EXTENDED REPORTS

Estimating the burden of musculoskeletal disorders in the community: the comparative prevalence of symptoms at different anatomical sites, and the relation to social deprivation

Michelle Urwin, Deborah Symmons, Timothy Allison, Thérèse Brammah, Helen Busby, Morven Roxby, Alicia Simmons, Gareth Williams

Abstract

***Background*—Epidemiologically-based rheumatology healthcare needs assessment requires an understanding of the incidence and prevalence of musculoskeletal disorders in the community, of the reasons why people consult in primary care, and of the proportion of people who would benefit from referral to secondary care and paramedical services. This paper reports the first phase of such a needs assessment exercise.**

***Specific objective*—To estimate the relative frequency of musculoskeletal pain in different, and multiple, anatomical sites in the adult population.**

***Setting*—Three general practices in the former Tameside and Glossop Health Authority, Greater Manchester, UK, a predominantly urban area.**

***Design*—Population survey.**

***Methods*—An age and sex stratified sample of 6000 adults from the three practices was mailed a questionnaire that sought data on demographic factors, musculoskeletal symptoms (pain in the past month lasting for more than a week), and physical disability (using the modified Health Assessment Questionnaire-mHAQ). The areas of pain covered were neck, back, shoulder, elbow, hand, hip, knee, and multiple joints. The Carstairs index was used as a measure of social deprivation of the postcode sector in which the person lived.**

***Results*—The response rate after two reminders was 78.5%. Non-responders were more likely to live in areas of high social deprivation. People who lived in more deprived areas were also more likely to report musculoskeletal pain, especially backpain. After adjusting for social deprivation the rates of musculoskeletal pain did not differ between the practices and so their results were combined. After adjustment for social deprivation, the most common site of pain was back (23%; 95% CI 21, 25) followed by knee (19%; 95% CI 18, 21), and shoulder (16%; 95% CI 14, 17). The majority of subjects who reported pain had pain in more than one site. The prevalence of physical disability in the community rose with age. It was highest in those with multiple joint problems but was also high in those with isolated back or knee pain.**

***Conclusion*—Musculoskeletal pain is common in the community. People who live in socially deprived areas have more musculoskeletal symptoms. Estimates of the overall burden of musculoskeletal pain that combine the results of site specific surveys will be too high, those that do not adjust for socioeconomic factors will be too low.**

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ARC Epidemiology Research Unit, University of Manchester Medical School
M Urwin
D Symmons

Department of Public Health Medicine, West Pennine Health Authority
T Allison
M Roxby

Department of Rheumatology, Tameside District General Hospital
T Brammah
A Simmons

National Primary Care Research and Development Centre, at Public Health Research and Resource Centre, University of Salford
H Busby

Public Health Research and Resource Centre, University of Salford
G Williams

Correspondence to:
Dr D P M Symmons, ARC Epidemiology Research Unit, University of Manchester Medical School, Oxford Road, Manchester, M13 9PT.

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It is well recognised that musculoskeletal symptoms are common in the adult community. Disorders of the musculoskeletal system were the most frequent self reported long-standing illness in the 1995 General Household Survey, with a rate of 159 per 1000 adult women and 143 per 1000 adult men.[1] The frequency of these disorders, and the prevalence of physical disability, increase with age.[2] Almost one third of people aged over 75 have a significant musculoskeletal problem, and the prevalence of locomotor disability rises from 3.1% in those aged less than 60 to almost 50% in those aged more than 75.[3] Musculoskeletal complaints therefore place a heavy burden on primary care services. It has been estimated that 15% of general practitioner (GP) consultations are for musculoskeletal problems.[4] Yet the appropriate management of many of these conditions is poorly understood in primary care and indications for referral to secondary care and for physical therapy are not clearly defined.

