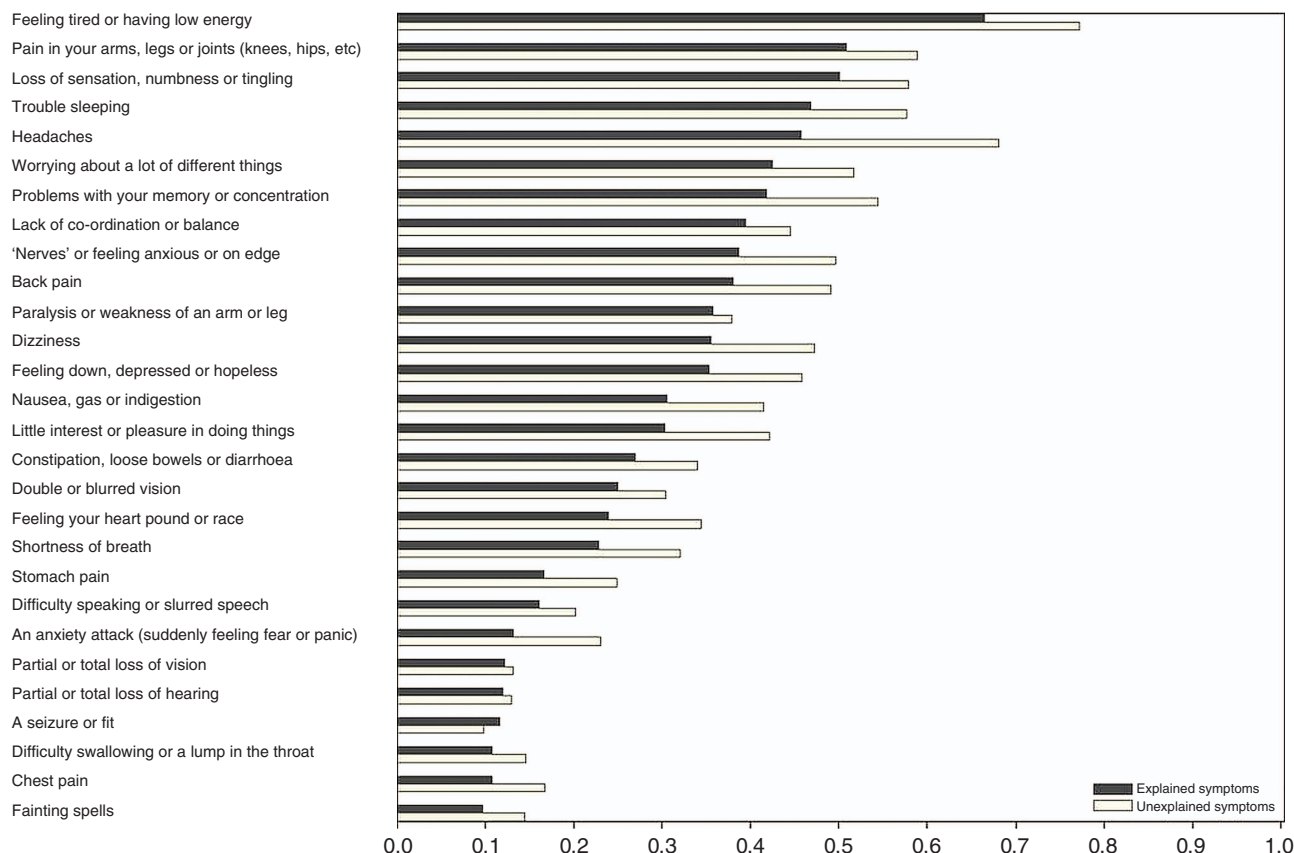
Figure 2 Symptom prevalence in cases with symptoms 'unexplained by organic disease' and controls with symptoms 'explained by organic disease'.

disease from those whose symptoms were explained by disease. Notably these findings were robust to reanalysis using different combinations of symptoms and using the more fine-grained rating of how explained the symptoms were by disease.

