Rheumatology 2005;44:890–895 doi:10.1093/rheumatology/keh599
Advance Access publication 22 March 2005

# Is musculoskeletal pain more common now than 40 years ago?: two population-based cross-sectional studies

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***Objective*. To test the hypothesis that the prevalence of specific musculoskeletal pain symptoms has increased over time in the northwest region of England. To meet this objective we have examined the difference in the prevalence of low back, shoulder and widespread pain between the 1950s and today using historical data collected by the Arthritis Research Campaign (arc).**
***Methods*. Two cross-sectional surveys conducted over 40 yr apart in the northwest region of England. The status of two regional pain sites and widespread pain was determined using interview and questionnaire responses, for the earlier and later studies respectively. Subjects were classified positively if they reported low back pain, shoulder pain or widespread pain on the day of the survey. Rates were standardized to the Greater Manchester population.**
***Results*. There were large differences in the prevalence of musculoskeletal pain between the two surveys. For all three symptoms examined prevalence increased from 2- to 4-fold between the two surveys. In both surveys low back pain was more common in women. Shoulder and widespread pain was less prevalent in women than in men in the earlier survey but by the time of the later survey women reported more pain at these sites.**
***Conclusions*. The prevalence of musculoskeletal pain is much higher than that reported over 40 yr ago. The change in prevalence is unlikely to be entirely due to the study design; other possible explanations such as the increased reporting or awareness of these symptoms is discussed.**

KEY WORDS: Pain, Prevalence, Trends.

The impact of musculoskeletal disorders on the economy is high. However, the prevalence of musculoskeletal disorders does not accurately reflect the proportion of the population who may be suffering physically and/or psychologically as a result of musculoskeletal pain. Indeed, the presence of musculoskeletal pain is frequently unrelated to organic disease. Within the UK in 1998, the estimated cost of low back pain was in the region of £12 billion [1]. Of these costs, lost productivity and informal care costs form the largest proportion. This is also reflected in the statistics for sickness and invalidity benefits which, for chronic low back disabilities, have risen dramatically from 1953 to 1994 [2]. However, individuals who take sick leave or make disability claims are only likely to represent a relatively small proportion of those who experience musculoskeletal symptoms.

Population-based studies of prevalence trends have been equivocal. In the UK, Palmer *et al.* [3] found a 12.7% rise in the 1-yr prevalence of low back pain over a 10-yr period. In contrast two Finnish studies, using independent random cross-sectional surveys, reported that the prevalence of back pain changed little over a 20-yr [4] and 14-yr period [5]. No population-based studies have been identified that examined the prevalence of shoulder pain or chronic widespread pain over time. However, between 1987 and 1996 Andersson *et al.* [6] reported an increase in primary care consultations as a result of pain and this increased consultation rate was primarily due to fibromyalgia. Meanwhile, others have reported that claims for fibromyalgia 'have reached near epidemic proportions' in those seeking some form of compensation through the legal system [7, 8].

Consequently, it is unclear whether there has been a real increase in musculoskeletal pain over time. A possible explanation of previous observations is a true increase in the prevalence of these symptoms over time, although other plausible explanations are increases in episode duration, changes in people's perception of pain symptoms (patients and health professionals), the notion of possible 'gain' from having symptoms (workers' compensation, disability allowances) or it may be due to an artefact of the data.

We are in the unique position of being able to examine changes in the prevalence of specific musculoskeletal symptoms (low back, shoulder and widespread pain) within the northwest region of England. The aim of this study was to test the hypothesis that the prevalence of low back, shoulder and widespread pain has increased over time. Our objective was to examine prevalence from historical data collected during the 1950s and compare this with data from a more recent study conducted during the 1990s.

## Methods

### *Design*

The current analysis used data from two datasets. These were cross-sectional surveys conducted over 40 yr apart in the northwest region of the UK.

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Received 4 October 2004; revised version accepted 8 February 2005.

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*Study 1*

*Study subjects*. This survey was conducted in 1956–58 in an industrial town, Leigh, north of Manchester. The main industries at that time were coal mining, cotton weaving and spinning. Study subjects consisted of two groups. In 1954 a 1 in 2 sample of surviving adults aged 55–64 yr from the original Leigh survey (conducted during 1949–50) were interviewed. The original survey consisted of a random sample of 1 in 10 households selected from the electoral register. Newly erected and occupied houses were notified from a list supplied by the housing department.

To obtain a complete population sample, the second group was surveyed between 1956–58. At that time a 1 in 360 random sample of households from the electoral roll was used plus subjects from the fifth neighbouring households in both directions (clusters of three households). Subjects between the ages of 15 and 54 yr were invited to participate. When 85% of subjects had been examined, a new sample of households was chosen in the same way. This was repeated until over 200 people in each decade up to age 54 had been examined.

*Study interview*. Following an initial explanatory letter encouraging study participation a 'medico-social worker' visited each household. They gathered demographic information on each household member and ascertained those eligible for inclusion.

A history of all symptoms was taken, whether rheumatic or not, with particular attention to musculoskeletal disorders. Subjects had a detailed examination of the skeletal system, whether they reported symptoms or not.

