Ascertaining the size of the symptom iceberg in a UK-wide community-based survey

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ABSTRACT

Background
The symptom iceberg describes the phenomenon that most symptoms are managed in the community without people seeking professional health care. The size of the iceberg for many symptoms is unknown, as is their association with personal characteristics, including history of a chronic disease.

Aim
To ascertain the size of the symptom iceberg in the UK.

Design of study
A UK-wide community-based postal survey.

Setting
Urban and rural communities across the UK.

Method
A postal survey was sent to an age- and sex-stratified random sample of 2474 adults, aged 18–60 years, drawn from 20 practices around the UK. Questions were aimed at investigating adults' experiences of 25 different symptoms in the previous 2 weeks.

Results
The number of symptoms experienced by one individual in the previous 2 weeks ranged from 0 to 22 (mean 3.66). Of the symptoms examined, the three most common were: feeling tired/run down; headaches; and joint pain. Univariate analysis found symptom prevalence to be significantly associated with a wide range of participant characteristics. However, after adjustment, many of these associations no longer remained significant for a number of the symptoms. Presence of a chronic condition, age, and employment status were the three factors most commonly associated with the 2-week prevalence of symptoms. Reported symptom characteristics (severity, duration, interference, and time off work) varied little by sex or age.

Conclusion
Symptoms in the UK community are common. Symptom prevalence was associated with a number of participant characteristics, although the extent of this association was less than has been reported in previous research. This study provides an important current baseline prevalence of 25 symptoms in the community for those who do, and do not, have a chronic condition.

Keywords
community-based; epidemiology; prevalence; signs and symptoms; symptom iceberg.

INTRODUCTION

The symptom iceberg describes the phenomenon that most symptoms are managed in the community without people seeking professional health care.[1,2] The visible part of the iceberg for a particular symptom represents the proportion that is presented to healthcare services; the submerged part is the proportion that is not. Research into the frequency of different symptoms (that is, the overall size of respective icebergs) and their relationship to individual characteristics, including presence of chronic conditions, informs the development of efficient symptom-based predictive models for serious disease, such as cancer referral guidelines.

A community perspective is important when researching the epidemiology of symptoms. Research based on symptoms presented to healthcare settings provides an incomplete and potentially misleading picture. So far, there have been few population-based studies of a range of different symptoms experienced in the community and most of the previous studies have been based in the US,[3–5] Canada,[6] or Scandinavia.[7,8] Studies based in the UK that looked at a range of symptoms were conducted some time ago,[9–11] limited to one geographical area,[12] or examined symptoms associated with particular clinical conditions.[13,14]

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Although national community-based surveys are undertaken by the UK government on a regular basis, these tend to focus on general health or a limited number of symptoms related to specific conditions.[15–17] As a result, we do not have a current picture of the symptom iceberg in the UK. Such information would provide an important baseline prevalence of symptoms in the community.

This article describes patterns of symptoms in a large nationwide community-based survey of adults, including those who do, and do not, have a current chronic condition.

METHOD

Subjects and sampling

A UK-wide population-based postal survey of adults aged 18–60 years was undertaken between May 2007 and January 2008. The survey focused on those of a working age as members of older age groups are likely to have different patterns of symptoms and higher levels of comorbidity.

Following confirmation of ethical approval, an age- and sex-stratified random sample of 8000 adults was drawn from 20 general medical practices across the UK; 400 from each practice (200 men and 200 women each evenly split into four age groups: 18–30 years, 31–40 years, 41–50 years, and 51–60 years). GPs were asked to screen the sample and exclude anyone for whom they felt the questionnaire would be insensitive or inappropriate (for example, those with a terminal illness or severe mental impairment).

Convenience sampling was used to recruit practices from the nationally representative Medical Research Council's General Practice Research Framework. Practices varied in terms of their list size, area type (rural/urban), geographical location, and level of deprivation (Table 1). Identification and recruitment of potential participants was carried out by research nurses at each practice, with questionnaires and covering letters (signed by the local GP) sent out on the authors' behalf. A reminder letter and replacement questionnaire was sent to non-responders after 3 weeks.

Questionnaire

Twenty-five physical and psychological symptoms were included in the questionnaire. The symptoms, identified from previous literature and pilot work, ranged from those usually indicative of minor or self-limiting illness through to those that could be indicative of potentially serious conditions. Individuals were asked if they had experienced any of the symptoms during the previous 14 days. This time period was considered long enough to enable many of the symptoms to have lasted their full course, but short enough to ensure good recall of symptom

How this fits in

Symptoms are common but, to date, there have been very few population-based studies in the UK that have examined the prevalence of a range of different symptoms, and none that have been UK wide. Such information would provide a baseline prevalence of symptoms in the community and help to inform the development of efficient symptom-based models for serious disease. This is the first UK-wide, population-based study looking at the prevalence and patterns, in the community, of 25 physical and psychological symptoms in people who do, and do not, have a chronic condition. It provides an important current baseline prevalence of symptoms in the community for comparison.

occurrence. For all symptoms experienced in the previous 2 weeks, responders indicated the severity of the symptom at its worst, how long it had lasted, how much it interfered with daily life, and how much time (if any) was taken off work as a result.

Comprehensive data on responders' characteristics were also collected to allow investigation of symptoms by a broad range of demographic and socioeconomic factors. To enable comparison between those with an existing illness and an otherwise 'healthy' population, responders were asked to indicate if they had an existing chronic condition.

Analysis

All reported P-values were from two-sided tests. To minimise the chances of a type 1 error from multiple testing, a conservative P-value of <0.01 was used to denote statistical significance and 99% confidence intervals (CIs) are quoted throughout.

Basic descriptive analyses were used to calculate the mean number and standard deviation (SD) of symptoms experienced in the previous 2 weeks, with independent t-tests and analysis of variance used to investigate associations between participant characteristics and mean number of symptoms.