The assessment of the healthcare needs of the community is the first step in planning and providing appropriate services at primary and secondary care levels. The assessment of rheumatological healthcare needs should be based

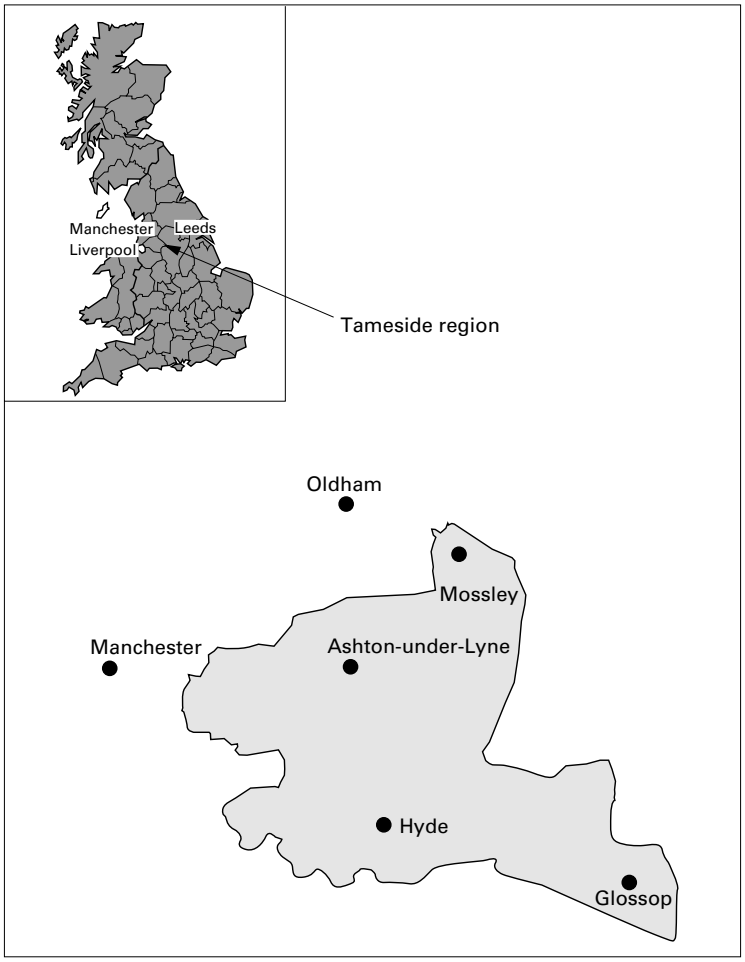

Figure 1 Map of Tameside area.

on an understanding of the incidence and prevalence of musculoskeletal complaints within the community; an appreciation of the availability and effectiveness of various interventions; and an estimate of the proportion of people with a particular musculoskeletal disorder that would benefit, for example, from hospital referral or physiotherapy. It is also necessary to understand what influences the decisions of people with musculoskeletal symptoms to consult within primary care at particular time points and what their expectations are from such consultations.

There have been a number of population surveys that have estimated the prevalence of individual musculoskeletal symptoms.[5–8] However few studies have considered the relative frequency of musculoskeletal symptoms at different sites. Those that have suggest a considerable degree of overlap.[2 9] There are also suggestions that the more areas of musculoskeletal pain a person has, the more likely it is that other areas will be involved later.[10] It is therefore not appropriate to try and estimate healthcare needs symptom by symptom. Socioeconomic factors also need to be considered. They are known to play an important part in the occurrence of back pain[11 12] and some general musculoskeletal disorders.[13] The role of socioeconomic factors in other major musculoskeletal disorders has not been fully explored.

There have been attempts to estimate the need for some aspects of musculoskeletal healthcare (for example joint replacement surgery and physiotherapy for back pain) using either published epidemiological data[14–16] or the results of postal questionnaires,[17 18] but none that have incorporated a clinical evaluation.

This paper reports the first phase of a project whose aims were to establish the need for rheumatology healthcare at the primary and secondary care level in the community, and to understand the factors that shape the need and demand for healthcare in adults with musculoskeletal symptoms. The study is unique in including a population survey, a clinical examination of a representative sample of respondents, and in depth semi-structured interviews concerning health beliefs and behaviour in a sub-sample of those selected for clinical examination. The aim of this particular report was to establish and compare the one month period prevalence of musculoskeletal pain in a variety of sites, and to explore the relation between such pain and age, sex, and social deprivation.