Our study has the strength of being of a large and representative sample of neurology patients who had received a full specialist diagnostic assessment as well as symptom assessment using the study measures. Importantly, we have been able to follow this cohort over time and have confidence in the neurologists' rating of 'unexplained by disease' as this diagnosis has a very low rate of subsequent diagnostic revision.[45] However, our study also has limitations. Although almost all Scottish neurologists participated in the study, not all their clinics were sampled and specialised clinics such as neurovascular and memory clinics were not included; consequently patients with these disorders may be under-represented. Similarly we cannot be certain that

Scottish neurological practice is similar to neurological practice round the world, although the prevalence rates of the common neurological disorders in patients attending the clinics sampled were similar to those reported in North America and Europe.[49] Our study was in secondary care, which could have altered the performance of the measure (developed for primary care). It may also be that patients attending neurology clinics pose particular difficulties diagnostically, potentially limiting the generalisation of our results to other clinical populations. Ideally our results should be replicated in other non-neurological populations.

A small number of previous studies have measured the utility of the PHQ 15 against a medical examination diagnosis of symptoms unexplained by disease; often operationalised as DSM-IV somatoform disorders. In a study of 10 507 patients in primary care,[34] of whom 19% were clinically 'somatisers' the

Table 2 Comparison of mean symptom counts (using different measures) between 'unexplained' cases and 'explained' controls

| | Maximum symptom count score | Number of patients | | Mean symptoms count (95% CI) | | | |
		Unexplained*	Explained†	Unexplained*	Explained†	t Statistic	p Value
PHQ-15‡	13	1136	2627	5.6 (5.4 to 5.8)	4.2 (4.1 to 4.4)	12.5	<0.0001
PHQ-15+10 neurological symptoms	23	1125	2613	8.5 (8.3 to 8.8)	6.8 (6.6 to 6.9)	10.9	<0.0001
PHQ-15+10 neurological symptoms+5 PRIME MD symptoms	28	1124	2610	10.7 (10.3 to 11.0)	8.4 (8.2 to 8.6)	11.4	<0.0001

*Unexplained=Not at all explained/Somewhat explained by disease.
†Explained=Largely explained/Completely explained by disease.‡PHQ-15=the maximum score is 13 as the 2 items on sexual problems and menstrual difficulties were removed.
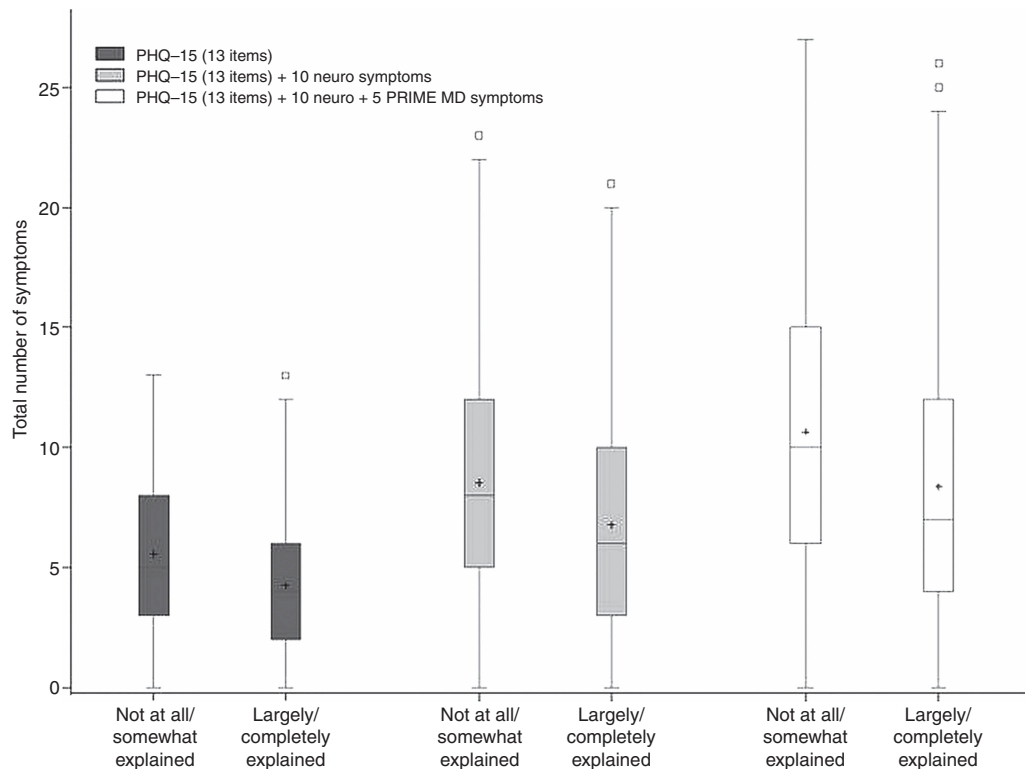PHQ, Patient Health Questionnaire.