Estimates of the prevalence of individual symptoms were calculated for all participants combined, and those with (that is, those who reported at least one current chronic condition) and without chronic disease separately. Binary logistic regression was used to calculate unadjusted and adjusted odds ratios (ORs) together with their 99% CIs and P-values. Adjustments were made for sex, age, marital status, level of social support, level of education, housing tenure, employment status, household income, ethnicity, smoking status, and the presence of a chronic condition. Number of children was included in the univariate, but not multivariate analyses, as it was highly correlated with age and marital status.

Basic descriptive analyses were used to report the characteristics of individual symptoms. For ease of

Table 1. GP practice data and response rates.

Practice	List size	Area type[a]	Geographical location	Carstairs deprivation scores[b]	Corrected response rate, *n* (%)
A	15 441	Cities	Devon	3	112 (30.9)
B	10 300	Remote rural	Suffolk	3	144 (37.9)
C	12 000	Accessible small towns	Tayside	3	152 (40.3)
D	10 000	Mixed urban rural	Somerset	2	155 (41.0)
E	12 500	Remote rural	Somerset	4	125 (34.1)
F	12 700	Mixed urban rural	Worcestershire	3	118 (30.7)
G	13 500	Outer London	Kent	3	124 (33.9)
H	10 000	Industrial	County Durham	5	66 (17.2)
I	19 158	Cities	Worcestershire	4	121 (32.6)
J	13 545	Industrial	Northamptonshire	4	101 (27.1)
K	7492	Mixed urban rural	Wiltshire	2	124 (33.4)
L	11 400	Remote rural	Pembrokeshire	5	123 (33.2)
M	4870	Cities	Nottinghamshire	4	128 (34.3)
N	6640	Cities	North Yorkshire	4	104 (30.1)
O	5805	Cities	North Yorkshire	1	171 (44.5)
P	5850	With new towns	Cambridgshire	1	148 (41.1)
Q	7926	Cities	Dorset	3	115 (29.9)
R	2318	Other metropolitan district	Greater Manchester	2	103 (25.8)
S	9210	Mixed urban rural	Hampshire	1	134 (34.8)
T	10 484	Industrial	County Durham	5	106 (30.4)

[a]*Area type classification as provided by the Medical Research Council's General Practice Research Framework.* [b]*Carstairs deprivation scores (1 = least deprived, 5 = most deprived) are based on 2001 census data (using ward area for GP practice), available at http://cdu.census.ac.uk/related/deprivation.htm (accessed 3 May 2010).*

reporting, symptom characteristics (severity, duration, interference, and time off work) were dichotomised: 'not severe' and 'severe'; 'short duration' and 'long duration'; 'low interference' and 'high interference'; 'no time off work and 'time off work'.

RESULTS

After screening, a total of 7828 questionnaires were sent out on the authors' behalf. Of these, 341 were returned as undelivered and 25 were returned as being unable to complete. Of the remaining questionnaires, 3462 (46.4%) were returned, of which 2474 had complete data and were included in the analyses. This gave a corrected completed response rate of 33.2%. Response rate varied by practice, from 17.2% to 44.5% (Table 1). The characteristics of sample participants are presented in Table 2, along with data from UK population surveys, to allow for comparison.

A total of 9024 symptoms in the previous 2 weeks were reported by responders. Over three-quarters reported experiencing at least one symptom, with half reporting having had between one and five symptoms. The number of symptoms experienced by any one individual ranged from 0 to 22, with the

overall mean number being 3.66 (SD = 3.47) symptoms.

Table 3 shows the mean number of symptoms experienced in the previous 2 weeks by patient characteristic among the full sample, and those with and without a chronic condition. In the full sample, there were significant associations between the mean number of symptoms and sex, age group, marital status, level of social support, number of children, level of education, housing tenure, employment status, annual household income, and smoking status. The mean number of symptoms was higher in those with a chronic condition than those without in all subgroups examined. Among those with a chronic condition, the patterns of association were very similar to the full sample, but age and number of children were no longer significant. Among those without a chronic condition there were significant associations only with sex, age, marital status, number of children, employment status, and annual household income.

Table 4 shows the reported 2-week prevalence of individual symptoms among the full sample, and those with and without a chronic condition. For the full sample, the reported prevalence varied substantially from 0.2% to 41.3%. The five symptoms

most frequently reported were: feeling tired/run down, headaches, joint pain, back pain, and difficulty sleeping. These five symptoms remained the most prevalent among those with or without a chronic condition, although the ranked order changed slightly.

The rankings were less consistent for acute symptoms (such as sore throat, cold or flu symptoms) which tended to rank higher among those without a chronic condition. The reported prevalence for all 25 symptoms was higher among those who had a chronic condition than those who did not; these differences were statistically significant for 15 symptoms.

Table 5 presents the unadjusted ORs for 2-week symptom prevalence by participant characteristics for the 20 most prevalent symptoms; the numbers of the other symptoms were too small for meaningful analysis. With the exception of ethnicity, all participant characteristics were found to be univariately associated with the prevalence of some symptoms, although this relationship varied by symptom. In general, women, those renting their home, those unable to work due to illness and others not in paid employment, ex- or current smokers, and those with a chronic condition reported having symptoms more often than those in the referent group for each characteristic. On the other hand, older age groups, those married or living together, those with medium/high social support, those with secondary or higher educational qualifications, and those with an annual household income of ≥£15 000 reported having symptoms less often than the referent groups.

Although the patterns of association remained very similar, many of the factors significant at the univariate level lost their significance once adjusted for other variables (Table 6). The factors independently associated with the prevalence of each symptom varied considerably. Presence of a chronic condition, age, and employment status were the three factors most commonly associated with the 2-week prevalence of different symptoms. Sex, marital status, level of social support, household income, and smoking status were associated with fewer symptoms. Level of education, housing tenure, and ethnicity were not significantly associated with any symptoms after adjustment.