Methods

SETTING

The project was set in three general practices in the Tameside and Glossop area to the east of Manchester, in the north west of England (fig 1). Over 95% of the population is registered with a GP. The practices are situated in the northern, central, and southern parts of the area and each has a list size of more than 10 000 adults. Practice 1 is in a semi-rural area, whereas practices 2 and 3 are based in large conurbations.

SAMPLE SIZE

The sample for the survey was selected so that there would be equal numbers from each of the eight age-sex bands (see table 1). The sample size of 750 from each band was chosen so as to enable a prevalence of 5% to be detected with a precision of 1% and with 80% power. One third of the sample was taken from each practice. There were fewer than 250 men in the 75+ age band in practice 1. This deficiency was compensated for in some measure by sampling more than 250 men from other practices. People from ethnic minorities accounted for approximately 7% of the registered lists for practices 2 and 3; and only 1% at practice 1.

SUBJECT SELECTION

The practices were surveyed in consecutive four month periods. For each practice the computerised list of patents was ordered, within each sex, by age. Within each age-sex band every *nth* patient was selected (where n = (total number of subjects in that band ÷ 250)) in order to yield a total sample of 250. The GPs were shown the selected list so that they could identify patients unsuitable for study (for example because of terminal illness). A total of 86 patients (1.4%) was removed for this reason and each was replaced by the next patient on the list.

Table 1 The age-sex bands, sample size, and response rates of the study population

Band	Age	Sample size*	Response rate (%)				χ^2 (p value)
			Practice 1	Practice 2	Practice 3	Total	
Women							
F1	16–44	716	78.9	73.1	65.0	72.3†	14.43 (p<0.001)
F2	45–64	737	88.0	85.6	84.1	85.9	
F3	65–74	740	90.3	79.3	84.6	84.7†	11.43 (p<0.01)
F4	75+	718	82.6	74.5	74.2	77.0	
Total women		2911	85.0	78.1	77.1	80.0	
Men							
M1	16–44	687	67.7	61.1	54.4	61.1†	9.51 (p<0.01)
M2	45–64	714	84.4	79.6	77.1	80.4	
M3	65–74	730	86.1	82.6	84.4	84.4	
M4	75+	710	82.1	78.8	81.9	80.8	
Total men		2841	80.2	75.7	74.8	76.9	
Overall total		5752	82.6	76.9	76.0	78.5	

* Subjects registered at a different address on the electoral register from that to which the questionnaire was mailed were assumed not to have received the questionnaire, and removed from the denominator.
† Significant difference between practices in response rate (questionnaires returned blank are included as responders for this test).

Table 2 Distribution of Carstairs categories amongst respondents, expressed as a percentage

		Practice 1	Practice 2	Practice 3	Combined practices	T and G 1991 census (aged 16+)
Sample size		1090*	1485	1454	4029	194,602
Carstairs category						
Most affluent	1	—	—	—	—	—
	2	—	—	—	—	—
	3	1.3	2.7	29.2	11.9	18.6
	4	95.0	45.4	23.9	51.1	44.6
	5	3.4	41.1	32.8	27.9	28.1
	6	0.1	6.9	10.0	6.2	4.0
Most deprived	7	0.2	4.0	4.1	3.0	4.6

T and G = Tameside and Glossop.
*Less 477 subjects who lived outside the T and G boundary, most of whom were assigned to category 2.