Figure 3 Box plots of the total number of symptoms presented separately for patients with symptoms unexplained and explained by disease. The box plots are repeated for each of the three different versions of the symptoms questionnaire. (Bars show IQRs). PHQ, Patient Health Questionnaire.

PHQ 15 supplemented by data from the Whiteley-7 hypochondriasis score had sensitivity of only 33% and a specificity of 82%; the accuracy of primary care diagnosis, which was the comparator standard, is unknown. We previously examined accuracy of primary care diagnoses in relation to neurological symptoms unexplained by disease and found that they correlated very poorly with specialist opinion.[46] However, one cannot simply assume that specialist opinion is more likely to be accurate. Perhaps more importantly there is a lot of anecdotal

evidence suggesting a so-called 'neurophobia' among many doctors—that is, they feel a lack of confidence in neurological diagnosis. It may well be that data from neurology paint an unduly negative picture and primary care practitioners perform better in other fields such as orthopaedics, cardiology or respiratory medicine.

A study of 906 Dutch primary care patients[27] reported a sensitivity of 78% for the PHQ (at a cut-off of three or more severe symptoms) against a SCID-1 diagnosis of a somatoform disorder. The observed positive predictive value of 20% is not clinically useful, although some would argue that a negative predictive value of 3% does have utility as a screening test. However, in this study the SCID-1 only diagnosed a somatoform disorder in 32% of patients who had a clinical diagnosis of 'unexplained somatic complaints' made by their family physician. The SCID user's guide, with reference to somatoform diagnoses, cautions against making diagnostic judgements using the SCID. The advice given is "Needless to say this judgement can be difficult (or impossible) to make during an interview and usually requires contact with the subject's general medical provider or a review of the subject's medical records".

More recently Korber and colleagues commented enthusiastically on a sensitivity of 80% and specificity of 58% using the PHQ 15 in a German primary care cohort of 308 patients.[8] Finally in a recent systematic review of symptoms counts the PHQ15 was recommended for a variety of purposes including measuring a 'comparable construct' to somatisation.[50] In summary, despite enthusiastic endorsements, studies showing comparison against the gold standard of specialist medical assessment with follow-up were notably lacking.

Our own data, in which patients had the benefit of a prospectively conducted specialist assessment, suggested a much poorer performance of somatic symptom counts. While somatic symptom counts can identify patients who are high users of
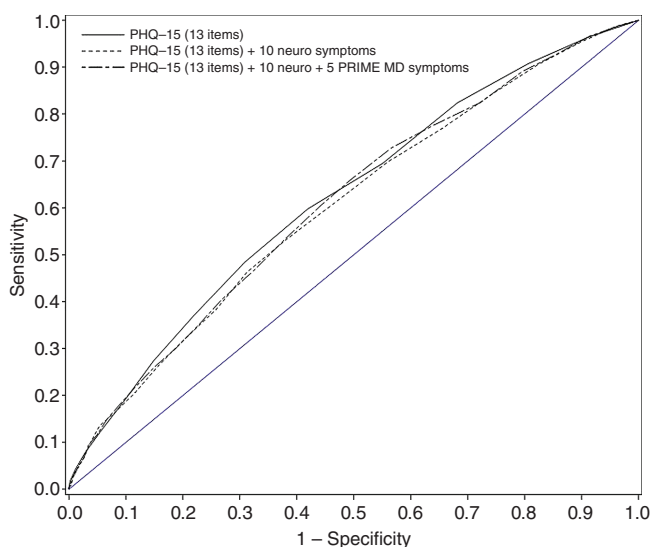

Figure 4 ROC curves showing the diagnostic qualities of the total symptom count for identifying symptoms unexplained by organic disease. The ROC curves are shown for each of the three versions of the symptoms questionnaire. PHQ, Patient Health Questionnaire.