There was considerable variation in the reported characteristics of different symptoms (Table 7). Vomiting, coughing up blood, difficulty sleeping, and stomach/abdominal pain were most commonly rated as severe. Joint pain, psychological symptoms (feeling depressed, difficulty sleeping, nervousness/anxiety, and feeling tired/run down), and unintentional weight loss were the symptoms most commonly reported as being of long duration. The four psychological symptoms and vomiting had the

Table 2. Participant characteristics of symptom survey sample and UK demographics.

	n^a	Symptom survey sample, %	UK demographics, %
Sex			
Male	990	40.2	49.9[b,c]
Female	1471	59.8	50.1[b,c]
Age group, years			
18–24	203	8.2	16.5[b,c]
25–34	393	16.0	22.2[b,c]
35–44	631	25.6	25.8[b,c]
45–54	686	27.9	23.0[b,c]
55–60	548	22.3	12.5[b,c]
Marital status			
Single	413	17.0	42.8[b,c]
Married/living together	1798	73.8	46.2[b,c]
No longer married	224	9.2	11.0[b,c]
Social support			
Low	126	5.3	–
Medium	769	32.4	–
High	1480	62.3	–
Number of children			
0	736	30.2	–
1	371	15.2	–
2	869	35.7	–
≥3	461	18.9	–
Educational status			
No formal qualifications	257	10.7	–
Secondary school or equivalent	1066	44.5	–
Higher education	1072	44.8	–
Housing tenure			
Owned/mortgaged	2024	83.4	68.4[c]
Council/housing association rented	164	6.8	16.8[c]
Privately rented and other	240	9.9	14.8[c]
Employment status			
Full time	1280	52.9	49.7[c]
Part time	447	18.5	15.9[c]
Self-employed	217	9.0	8.6[c]
Cannot work due to illness	102	4.2	21.4[c] economically
Others not in paid work	372	15.4	inactive
Household income, £			
<15 000	287	13.0	~20.0[c,d]
15 000–29 999	566	25.7	~30.0[c,d]
30 000–49 999	700	31.8	~40.0[c,d]
≥50 000	651	29.5	~10.0[c,d]
Ethnic group			
White	2345	97.4	92.1[c]
Other	63	2.6	7.9[c]
Smoking status			
Never smoked	1334	55.4	53.0[e]
Ex-smoker	615	25.5	25.0[e]
Current smoker	461	19.1	21.0[e]
Chronic condition			
Yes	1098	45.4	29.0[e,f]
No	1323	54.6	71.0[e]

[a]Total numbers for each group may not add up to full sample due to missing data in participant characteristics categories. [b]Working age population specifically (18–60 years). [c]Office for National Statistics data (http://www.statistics.gov.uk), accessed April 2010. [d]Average gross income by decile groups of non-retired households. [e]General Lifestyle Survey, 2008.[16] [f]Proportion of persons aged 16–64 years who reported a longstanding illness — comparable data not available.

Table 3. Mean number of symptoms in the previous 2 weeks by participant characteristics.

	All participants (n = 2474)		Chronic condition (n = 1098[a])		No chronic condition (n = 1323)	
	Mean	P-value[b]	Mean	P-value[b]	Mean	P-value[b]
Sex						
Male	**3.31**		**4.19**		**2.51**	
Female	**3.89**	**<0.001**	**5.00**	**<0.001**	**3.03**	**0.001**
Age group, years						
18–24	**4.53**		5.40		**4.12**	
25–34	**3.69**		5.17		**3.02**	
35–44	**3.47**		4.56		**2.91**	
45–54	**3.58**		4.74		**2.33**	
55–60	**3.64**	**0.004**	4.34	0.119	**2.30**	**<0.001**
Marital status						
Single	**4.11**		**5.27**		**3.44**	
Married/living together	**3.45**		**4.40**		**2.65**	
No longer married	**4.64**	**<0.001**	**5.57**	**<0.001**	**3.11**	**<0.001**
Level of social support						
Low	**5.00**		**6.16**		3.29	
Medium	**3.78**		**4.91**		2.70	
High	**3.48**	**<0.001**	**4.32**	**<0.001**	2.85	0.342
Number of children						
0	**3.84**		4.95		**3.18**	
1	**3.75**		4.45		**3.06**	
2	**3.36**		4.38		**2.41**	
≥3	**3.93**	**0.009**	5.03	0.896	**2.78**	**0.001**
Level of education						
No formal qualifications	**4.71**		**5.71**		2.73	
Secondary school or equivalent	**3.79**		**4.82**		2.93	
Higher education	**3.28**	**<0.001**	**4.05**	**<0.001**	2.75	0.540
Housing tenure						
Owned/mortgaged	**3.43**		**4.29**		2.73	
Privately rented and other	**4.29**		**5.62**		3.35	
Council/housing association/rented	**5.55**	**<0.001**	**6.81**	**<0.001**	3.51	0.011
Employment status						
Full time	**3.28**		**3.98**		2.74	
Part time	**3.49**		**4.72**		2.65	
Self-employed	**3.08**		**3.74**		2.53	
Cannot work due to illness	**7.29**		**7.46**		5.88	
Others without paid work	**4.49**	**<0.001**	**5.65**	**<0.001**	3.38	**0.001**
Household income, £						
<15 000	**5.33**		**6.24**		3.88	
15 000–29 999	**3.93**		**4.99**		2.95	
30 000–49 999	**3.18**		**3.93**		2.59	
≥50 000	**3.07**	**<0.001**	**3.80**	**<0.001**	2.64	**<0.001**
Ethnic group						
White	3.66		4.66		2.81	
Other	3.92	0.550	4.80	0.857	3.34	0.270
Smoking status						
Never smoked	**3.38**		**4.41**		2.67	
Ex-smoker	**3.57**		**4.23**		2.88	
Current smoker	**4.56**	**<0.001**	**5.74**	**<0.001**	3.31	0.014
Overall	3.66		4.66		2.83	

[a]Total numbers for those with and without a chronic condition does not add up to full sample due to missing data on presence of a chronic condition. [b]P-value based on t-tests (sex and ethnic group) and analysis of variance (age group, marital status, level of social support, number of children, level of education, housing tenure, employment status, annual household income, and smoking status). Bold indicates a significant difference at the 1% significance level.

highest levels of interference. Fainting and gastrointestinal symptoms (including vomiting, nausea/feeling sick, and loss of appetite) were most often associated with time off work. Symptom characteristics were further explored by sex and age (data not shown); few significant associations were found.