QUESTIONNAIRE

The selected patients were mailed a questionnaire. A reply paid envelope was included. Subjects who did not return their questionnaires within two weeks were sent a reminder postcard, and those who did not reply within a further two weeks were sent another questionnaire. The questionnaire included a covering letter from the subject's GP endorsing the study and encouraging the subject to participate. The questionnaire sought sociodemographic data (employment status, type of housing, number of other people in same household, ethnic origin), information on musculoskeletal symptoms, and a validated instrument for assessing physical function (the modified Health Assessment Questionnaire - mHAQ).[19] The mHAQ is a shortened version of the Stanford Health Assessment Questionnaire.[20 21] The mHAQ was developed to assess global physical function in patients with rheumatoid arthritis, and so is not the most appropriate tool to assess, for example, disability because of shoulder pain. However, it does enable comparison between the groups. Although the authors of the mHAQ recommend scoring it from 1 to 4, we have scored it from 0 to 3 to make the results more comparable with those of the full HAQ. This adjustment does not change the measurement properties of the instrument.

Subjects were asked whether they had experienced pain in any of the following areas for more than one week in the past month: neck, back, shoulder, elbow, hand, hip, knee, most joints. Subjects were also asked to indicate the area of maximum pain if they had pain in more than one area.

SOCIAL DEPRIVATION INDEX

The Carstairs deprivation index is a measure of material disadvantage. It is a composite Z score derived using information from the National Census. It has four component parts based on the proportions of people living in overcrowded housing; people in social classes IV and V; unemployed men; and people with no car.[22] The calculated score is grouped into seven unequal categories ranging from very affluent (Carstairs category 1) to severely deprived (Carstairs category 7).[3] The index is calculated at postcode sector level that relates to approximately 5000 people and the scores are standardised to England and Wales. It applies to the area in which a person lives and not to the person themself. The Carstairs score was calculated for the area of residence of each person in the total sample, using 1991 census variables. It provided a proxy for social class that could be used to compare responders and non-responders; and the selected samples from each practice.

Results

The names of non-responders were checked against the electoral register. Two hundred and twenty eight were recorded as living at a different address from that to which the questionnaire was sent. These people were assumed not to have received the questionnaire and were removed from the sample. The overall response rate was 78.5% after two reminders (table 1). Response rates were lowest in young men and highest in middle aged women. A further 5% of the sample returned the screening question-

Table 3 Crude prevalence of self reported pain by site affected, in responders (per 100)

Age/sex band	Joint area								
	Back	Neck	Shoulder	Elbow	Hip	Knee	Hand	Most joints	Pain in ⩾3 areas
Women									
F1 16–44	20	12	12	5	4	10	7	2	9
F2 45–64	27	19	19	8	15	23	19	9	23
F3 65–74	32	23	26	6	20	32	21	16	31
F4 75+	30	21	24	9	20	35	20	19	31
Men									
M1 16–44	20	7	9	3	3	15	7	2	8
M2 45–64	24	15	19	13	11	21	12	7	18
M3 65–74	20	17	16	6	13	27	14	8	20
M4 75+	17	18	20	6	11	27	12	11	19

Table 4 Number of areas affected by pain by age and sex (proportion of respondents %)

	Women				*Men*			
Age group	*16–44*	*45–64*	*65–74*	*75+*	*16–44*	*45–64*	*65–74*	*75+*
Areas with pain								
None	65.1	44.1	36.2	36.9	64.3	49.0	48.4	51.0
1 or more	35.0	55.9	63.8	63.0	35.6	51.1	51.7	48.9
2 or more	20.7	36.3	45.9	46.2	16.6	32.5	31.7	31.3
4 or more	3.9	12.1	17.7	17.8	3.5	10.0	8.3	9.9
6 or more	1.0	3.6	5.4	7.0	0.2	3.0	2.8	4.7
8 areas	0.0	0.6	1.1	1.6	0.0	0.7	0.5	0.7
Sample size	518	633	627	553	420	574	616	574

85 subjects had musculoskeletal pain in areas not included in the research (for example ankle/foot).

naire blank, not wishing to participate in the study. More than two thirds of this group was aged 65 years or over.

AMALGAMATING THE PRACTICES

Response rates differed significantly between the practices with practice 1 having higher response rates in all the age-sex bands. In addition there were significant differences in the prevalence of musculoskeletal pain between the practices.