Figure 5 Box plots of the total number of symptoms presented separately for each of the four organicity groups and repeated for each of the three different versions of the symptoms questionnaire. PHQ, Patient Health Questionnaire.
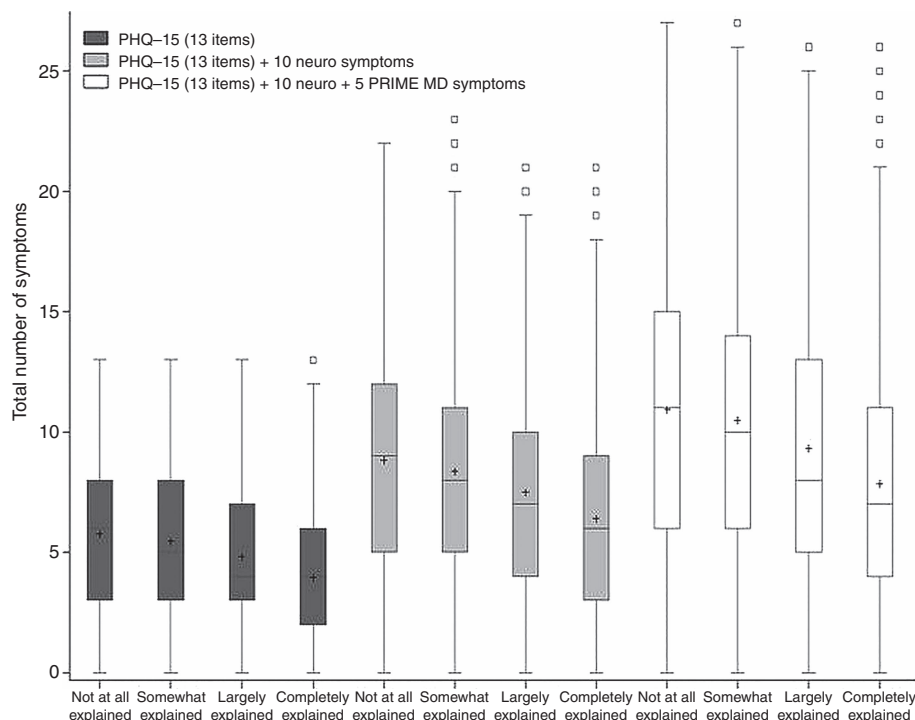
medical services,[10 28] function as a measure of severity in patients with a diagnosis of somatisation disorder[19] and potentially allow for targeted symptom management programmes[40 51 52] we have found that a self-rated symptom count scores, such as the PHQ 15, did not have diagnostic utility in identifying patients with symptoms unexplained by disease.

The recently published DSM-5 has changed the somatoform category. A new diagnosis of somatic symptom disorder (SSD) has been introduced, which is designed to make the concept of symptoms unexplained by disease less central to the diagnosis. It does this by defining the disorder on the basis of an excessive reaction to symptoms, whether explained by disease or not. DSM-5 has not eradicated the importance of identifying symptoms unexplained by disease however. First, the diagnosis of SSD still requires a judgement about whether the patient's concern about their symptoms is 'disproportionate to their seriousness'. Second, in such cases the degree to which the symptoms are explained by disease is important in guiding medical treatment; for example, while patients with inflammatory bowel disease and irritable bowel disease may merit a diagnosis of SSD, one may benefit from immunosuppressant therapy and possibly surgical intervention whereas the other would not. It remains the case that the distinction of whether or not there is pathophysiological disease is the core purpose of medical assessment and we would suggest the one of central importance to patients. Third, and especially important to neurological symptoms, are the modifications in DSM-5 to conversion (functional) disorder; which emphasise that this is a positive diagnosis that should be made on the basis of physical signs on examination that are inconsistent or incongruent with neurological disease, and not simply because tests are normal. SNSS data as a whole could be viewed as supporting this change in definition as our original report on diagnostic accuracy[45] showed a very low level of revision when diagnoses were made on such lines whereas this report suggests attempts to define a psychopathological measure of 'somatisation' using symptom counts are not successful.