DISCUSSION

Summary of main findings

Our population-based UK-wide survey of 25 symptoms found that over three-quarters of responders reported having had at least one symptom during the previous 2 weeks, with individuals each having an average of between three and four symptoms. The prevalence of individual symptoms varied substantially and was found to be associated with a range of participant characteristics. Presence of a chronic condition was the factor most strongly associated with symptom prevalence.

Strengths and limitations of the study

This is the first UK-wide, population-based study looking at patterns of a wide range of different symptoms in the community in people who do, and do not, have a chronic condition. The response rate was low, an increasingly common problem in epidemiological research.[18,19] In addition to the usual reasons for non-response, the questionnaire was sent only to a working-age population, thereby excluding older people who are known to be more likely to respond.[20] As this was a general health questionnaire not targeted at people with a specific condition, many individuals may have felt that the questionnaire was not relevant to them.[21]

The questionnaire was sent to a number of areas of high deprivation. Low socioeconomic status is known to be associated with poorer response rates.[22,23] The primary issue with low response rate is that it introduces the potential for responder bias.

In general, men, younger age groups, those in council/housing association properties, those with household incomes <£30 000 per annum, those in 'other' ethnic groups, and those who do not have a chronic condition are under-represented in the study sample, compared with the UK population. The precise impact of this on prevalence rates is difficult to assess and is likely to be mixed. For example, the relatively high proportion of those with a chronic condition in this sample may have over-estimated the prevalence of some symptoms, while the under-representation of those who live in council/housing association properties or those with low incomes may have under-estimated the prevalence of some symptoms.

Despite the low response rate, the relatively large

Table 4. Reported prevalence in the previous 2 weeks for the full sample and those with and without a chronic condition.

	All (n = 2474)				With chronic condition (n = 1098[a])			No chronic condition (n = 1323[a])		
	n	Rank	%	99% CI	Rank	%	99% CI	Rank	%	99% CI
Feeling tired/run down	1006	1	41.3	38.7 to 43.9	1	**50.0**	**46.0 to 53.9**	2	**34.0**	**30.7 to 37.4**
Headaches	942	2	38.7	36.2 to 41.3	2	42.0	38.2 to 45.9	1	36.0	32.6 to 39.4
Joint pain	759	3	31.2	28.8 to 33.6	3	**40.5**	**36.8 to 44.4**	4	**23.5**	**20.6 to 26.6**
Back pain	738	4	30.3	28.0 to 32.8	5	**36.3**	**32.6 to 40.1**	3	**25.2**	**22.2 to 28.4**
Difficulty sleeping	687	5	28.2	25.9 to 30.6	4	**37.3**	**33.6 to 41.1**	5	**20.8**	**18.0 to 23.8**
Sore throat	461	6	18.9	17.0 to 21.0	11	19.1	16.2 to 22.3	6	18.6	16.0 to 21.5
Nervousness/anxiety	451	7	18.6	16.6 to 20.7	6	**27.2**	**23.9 to 30.8**	11	**11.1**	**9.1 to 13.6**
Indigestion/heartburn	443	8	18.2	16.3 to 20.3	7	**25.2**	**22.0 to 28.7**	9	**12.6**	**10.4 to 15.1**
Cough	433	9	17.8	15.9 to 19.9	9	**21.4**	**18.4 to 24.8**	8	**14.8**	**12.5 to 17.5**
Cold or flu symptoms	426	10	17.5	15.6 to 19.6	12	18.3	15.4 to 21.5	7	16.8	14.3 to 19.6
Feeling depressed	408	11	16.8	14.9 to 18.8	8	**24.8**	**21.6 to 28.4**	12	**10.3**	**8.3 to 12.6**
Stomach/abdominal pain	374	12	15.4	13.6 to 17.4	10	**20.0**	**17.1 to 23.3**	10	**11.6**	**9.5 to 14.1**
Diarrhoea	303	13	12.4	10.8 to 14.3	13	**16.0**	**13.4 to 19.1**	14	**9.5**	**7.6 to 11.8**
Nausea/feeling sick	284	14	11.6	10.1 to 13.4	16	13.9	11.4 to 16.8	13	9.8	7.9 to 12.1
Constipation	233	15	9.6	8.1 to 11.2	15	**14.0**	**11.5 to 16.9**	16	**5.7**	**4.3 to 7.6**
Dizziness	224	16	9.2	7.8 to 10.8	17	**12.5**	**10.2 to 15.4**	15	**6.5**	**5.0 to 8.5**
Shortness of breath	201	17	8.3	6.9 to 9.8	14	**14.1**	**11.6 to 17.1**	20	**3.4**	**2.4 to 5.0**
Wheezy chest	182	18	7.5	6.2 to 9.0	18	**12.1**	**9.8 to 14.9**	19	**3.7**	**2.5 to 5.3**
Loss of appetite	134	19	5.5	4.4 to 6.8	20	7.0	5.3 to 9.3	17	4.4	3.1 to 6.1
Chest pain	124	20	5.1	4.1 to 6.4	19	**8.1**	**6.2 to 10.5**	21	**2.6**	**1.7 to 4.0**
Vomiting	107	21	4.4	3.4 to 5.6	21	5.0	3.5 to 7.0	18	4.1	2.9 to 5.7
Blood in stool	61	22	2.5	1.8 to 3.5	22	3.6	2.4 to 5.4	22	1.7	1.0 to 2.9
Unintentional weight loss	42	23	1.7	1.2 to 2.6	23	2.5	1.5 to 4.0	23	1.1	0.5 to 2.1
Fainting	15	24	0.6	0.3 to 1.2	24	0.8	0.4 to 1.9	24	0.4	0.1 to 1.1
Coughing up blood	4	25	0.2	0 to 0.6	25	0.3	0.1 to 1.1	25	0.1	0 to 0.6