The distribution of Carstairs categories in each of the practices is shown in table 2. Only four addresses could not be assigned a Carstairs deprivation score because of incomplete postcode data. Four hundred and seventy seven responders (11%) lived in a relatively affluent area that bordered on, but was just outside, the Tameside and Glossop boundary. These respondents were registered with practice 1 and 75% fell into Carstairs category 2. They have been excluded from table 2, but included in the remainder of the analysis. The distribution of Carstairs categories differed substantially between practices, but when the practices were combined, mirrored those of the whole Tameside and Glossop population. No postcode sectors in Tameside and Glossop fall into the two lowest (most affluent) Carstairs categories. Adjustment for Carstairs category reduced the relative risk of musculoskeletal symptoms between practice 1 and practice 2 to 1.05 (95% CI 0.97, 1.14) and practice 1 and practice 3 to 1.00 (95% CI 0.92, 1.08) (Mantel-Haenszel test). We have therefore used the combined results from the three practices for subsequent analysis.

PREVALENCE OF PAIN IN INDIVIDUAL BODY AREAS

Table 3 shows the crude prevalence of pain in the individual body areas.

Back pain was the most common symptom in those aged under 65, and knee pain in those aged 65 and over. The highest prevalence was for knee pain among women aged 75 and over (35%). Women reported considerably higher rates of pain in virtually all sites and for all age groups. Generally speaking the prevalence of pain in each area increased with age up to the age of 65 and then tended to plateau. The exceptions were elbow and back pain in men, which both had a peak prevalence in those aged 45–64. The gradient of increase in pain with age was steeper for women than for men. In women the number of joint sites affected by pain increased with age up to the age of 74 (table 4). In men, however, the number of joint areas affected was very similar after the age of 45. Only 34% of those who reported pain experienced the pain in only one site. One per cent of subjects had pain in all eight locations. There were numerous combinations of sites affected. The most common overlaps were back and knee pain, neck and shoulder pain, and back and hip pain.

DISABILITY

Five hundred and sixteen responders (11.4%) did not complete the mHAQ fully and were excluded from the analysis. The median mHAQ score for all age-sex bands was zero. The proportion of people with some disability (mHAQ score > zero) rose progressively with age (χ^2 test for trend = 175.67, p<0.001, 1df) (table 5). Disability scores were similar for men and women up to the age of 65, after which women reported significantly higher levels of disability. Sixty per cent of women aged 75 and over reported some disability, compared with only 41% of men of the same age (χ^2 = 41.08; p<0.0001, 1df).

The proportion of subjects with some disability (mHAQ>0) varied according to the area(s) of pain reported (table 5). Disability was highest among subjects reporting pain in three or more joint areas and/or "most joints" with over 70% in all age groups having an

Table 5 Relation between pain in individual joint areas and functional ability (mHAQ) (proportion of subjects %)

	mHAQ score	*All*	*Back*	*Neck*	*Shoulder*	*Elbow*	*Hip*	*Knee*	*Hand*	*Most joints plus ≥3 joint areas*	*No pain*
Sample size		3999	166	71	88	23	35	219	68	743	1997
Women											
16–44	>0	22	67	0	29	25	0	31	100	73	3
	>0.5	7	22	0	0	0	0	0	0	41	0
45–64	>0	36	67	18	27	0	63	43	33	81	7
	>0.5	14	11	9	0	0	13	7	7	49	1
65–74	>0	44	53	30	19	0	50	50	25	86	10
	>0.5	19	18	0	0	0	17	13	0	47	4
75+	>0	60	62	43	67	100	86	64	73	91	28
	>0.5	36	29	14	33	0	71	32	27	62	15
Men											
16–44	>0	18	55	25	33	50	50	24	13	72	2
	>0.5	6	16	25	0	50	0	0	13	31	0
45–64	>0	33	55	0	40	18	67	63	0	82	7
	>0.5	16	23	0	0	9	0	30	0	50	2
65–74	>0	34	57	21	31	0	0	54	33	75	14
	>0.5	13	7	7	15	0	0	9	0	41	5
75+	>0	41	57	11	47	100	33	54	33	79	21
	>0.5	22	29	0	18	0	0	23	0	60	8

The results apply to subjects who only had pain in the area indicated.