In conclusion, our findings confirm the common clinical impression that patients with symptoms unexplained by disease have more symptoms. However, on an individual level, self-rated symptom counts perform poorly as a diagnostic test, and should not be used to identify patients with symptoms unexplained by disease (or 'medically unexplained symptoms'). Accurate diagnosis based on a thorough clinical assessment remains the cornerstone of good medical practice. Clinical judgments and epidemiological surveys that use symptom counts as an indicator of 'medically unexplained symptoms' should be interpreted with caution.

Author affiliations
[1]Department of Psychiatry, University of Edinburgh, Edinburgh, UK
[2]Department of Clinical Neurosciences, University of Edinburgh, Edinburgh, UK
[3]Department of Medical Statistics, University of Edinburgh, Edinburgh, UK
[4]Department of Neurology, University of Otago, Christchurch, New Zealand
[5]Department of IHW, University of Glasgow, Glasgow, UK
[6]Division of Neuroscience, University of Dundee, Dundee, UK
[7]Department of Public Health Sciences, University of Edinburgh Medical School, Edinburgh, UK
[8]Department of Psychiatry, University of Oxford, Oxford, UK

REFERENCES
1 Carson A, Stone J, Hibberd C, *et al*. Disability, distress and unemployment in neurology outpatients with symptoms 'unexplained by disease'. *J Neurol Neurosurg Psychiatry* 2010;82:810–13.
2 Stone J, Carson A, Sharpe M. Functional symptoms and signs in neurology: assessment and diagnosis. *J Neurol Neurosurg Psychiatry* 2005;76(Suppl):1i2–12.
3 Kroenke K. Studying symptoms: sampling and measurement issues. *Ann Intern Med* 2001;134(9 Pt 2):844–53.
4 Kroenke K, Spitzer RL, Williams JB, *et al*. The patient health questionnaire somatic, anxiety, and depressive symptom scales: a systematic review. *Gen Hosp Psychiatry* 2010;32:345–59.

5 Kroenke K, Spitzer RL, deGruy FV III, *et al*. A symptom checklist to screen for somatoform disorders in primary care. *Psychosomatics* 1998;39:263–72.

6 Kroenke K, Spitzer RL, Williams JB. The PHQ-15: validity of a new measure for evaluating the severity of somatic symptoms. *Psychosom Med* 2002;64:258–66.

7 de Vroege L, Hoedeman R, Nuyen J, *et al*. Validation of the PHQ-15 for somatoform disorder in the occupational health care setting. *J Occup Rehabil* 2012;22:51–8.

8 Korber S, Frieser D, Steinbrecher N, *et al*. Classification characteristics of the Patient Health Questionnaire-15 for screening somatoform disorders in a primary care setting. *J Psychosom Res* 2011;71:142–7.

9 Steinbrecher N, Hiller W. Course and prediction of somatoform disorder and medically unexplained symptoms in primary care. *Gen Hosp Psychiatry* 2011;33:318–26.

10 Barsky AJ, Orav EJ, Bates DW. Distinctive patterns of medical care utilization in patients who somatize. *Med Care* 2006;44:803–11.

11 Burton C, Weller D, Marsden W, *et al*. A primary care Symptoms Clinic for patients with medically unexplained symptoms: pilot randomised trial. *BMJ Open* 2012;2: e000513.

12 Escobar JI, Gara MA, az-Martinez AM, *et al*. Effectiveness of a time-limited cognitive behavior therapy type intervention among primary care patients with medically unexplained symptoms. *Ann Fam Med* 2007;5:328–35.

13 Grover S, Kumar V, Chakrabarti S, *et al*. Prevalence and type of functional somatic complaints in patients with first-episode depression. *East Asian Arch Psychiatry* 2012;22:146–53.