[a]*Total numbers for those with and without a chronic condition does not add up to full sample due to missing data on presence of a chronic condition.*
Bold indicates a significant difference between reported prevalence of those who have a chronic condition and those who do not have a chronic condition (1% significance level).

sample size of this study and recruitment of practices from a wide variety of geographical and socioeconomic areas has ensured that most sub-groups are well represented. This allowed for important sub-group analysis and provided a good level of generalisability for the working-age population of the UK. A comparison of general health (as measured by the Short Form–36) among our responders with UK norms for a working-age population[24,25] showed very similar scores for all dimensions except bodily pain, in which this sample had poorer scores. This similarity between the general health of this study's sample and the working-age UK general population further supports the generalisability of these results.

Although the potential for residual confounding cannot be discounted, this study collected and adjusted for many more participant characteristics than has been reported in previous studies. The range of symptoms covered a broad spectrum from

relatively minor to potentially serious problems, and also included a number of psychological symptoms. This has allowed us to explore patterns of symptoms in the UK in greater depth than previous studies.

The small number of responders who had some of the symptoms means that the corresponding CIs were wide, and the study probably did not have enough power to detect important differences between some groups.

Comparison with existing literature
Four other large-scale community-based studies have looked at a similar range of symptoms.[3,4,9,12] Methodological differences between the studies, however, make direct comparison of prevalence rates difficult; previous studies have had different settings (time, place), participants (age groups), time frames (longer or shorter than 2 weeks), and methods of data collection (for example, interviews rather than questionnaires). In addition, symptom definitions

Table 5. Unadjusted odds ratios for reported 2-week prevalence of symptoms by participant characteristics.