Table 6 Prevalence of musculoskeletal (MS) pain by Carstairs Index in respondents (%)

	Carstairs Index								
	2	*3*	*4*	*5*	*6/7*	χ^2	*p Value*	χ^2 *test for trend*	*p Value*
Any MS pain	48.2	50.0	52.9	56.9	55.7	12.25	<0.05	11.46	<0.001
Back	17.6	19.3	24.7	26.9	24.3	20.85	<0.001	14.13	<0.001
Neck	15.7	18.6	15.4	17.7	20.8				
Shoulder	16.0	17.5	19.2	17.9	20.3				
Elbow	5.6	5.9	7.3	7.0	8.4				
Hand	12.3	13.9	14.7	15.7	13.8				
Hip	8.7	10.6	13.2	14.4	10.8	12.38	<0.05	4.45	<0.05
Knee	19.0	23.1	24.8	25.1	26.5	7.38	>0.05	5.73	<0.05
Most joints	7.6	7.6	9.7	10.5	11.1	6.36	>0.05	5.75	<0.05
≥3 joint areas	15.4	19.4	20.8	20.9	24.3	9.63	<0.05	7.58	<0.05

These figures are not adjusted for age/sex. There was a very similar distribution of Carstairs for each age/sex band.

Table 7 Proportion of subjects (%) with mHAQ >0 by age/sex band and Carstairs Index

		Carstairs categories			
Band	*Age*	*2/3*	*4*	*5/6/7*	χ^2
F1	16–44	21.8	23.9	18.7	
F2	45–64	23.7	33.2	47.4	18.75 p<0.05
F3	65–74	37.3	42.1	51.9	6.49 p<0.05
F4	75+	53.3	62.9	60.0	
M1	16–44	18.0	18.8	16.9	
M2	45–64	20.3	35.8	39.6	12.96 p<0.05
M3	65–74	30.8	38.2	30.9	
M4	75+	41.4	41.0	41.0	

mHAQ above zero. Global disability was also high among those reporting isolated back or knee pain, while upper limb symptoms caused less global disability. This is not to say that people with, for example, shoulder pain are not disabled but that their disability is not global and so not detected by the mHAQ. None of the activities listed in the mHAQ would require the arms to be elevated above 90°.

RELATION BETWEEN DEPRIVATION SCORE AND PAIN AND DISABILITY

A significant difference, with regards to the Carstairs score, was found between those who reported musculoskeletal pain at any site and those who did not (χ^2 = 13.25, p<0.05, 4df). The proportion of subjects with musculoskeletal pain increased as deprivation score increased (χ^2 test for trend = 11.46, p<0.001, 1df) (table 6). The prevalence of pain increased to some degree for most anatomical sites as the deprivation score rose. The trend was most marked for back pain but was also significant for hip pain, knee pain and pain in "most joints". The relation between social deprivation and disability was less marked (table 7). There was a significant increase in the prevalence of global disability (mHAQ > 0) with deprivation category for women aged 45–74 and men aged 45–64.

Table 8 Adjusted prevalence of self reported pain by site affected in Tameside and Glossop population (per 100)

Joint area	*All women*	*(95% CI)*	*All men*	*(95% CI)*	*Overall adjusted rate*	*(95% CI)*
Back	24	(22, 26)	22	(19, 25)	23	(21, 25)
Neck	17	(15, 19)	11	(9, 13)	14	(13, 15)
Shoulder	17	(15, 19)	14	(12, 16)	16	(14, 17)
Elbow	6	(5, 7)	6	(5, 8)	6	(5, 7)
Hip	11	(8, 12)	7	(6, 9)	9	(8, 10)
Knee	19	(17, 20)	20	(17, 23)	19	(18, 21)
Hand	13	(12, 15)	10	(8, 12)	12	(11, 13)
Most joints	8	(7, 9)	5	(4, 6)	6	(5, 7)
≥3 joint areas	18	(16, 20)	14	(12, 16)	16	(15, 18)
Any MS pain	48	(46, 51)	46	(43, 49)	47	(46, 49)