14 Haftgoli N, Favrat B, Verdon F, *et al*. Patients presenting with somatic complaints in general practice: depression, anxiety and somatoform disorders are frequent and associated with psychosocial stressors. *BMC Fam Pract* 2010;11:67.

15 Hahn SR. Physical symptoms and physician-experienced difficulty in the physician-patient relationship. *Ann Intern Med* 2001;134(9 Pt 2):897–904.

16 Han C, Pae CU, Patkar AA, *et al*. Psychometric properties of the Patient Health Questionnaire-15 (PHQ-15) for measuring the somatic symptoms of psychiatric outpatients. *Psychosomatics* 2009;50:580–5.

17 Harris AM, Orav EJ, Bates DW, *et al*. Somatization increases disability independent of comorbidity 19. *J Gen Intern Med* 2009;24:155–61.

18 Hoedeman R, Krol B, Blankenstein N, *et al*. Severe MUPS in a sick-listed population: a cross-sectional study on prevalence, recognition, psychiatric co-morbidity and impairment. *BMC Public Health* 2009;9:440.

19 Interian A, Allen LA, Gara MA, *et al*. Somatic complaints in primary care: further examining the validity of the Patient Health Questionnaire (PHQ-15). *Psychosomatics* 2006;47:392–8.

20 Kang HK, Li B, Mahan CM, *et al*. Health of US veterans of 1991 Gulf War: a follow-up survey in 10 years. *J Occup Environ Med* 2009;51:401–10.

21 Kocalevent R-D, Hinz A, Brähler E. Standardization of a screening instrument (PHQ-15) for somatization syndromes in the general population. *BMC Psych* 2013;13:91.

22 Köteles F, Szemerszky R, Freyler A, *et al*. Somatosensory amplification as a possible source of subjective symptoms behind modern health worries. *Scand J Psychol* 2011;52:174–8.

23 Kroenke K, Spitzer RL, deGruy FV III, *et al*. Multisomatoform disorder. An alternative to undifferentiated somatoform disorder for the somatizing patient in primary care [see comments]. *Arch Gen Psychiatry* 1997;54:352–8.

24 Mewes R, Rief W, Brahler E, *et al*. Lower decision threshold for doctor visits as a predictor of health care use in somatoform disorders and in the general population. *Gen Hosp Psychiatry* 2008;30:349–55.

25 Nordin S, Palmquist E, Nordin M. Psychometric evaluation and normative data for a Swedish version of the patient health questionnaire 15-item somatic symptom severity scale. *Scand J Psychol* 2013;54:112–17.

26 Rost KM, Dickinson WP, Dickinson LM, *et al*. Multisomatoform disorder: agreement between patient and physician report of criterion symptom explanation. *CNS Spectr* 2006;11:383–8.

27 van Ravesteijn H, Wittkampf K, Lucassen P, *et al*. Detecting somatoform disorders in primary care with the PHQ-15. *Ann Fam Med* 2009;7:232–8.

28 Barsky AJ, Orav EJ, Bates DW. Somatization increases medical utilization and costs independent of psychiatric and medical comorbidity. *Arch Gen Psychiatry* 2005;62:903–10.

29 Bener A, Dafeeah EE, Chaturvedi SK, *et al*. Somatic symptoms in primary care and psychological comorbidities in Qatar: neglected burden of disease. *Int Rev Psychiatry* 2013;25:100–6.

30 Lee S, Ma YL, Tsang A. Psychometric properties of the Chinese 15-item patient health questionnaire in the general population of Hong Kong. *J Psychosom Res* 2011;71:69–73.

31 Lowe B, Grafe K, Kroenke K, *et al*. Predictors of psychiatric comorbidity in medical outpatients. *Psychosom Med* 2003;65:764–70.

32 Sha MC, Callahan CM, Counsell SR, *et al*. Physical symptoms as a predictor of health care use and mortality among older adults. *Am J Med* 2005;118:301–6.

33 Schaefert R, Höner C, Salm F, *et al*. Psychological and behavioral variables associated with the somatic symptom severity of general hospital outpatients in China. *Gen Hosp Psychiatry* 2013;35:297–303.