Variables	Feeling tired/run down	Headaches	Joint pain	Back pain	Difficulty sleeping	Sore throat	Nervousness/ anxiety	Indigestion/ heartburn	Cough	Cold/ flu	Feeling depressed	Stomach/ abdominal pain	Diarrhoea	Nausea/ feeling sick	Constipation	Dizziness	Shortness of breath	Wheezy chest	Loss of appetite	Chest pain
Sex (male)[a]																				
Female	**1.40**	**1.91**	0.98	1.12	1.18	**1.32**	**1.49**	**0.71**	1.03	0.98	1.24	**1.65**	1.15	**1.51**	**2.68**	1.26	1.07	0.83	1.25	0.96
Age (18–24 years),[a] years																				
25–34	0.81	0.95	1.21	0.88	0.99	0.80	0.75	0.98	0.55	0.65	0.76	0.88	0.90	0.67	0.81	0.70	0.49	0.53	0.74	0.33
35–44	0.69	0.77	**2.04**	0.93	1.09	0.64	0.75	1.04	**0.41**	**0.50**	0.68	0.89	0.65	**0.57**	0.60	0.60	**0.39**	**0.35**	0.60	**0.36**
45–54	**0.61**	0.71	**3.27**	0.98	1.41	**0.48**	0.82	1.48	**0.43**	**0.41**	0.74	0.62	0.68	**0.46**	0.69	0.75	0.67	0.70	0.56	**0.35**
55–60	**0.55**	**0.48**	**4.31**	1.13	1.46	**0.53**	0.76	1.66	**0.66**	**0.48**	**0.55**	**0.50**	**0.55**	**0.41**	0.87	0.73	1.01	0.70	0.53	**0.54**
Marital status (single)[a]																				
Married/living together	**0.70**	0.84	**1.58**	1.33	0.97	0.71	0.72	1.22	**0.60**	**0.60**	**0.47**	0.83	**0.63**	0.75	1.06	0.74	0.77	0.74	**0.52**	**0.43**
No longer married	1.15	0.90	**2.71**	**1.94**	**1.76**	0.87	1.00	1.45	0.72	0.68	0.99	0.82	0.88	1.18	1.69	1.31	1.83	1.38	0.92	1.40
Social support (low)[a]																				
Medium	0.66	0.81	0.81	0.79	**0.56**	1.02	**0.54**	0.72	1.08	1.14	**0.46**	**0.49**	**0.46**	0.76	0.78	0.82	**0.48**	0.52	0.46	1.02
High	**0.57**	0.70	0.73	0.65	**0.51**	1.31	**0.43**	**0.54**	1.12	1.28	**0.30**	**0.51**	0.58	0.85	0.74	0.59	**0.41**	0.52	**0.38**	0.62
Number of children[a]																				
1	1.01	0.93	1.38	1.26	1.04	1.11	0.74	1.22	0.81	0.87	0.79	0.74	0.70	0.80	1.22	0.96	0.89	0.86	1.07	0.68
2	0.95	0.82	**1.68**	1.16	1.00	**0.69**	0.77	0.91	**0.65**	**0.60**	**0.69**	0.89	**0.61**	0.78	1.25	0.89	0.67	**0.60**	0.55	0.66
≥3	0.83	0.91	**1.79**	**1.51**	1.46	0.98	0.90	1.21	0.95	0.86	0.96	0.75	0.87	0.77	0.94	1.19	0.85	0.71	0.82	0.88
Education (no qualifications)[a]																				
Secondary school	0.95	1.14	**0.54**	0.74	**0.63**	0.82	0.72	0.72	0.78	1.13	**0.61**	0.74	0.91	0.91	**0.51**	**0.51**	0.63	0.73	0.64	0.61
Higher education	0.91	0.97	**0.44**	**0.61**	**0.49**	0.80	0.70	**0.55**	0.66	0.99	**0.45**	**0.64**	0.72	0.83	**0.43**	**0.36**	**0.43**	**0.49**	**0.40**	**0.31**
Housing (owned/mortgaged)[a]																				
Privately rented and other	**1.46**	1.18	0.83	1.06	1.29	1.30	**1.77**	0.99	1.23	1.00	**2.22**	1.22	1.45	1.28	1.41	1.63	1.63	**1.80**	**2.08**	1.84
Council/housing association	**2.15**	1.51	1.43	**1.88**	**1.92**	1.32	**1.87**	**1.91**	**2.08**	1.36	**3.43**	1.18	1.72	**1.93**	**2.40**	2.15	**2.87**	**1.98**	**2.23**	**4.13**
Employment (full time)[a]																				
Part time	0.98	**1.44**	1.06	1.12	1.13	1.12	1.13	0.71	1.32	1.27	1.25	1.04	0.79	1.17	1.48	1.37	0.88	0.73	0.70	0.58
Self-employed	0.95	0.85	1.21	1.19	0.99	0.75	0.79	0.72	0.77	0.82	1.23	0.92	0.89	0.56	0.94	0.77	1.12	0.91	1.08	1.23
Cannot work due to illness	**2.86**	1.36	**5.04**	**3.47**	**4.46**	1.64	**3.73**	**2.40**	**2.20**	1.45	**5.04**	**2.40**	**2.76**	**2.35**	**4.90**	**5.95**	**6.48**	**3.87**	**3.15**	**8.60**
Others not in paid work	1.32	**1.50**	1.29	1.34	1.43	**1.56**	1.66	1.06	**2.10**	**1.78**	1.47	1.31	1.43	1.46	1.58	**2.25**	**1.98**	1.50	1.75	1.80
Household income (<£15 000),[a] £																				
15 000–29 999	**0.66**	0.92	0.72	0.87	**0.60**	0.66	**0.47**	0.67	**0.56**	0.66	**0.47**	0.78	0.74	0.63	0.60	**0.48**	**0.47**	0.64	0.62	**0.49**
30 000–49 000	**0.55**	**0.64**	**0.58**	**0.59**	**0.46**	0.55	**0.41**	**0.53**	**0.51**	0.64	**0.28**	0.66	**0.54**	**0.49**	**0.46**	**0.34**	**0.27**	**0.37**	**0.31**	**0.22**
≥50 000	**0.46**	**0.66**	**0.55**	**0.54**	**0.39**	0.73	**0.34**	**0.61**	**0.50**	0.67	**0.26**	0.70	0.66	**0.51**	**0.42**	**0.26**	**0.17**	**0.36**	**0.33**	**0.24**
Ethnicity (white)[a]																				
Other	1.26	1.49	0.64	0.80	0.96	1.53	1.42	1.18	0.68	1.28	1.60	0.94	0.75	0.81	2.10	1.05	0.98	0.41	1.18	0.61
Smoking (never)[a]																				
Ex-smoker	0.95	0.86	1.28	**1.40**	1.07	0.79	1.02	**1.43**	0.84	0.76	1.15	1.03	1.09	0.91	0.99	1.48	1.20	1.08	1.37	1.25
Current smoker	**1.43**	0.94	1.04	**1.77**	**1.61**	0.99	1.37	1.33	**1.81**	**1.52**	**1.69**	1.34	1.22	1.48	**1.79**	**1.74**	**1.92**	**2.16**	**3.06**	**2.28**
Chronic condition (no)[a]																				
Yes	**1.92**	**1.28**	**2.22**	**1.69**	**2.27**	1.03	**2.94**	**2.33**	**1.56**	1.11	**2.86**	**1.89**	**1.82**	**1.49**	**2.70**	**2.08**	**4.54**	**3.57**	**1.67**	**3.33**

[a]Referent group (odds ratio = 1.00). Bold indicates significance at 1% level.

Table 6. Adjusted odds ratios[a] for reported 2-week prevalence of symptoms by participant characteristics.