ESTIMATED PREVALENCE OF PAIN IN THE TAMESIDE AND GLOSSOP ADULT POPULATION

An adjusted prevalence rate for the population of Tameside and Glossop, for pain in each of the individual joint areas, was estimated by direct standardisation using the figures for age and sex distribution from the 1991 census (table 8). Forty seven per cent (95% CI 45, 49) of the adult population can be expected to have had musculoskeletal pain lasting for more than one week in the past month. The most common sites of pain would be back (23%) followed by knee (19%) and shoulder (16%). Sixteen per cent (95% CI 15, 18) of the population would have pain in three or more joint areas.

NON-RESPONSE BIAS

A significant difference was found between the Carstairs scores for non-responders and responders (χ^2 = 37.82, p<0.001, 4df). Only 18.1% of those living in the more affluent areas (Carstairs category 2) were non-responders compared with 29.0% in the more deprived areas (Carstairs category 6 and 7). As deprivation increased (with regards to area of residence) the proportion of non-responders increased (χ^2 test for trend = 32.05, p<0.001, 1df). A 15% stratified random sample of non-responders was selected and compared with a random sample of responders matched for age/sex band and practice. Information on the number of GP visits over the past 12 months for all reasons and for musculoskeletal symptoms, co-morbidity, current medication, and previous specialist referrals for musculoskeletal related conditions was collected from the medical records of 167 non-responders and 167 responders. Analysis was conducted for each practice separately. The only significant difference was that responders in practice 2 had visited their GPs more often over the past 12 months than non-responders. However, there was a tendency for responders to have more co-morbidity and more previous specialist referrals in all practices.

Discussion

This study confirms that the prevalence (in this case the one month period prevalence) of musculoskeletal symptoms is high. In women the prevalence of musculoskeletal pain at most sites increased with age up to the age of 75 and then reached a plateau. Only knee pain and multiple joint pain increased in prevalence in women between the two oldest age bands. In men the prevalence was similar in all age groups over 45. Other studies have also shown that, among the older population, the prevalence of certain musculoskeletal symptoms does not increase with age.[24 25] In contrast a similar study conducted in nearby Calderdale[2] reported a progressive increase in the prevalence of joint pain at most sites up to the age of 85 and beyond. One possible reason for this discrepancy is that Badley and Tennant

estimated point prevalence and the elderly may be more prone to short lived episodes of pain. Another is that information about all household members was obtained on a single questionnaire and so the pain may have been reported by proxy in a number of instances.

The prevalence of musculoskeletal pain varies tremendously according to the exact wording of the question.[26 27] In this study we were working towards estimating needs that might give rise to demand for healthcare and so we focused on pain that had lasted for at least one week. Using this definition we estimated that the one month period prevalence of back pain was 23%. A study in South Manchester, which used a definition of pain lasting for 24 hours or longer, estimated that the one month period prevalence was 39%.[8] Hillman *et al* found that, on a single day, the point prevalence of back pain was 19%.[18] In terms of establishing the need for primary and secondary healthcare services for back pain what really matters is the severity of the pain, the disability associated with it, and the duration. The second phase of our study tackles these issues.