34 Clarke DM, Piterman L, Byrne CJ, *et al*. Somatic symptoms, hypochondriasis and psychological distress: a study of somatisation in Australian general practice. *Med J Aust* 2008;189:560–4.

35 Gerber MR, Wittenberg E, Ganz ML, *et al*. Intimate partner violence exposure and change in women's physical symptoms over time. *J Gen Intern Med* 2008;23:64–9.

36 Hoge CW, McGurk D, Thomas JL, *et al*. Mild traumatic brain injury in U.S. Soldiers returning from Iraq. *N Engl J Med* 2008;358:453–63.

37 Jackson JL, Kroenke K. The effect of unmet expectations among adults presenting with physical symptoms. *Ann Intern Med* 2001;134(9 Pt 2):889–97.

38 Konnopka A, Kaufmann C, König HH, *et al*. Association of costs with somatic symptom severity in patients with medically unexplained symptoms. *J Psychosom Res* 2013;75:370–5.

39 Kroenke K, West SL, Swindle R, *et al*. Similar effectiveness of paroxetine, fluoxetine, and sertraline in primary care: a randomized trial 161. *JAMA* 2001;286:2947–55.

40 Kroenke K, Messina N III, Benattia I, *et al*. Venlafaxine extended release in the short-term treatment of depressed and anxious primary care patients with multisomatoform disorder. *J Clin Psychiatry* 2006;67:72–80.

41 Reuber M, Burness C, Howlett S, *et al*. Tailored psychotherapy for patients with functional neurological symptoms: a pilot study. *J Psychosom Res* 2007;63:625–32.

42 Schaefert R, Kaufmann C, Wild B, *et al*. Specific collaborative group intervention for patients with medically unexplained symptoms in general practice: a cluster randomized controlled trial. *Psychother Psychosom* 2013;82:106–19.

43 Schmid G, Dinkel A, Henningsen P, *et al*. Assessment of psychological aspects of somatoform disorders: a study on the German version of the Health Attitude Survey (HAS). *Compr Psychiatry*. 2014;55:155–64.

44 Spiller RC, Humes DJ, Campbell E, *et al*. The Patient Health Questionnaire 12 Somatic Symptom scale as a predictor of symptom severity and consulting behaviour in patients with irritable bowel syndrome and symptomatic diverticular disease. *Aliment Pharmacol Ther* 2010;32:811–20.

45 Stone J, Carson A, Duncan R, *et al*. Symptoms 'unexplained by organic disease' in 1144 new neurology out-patients: how often does the diagnosis change at follow-up? *Brain* 2009;132:2878–88.

46 Carson AJ, Ringbauer B, Stone J, *et al*. Do medically unexplained symptoms matter? A prospective cohort study of 300 new referrals to neurology outpatient clinics. *J Neurol Neurosurg Psychiatry* 2000;68:207–10.

47 Spitzer RL, Williams JB, Kroenke K, *et al*. Utility of a new procedure for diagnosing mental disorders in primary care. The PRIME-MD 1000 study. *JAMA* 1994;272:1749–56.

48 Lempert T, Dieterich M, Huppert D, *et al*. Psychogenic disorders in neurology: frequency and clinical spectrum. *Acta Neurol Scand* 1990;82:335–40.

49 Stone J, Carson A, Duncan R, *et al*. Who is referred to neurology clinics? The diagnoses made in 3781 new patients. *Clin Neurol Neurosurg* 2010;112:747–51.

50 Zijlema WL, Stolk RP, Löwe B, *et al*. How to assess common somatic symptoms in large-scale studies: a systematic review of questionnaires. *J Psychosom Res* 2013;74:459–68.

51 Katon W, Lin EH, Kroenke K. The association of depression and anxiety with medical symptom burden in patients with chronic medical illness. *Gen Hosp Psychiatry* 2007;29:147–55.

52 Smith RC, Lein C, Collins C, *et al*. Treating patients with medically unexplained symptoms in primary care. *J Gen Intern Med* 2003;18:478–89.