Variables	Feeling tired/run down	Headaches	Joint pain	Back pain	Difficulty sleeping	Sore throat	Nervousness/anxiety	Indigestion/heartburn	Cough	Cold/flu	Feeling depressed	Stomach/abdominal pain	Diarrhoea	Nausea/feeling sick	Constipation	Dizziness	Shortness of breath	Wheezy chest	Loss of appetite	Chest pain
Sex (male)[b]																				
Female	**1.51**	**1.84**	1.06	1.09	1.15	1.16	1.41	0.72	0.89	0.78	1.21	**1.71**	1.05	1.37	**2.95**	1.16	1.11	0.87	1.26	1.01
Age (18–24 years)[b], years																				
25–34	0.90	1.12	1.35	0.75	1.17	0.89	0.98	0.94	0.69	0.92	1.06	0.80	1.09	0.59	0.82	0.95	0.42	0.49	1.15	0.43
35–44	0.72	0.89	**2.68**	0.75	1.30	0.70	1.11	0.95	0.56	0.68	0.93	0.82	0.91	0.55	0.51	0.72	**0.27**	**0.31**	0.86	0.38
45–54	0.57	0.84	**3.52**	0.67	1.54	**0.47**	1.00	1.17	0.52	0.56	0.78	0.50	0.80	**0.39**	0.50	0.86	**0.29**	0.39	0.58	**0.24**
55–60	**0.44**	0.51	**3.91**	0.65	1.31	**0.46**	0.64	0.97	0.72	0.55	**0.44**	**0.30**	0.52	**0.30**	0.63	0.56	**0.36**	**0.26**	0.47	**0.28**
Marital status (single)[b]																				
Married/living together	0.93	1.05	1.05	**1.68**	0.95	1.10	0.85	1.16	0.88	0.89	**0.55**	1.08	0.74	1.32	1.47	1.05	**2.14**	1.52	0.67	0.85
No longer married	1.12	0.96	1.24	**1.79**	1.28	1.29	0.75	0.98	0.71	0.93	0.76	0.78	0.80	1.68	1.69	1.40	**2.52**	1.34	1.06	1.76
Social support (low)[b]																				
Medium	0.61	0.72	1.18	0.96	0.64	1.10	**0.52**	0.78	1.11	1.46	**0.50**	0.53	0.54	0.72	1.47	0.72	0.48	0.57	0.43	1.58
High	0.52	**0.56**	1.32	0.83	0.63	1.38	**0.48**	0.63	1.20	1.54	**0.35**	0.58	0.74	0.84	1.69	0.63	0.47	0.67	**0.36**	1.16
Education (no qualifications)[b]																				
Secondary school	1.12	1.05	0.87	0.95	0.97	0.63	1.03	1.01	0.85	1.03	0.86	0.60	0.95	0.72	0.74	0.61	1.01	0.85	0.76	0.77
Higher education	1.32	1.03	0.70	0.94	0.90	0.68	1.26	0.77	0.88	1.10	0.35	0.56	0.78	0.79	0.72	0.54	1.02	0.76	0.60	0.55
Housing (owned/mortgaged)[b]																				
Privately rented and other	1.08	0.96	1.03	0.97	1.25	1.09	1.46	0.99	0.99	0.69	1.54	1.01	1.17	0.93	1.21	1.38	1.21	1.54	1.18	1.19
Council/housing association	1.34	1.19	0.88	0.91	0.95	0.83	0.78	1.23	1.32	0.90	1.45	0.55	0.90	1.10	1.06	0.66	1.23	0.71	0.53	1.40
Employment (full time)[b]																				
Part time	0.84	1.08	0.99	1.02	0.97	0.98	0.84	0.78	1.28	1.40	1.08	0.81	0.69	0.95	0.96	1.26	0.80	0.74	0.48	0.52
Self-employed	1.00	0.80	0.94	1.09	0.86	0.89	0.68	**0.53**	0.82	0.93	1.28	0.85	0.82	0.45	1.09	0.69	0.94	0.92	1.02	1.24
Cannot work due to illness	1.54	1.12	**3.01**	**2.17**	**2.24**	1.72	1.84	1.07	1.46	1.76	1.99	1.98	2.14	2.03	2.01	**3.37**	**2.52**	1.60	1.59	**4.96**
Others not in paid employment	1.11	1.36	1.10	1.32	1.20	1.49	1.32	0.95	**1.74**	**1.82**	0.99	1.13	1.32	1.12	0.92	**2.16**	1.17	1.28	1.51	1.10
Household income (<£15 000),[b] £																				
15 000–29 999	0.89	1.11	0.79	0.97	0.77	0.73	0.61	0.74	0.80	0.84	0.76	0.80	0.91	0.75	0.77	0.71	0.70	0.72	0.94	0.92
30 000–49 999	0.78	0.79	0.76	0.74	0.67	0.65	0.53	0.60	0.86	0.87	**0.50**	0.73	0.73	0.63	0.79	0.61	**0.45**	**0.42**	0.56	0.54
≥50 000	0.72	0.86	0.71	0.71	0.63	0.93	**0.47**	0.75	0.88	0.91	0.60	0.91	0.98	0.72	0.88	0.59	**0.35**	0.53	0.72	0.79
Ethnicity (white)[b]																				
Other	1.10	1.27	0.58	0.66	1.02	1.01	1.09	1.28	0.34	1.04	1.25	0.70	0.91	0.90	2.15	1.27	0.57	0.18	1.32	0.34
Smoking (never)[b]																				
Ex-smoker	0.92	0.85	1.06	1.29	0.96	0.84	1.06	1.28	0.80	0.85	1.01	1.04	1.14	1.00	0.94	1.46	1.12	1.08	1.33	1.02
Current smoker	1.09	0.81	0.85	**1.50**	1.31	0.89	1.15	1.07	1.49	1.40	1.10	1.16	0.92	1.19	1.49	1.28	1.24	**1.87**	**1.97**	1.11
Chronic condition (no)[b]																				
Yes	**2.00**	**1.47**	**1.59**	**1.52**	**1.85**	1.12	**2.85**	**1.92**	1.43	1.22	**2.94**	**2.17**	1.85	1.43	**2.56**	1.67	**3.22**	**3.22**	1.54	**2.22**

[a]Adjusted for sex, age, marital status, social support, level of education, housing tenure, employment status, household income, ethnicity, smoking status, and presence of a chronic condition, except when the variable itself was being examined. [b]Referent group (odds ratio = 1.00). Bold indicates significance at 1% level.

Table 7. Proportion of people who reported each symptom as severe, of long duration, causing high interference, or resulting in time off work.