This study has confirmed that there is considerable overlap between pain experienced at different sites. Only about a third of respondents with pain had pain at a single site. This means that any estimate of the global burden of musculoskeletal complaints using extrapolations from site specific surveys is likely to be an overestimation. Badley and Tennant also found that pain in more than one joint area was common.[2] A study of lower limb symptoms in people aged over 55 in Rotterdam found that 0.7% of men and 1.9% of women reported joint pain in hips, knees and feet simultaneously.[28] We estimate that 16% of adults experience pain in three or more joint areas. Back and knee pain was the most common combination. Wolfe and Hawley also found a high prevalence of back pain (54.6%) among patients with knee osteoarthritis.[29]

Very few studies have attempted to estimate the prevalence of self reported physical disability using the HAQ or mHAQ at the population level across all adult age bands. We found that the prevalence of disability (mHAQ>0) rises with age in both sexes and is especially high in the over 75s. Although disability was more frequently reported by people experiencing musculoskeletal morbidity, physical disability also rose with age among those with no musculoskeletal pain. Twenty eight per cent of the women and 21% of the men aged over 75 who had no musculoskeletal pain had an mHAQ score greater than zero. This confirms that, while joint problems are an important cause of disability among the elderly, they are not the only cause and suggests that the mHAQ may be a useful general screening tool for identifying those with physical problems. Disability was reported more often by women. This may be a true representation or may represent a sex bias in the questions included in the mHAQ. The prevalence of disability also rose with the number of areas of pain. Over 70% of those with pain in three or more joint areas had some disability.

We used the Carstairs index as a measure of social deprivation of the area in which the person lives. It was designed initially for use in Scotland. Unlike the Townsend score, which is more frequently used in England,[30] it does not include owner occupation as a component because of the higher frequency of rented accommodation in Scotland. In place of owner occupation, it uses the proportion of people in social classes IV and V. The Carstairs index is highly correlated with the Townsend score of deprivation.[31] We chose the Carstairs score because it can be standardised to the population of England and Wales, and has categories that aim to retain discrimination in the population rather than ensuring equal numbers in each category.[22] The Townsend score is often used as an index of relative deprivation within an area under study, and in this sense provides no external standard. The Carstairs index therefore provided us with information on the relative level of deprivation within the Tameside and Glossop community, and with reference to the population of England and Wales. This latter point will assist other purchasers of healthcare to extrapolate from our results.

The differences found between the practices in terms of the prevalence of pain could largely be explained by this index of deprivation. Combining the results from the three practices reflected the Carstairs profile for the whole population of Tameside and Glossop and so the adjusted standardised results for each age/sex band were very similar to the combined crude estimates. The standardisation has, however, provided us with an estimate of the overall one month period prevalence of musculoskeletal symptoms within the adult community, which will be a useful starting point for the estimation of healthcare need.

This study adds to the growing body of evidence that social deprivation is linked not only to mortality but also to morbidity. A large postal questionnaire survey from Somerset and Avon found a link between social deprivation (using the Townsend index) and self reported diagnosed musculoskeletal disorders.[13] A research programme in the Netherlands found links between socioeconomic factors and low back pain, arthritis, and physical disability.[32] Our study has shown that material disadvantage does not affect the prevalence of pain at all musculoskeletal sites equally. The relation between social deprivation and the prevalence of back pain was much stronger than the relation for other sites. Clearly these associations merit further investigation. There may be environmental factors such as poor housing or type of employment that influence musculoskeletal symptoms at certain sites, or the link may be via psychological factors such as stress and depression. A relation between physical disability and social deprivation was seen only in middle age. One possible explanation is that people of working age are financially disadvantaged by their disability and therefore more likely to live in poorer areas.

The social class proxy also provided additional information about the non-responders. As in other studies[33] the non-responders were

significantly more likely to come from deprived areas than responders. As social deprivation also influenced the prevalence of musculoskeletal symptoms it is probable that unadjusted estimates of the prevalence of self reported symptoms using postal questionnaires will provide an underestimate of the true burden of disease especially for less affluent areas.

In conclusion we have estimated the relative frequency of different musculoskeletal symptoms in a community setting. We have shown that the prevalence of symptoms for most joint areas, and of physical disability rises with age. We have also shown that social deprivation is associated with the prevalence of musculoskeletal symptoms. This has important implications for the quantity and type of healthcare needed. The subsequent stages of our research programme will investigate the severity of pain and site specific disability for each anatomical site, look at the relation between pain and specific diagnosis at individual sites, establish recommendations for healthcare, and report on the health beliefs of individual subjects.

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