	Severe,[a] n (%)	Long duration,[b] n (%)	High interference,[c] n (%)	Time off work,[d] n (%)
Feeling tired/run down	143 (15.3)	347 (35.4)	217 (24.1)	47 (7.6)
Headaches	142 (15.4)	30 (3.3)	84 (9.9)	34 (5.8)
Joint pain	141 (19.5)	336 (46.1)	137 (20.4)	21 (4.8)
Back pain	121 (16.9)	216 (30.3)	136 (21.0)	25 (5.9)
Difficulty sleeping	132 (20.7)	270 (40.7)	148 (23.9)	25 (6.2)
Sore throat	43 (9.6)	24 (5.5)	25 (6.0)	33 (12.1)
Nervousness/anxiety	62 (14.7)	159 (36.1)	107 (25.8)	20 (7.8)
Indigestion/heartburn	43 (10.3)	63 (14.6)	21 (5.4)	7 (2.7)
Cough	50 (12.0)	69 (16.4)	32 (8.5)	23 (10.0)
Cold or flu symptoms	48 (11.5)	13 (3.1)	50 (13.3)	37 (15.2)
Feeling depressed	72 (19.0)	168 (42.2)	124 (34.3)	23 (10.6)
Stomach/abdominal pain	73 (20.3)	59 (16.7)	58 (16.9)	31 (14.4)
Diarrhoea	39 (13.5)	28 (9.6)	39 (14.3)	18 (10.6)
Nausea/feeling sick	37 (13.7)	25 (9.0)	36 (13.6)	37 (21.4)
Constipation	23 (10.4)	37 (16.4)	16 (7.8)	5 (4.2)
Dizziness	16 (7.5)	41 (19.1)	27 (13.2)	13 (11.9)
Shortness of breath	25 (13.1)	38 (19.7)	31 (17.6)	11 (11.1)
Wheezy chest	18 (10.5)	33 (18.6)	17 (10.5)	14 (14.9)
Loss of appetite	19 (15.1)	17 (13.4)	15 (12.5)	5 (55.6)
Chest pain	14 (12.2)	18 (15.7)	15(13.8)	4 (7.4)
Vomiting	26 (26.5)	7 (6.9)	26 (27.1)	23 (37.7)
Blood in stool	4 (6.9)	12 (20.7)	5 (9.6)	1 (4.3)
Unintentional weight loss	7 (19.4)	13 (37.1)	5 (14.3)	0
Fainting	2 (14.3)	1 (7.1)	2 (14.3)	4 (44.4)
Coughing up blood	1 (25.0)	2 (50.0)	0	0

[a]'Not severe' = mild, tolerable, moderate; 'Severe' = severe, extremely severe. [b]'Short duration' = <1 day, 1–2 days, 3–4 days, 5–6 days, 1–2 weeks; 'Long duration' = 3–4 weeks, >4 weeks. [c]'Low interference' = not at all, slightly, moderately; 'High interference' = quite a bit, extremely. [d]'No time off work' = no time off; 'Time off work' = 1 day, 2–3 days, 4–5 days, 6–10 days, >10 days.

varied (for example, Kroenke and Price[3] used the term 'insomnia' rather than 'difficulty sleeping'). All these factors will affect reported findings; as an example, the generally lower prevalence rates in Hannay's study[9] are likely to be due, in part, to the fact that it was an interview rather than a questionnaire study and that participants included children as well as adults.

Despite the difficulties in conducting a direct comparison, in general, the current findings seem to be broadly consistent with previous symptom research in that feeling tired, headache, musculoskeletal symptoms (joint pain, back pain), respiratory symptoms (cold/flu, cough, wheezy chest), and difficulty sleeping have consistently been found to be among the most commonly reported symptoms.[4,5,8,10] Studies wishing to investigate whether the prevalence of specific symptoms has changed over time would need to use the same study design and data collection methods applied to the same population.

Sex differences in the reporting of symptoms have commonly been reported in previous research. As with previous studies,[3,8,26,27] this study found that women reported a higher prevalence of most symptoms than men. However, when other differences between participants were taken into account, sex differences were significant in only four of the symptoms examined. This suggests that sex may be less of a factor in the reporting of symptoms than previously believed. A similar finding was reported in a recent study by Jackson *et al*,[28] who found no differences in the type, duration, or severity of physical symptoms between men and women attending a walk-in clinic.

Contrary to findings from previous studies,[3,8] this study found that participants in the youngest age group were significantly more likely to report having many of the symptoms examined than those in the older age groups. There are a number of possible explanations for this. This study only investigated people aged <60 years; older adults may experience

more symptoms. In addition, this study had fewer responders in the youngest age group; it is possible that the younger people who responded were less well than similarly aged non-responders, resulting in a higher reported prevalence in this group. Finally, several of the symptoms that the younger age groups were more likely to report having were minor ones that older people might normalise, and so be less likely to report.

Low socioeconomic status has always been strongly linked with ill health[29] and, as such, it was not unexpected that participants with lower household income, lower levels of education, and those living in council or housing association properties reported more symptoms. Importantly, after adjusting for other participant characteristics, only household income was associated with symptom prevalence, and then for only four of the symptoms examined.

Unsurprisingly, the presence of a chronic condition had a considerable influence on symptom prevalence. Previous studies have not tended to take presence of chronic condition into account when reporting symptom prevalence; this means that they are likely to have over-estimated symptom prevalence in the 'healthy' population. Therefore, this study provides an important baseline prevalence of 25 symptoms in the community for future comparisons.

Reported symptom characteristics give an important indication of symptom impact and are likely to affect how people manage their symptoms. In general, the proportion of symptoms that people rated as being severe, of long duration, high interference, or resulting in time off work was relatively small. Neither sex nor age was consistently or strongly associated with reported symptom characteristics.

Implications for future research
This UK-wide study provides an important picture of patterns of symptoms in those who have, and do not have, existing chronic conditions, as well as giving a useful current baseline prevalence of symptoms in the community for future comparison. Many symptoms were found to be common and were associated with a number of participant characteristics, although the extent of this association was less than has been reported in previous research. Information on the patterns of symptoms informs the development of predictive models for serious disease, such as cancer referral guidelines. The fact that many of the symptoms examined in this study were found to be common, and are unlikely to be linked to serious disease, highlights the need to remember that the positive predictive value of many individual symptoms is likely to be low.

In addition to having an important impact for individuals, symptoms also have important implications for the organisation of healthcare services. Future research needs to examine how people respond to their symptoms in order to optimise healthcare services.

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