Demographic information included age, gender and marital status. Interviews included the occurrence of pain at the following sites: cervical, dorsal, dorsolumbar, sacral, hand, wrist, elbow, shoulder, hip, knee, ankle and foot. Pain was recorded as being present 'now' or 'not now'.

*Pain classification*

(i) Low back pain. Subjects were classified as having low back pain if they reported having pain in the dorsolumbar region (L1, L2, L3, L4, L5).

(ii) Shoulder pain. Those subjects who reported pain in the right or left shoulder of the upper limb were classified as having shoulder pain.

(iii) Widespread pain. Widespread pain was classified according to the American College of Rheumatology (ACR) criteria for widespread pain used in the definition for fibromyalgia [9]. That is, subjects had to report contralateral limb pain in addition to axial pain. Upper right limb pain was taken as being positive if pain was reported in the right side of any of the following regions: hand, wrist, elbow or shoulder. Upper left limb pain was coded in the same way but for the left side of the body. Lower right limb pain was coded positively if pain was reported in the right side of any of the following regions: hip, knee, ankle or foot. Lower left limb pain was coded in the same way but for the left side of the body. Axial pain was coded positively if pain had been recorded in any of the following regions: cervical, dorsal, dorsolumbar or sacral spine areas.

We examined the point prevalence, that is, pain had to be present on the day of the survey, and thus had to be present 'now' for each pain site.

*Study 2*

The second pain survey conducted in 1994–95 consisted of subjects aged 18 to 64 yr who were randomly selected from the age/sex register of a general practice in a commuting suburb in south Manchester (Altrincham).

*Study questionnaire*. Information on demographic details and pain status was collected by means of a self-administered questionnaire. A covering letter explained the aims of the study, describing it as a study of aches and pains.

*Pain classification*. To establish pain status subjects were asked, 'During the past month have you had any ache or pain which has lasted for one day or longer?' Subjects were then asked to shade in blank whole body manikins (four views—front, back, left and right side) indicating where they felt these aches and pains.

(i) Low back pain. Subjects were classified as having low back pain if they shaded the low back region of the pain manikin (Fig. 1a).

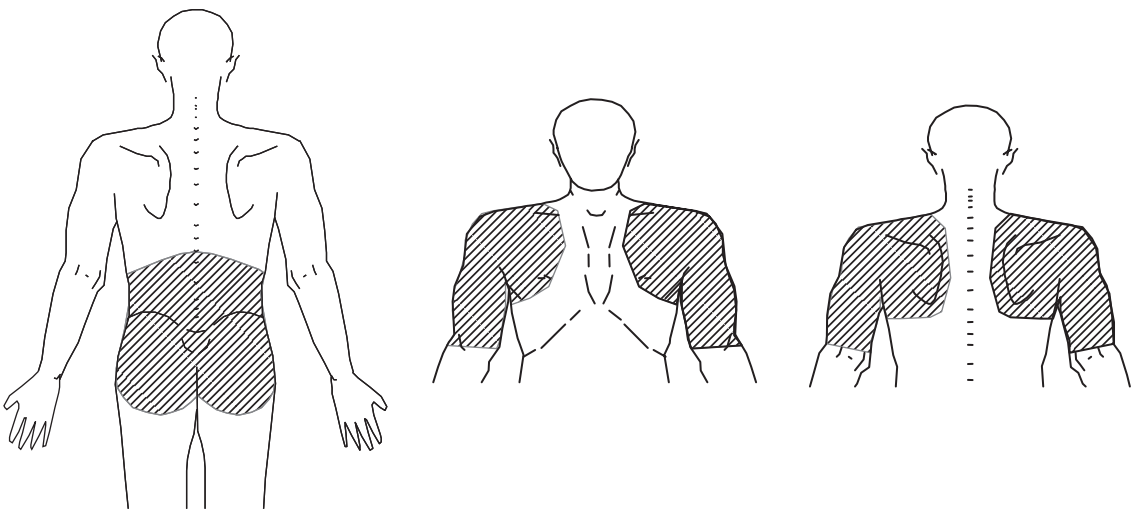


FIG. 1. Pain manikins.

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(ii) Shoulder pain. Similarly subjects were coded as having shoulder pain if they shaded the shoulder region of the pain manikin (Fig. 1b).
(iii) Widespread pain. Subjects were classified as having widespread pain according to the definition used in the ACR criteria for fibromyalgia [9]. That is, if they shaded the manikin to indicate pain in two contralateral limbs and in the axial skeleton.

To be comparable with Study 1 we examined the point prevalence of pain and thus individuals also had to respond positively to a question asking whether they were experiencing any such pain 'now'.

*Questionnaire administration*. Three thousand and four subjects received a copy of the questionnaire by post. After a series of reminders we received a total of 1953 replies and the overall 'adjusted' (for those subjects not at their listed address and those who had died) response rate was 75%.

### *Analysis*

Prevalence is reported separately for males and females. Rates were then directly standardized to the 1991 Greater Manchester population [10] and 95% confidence limits (CL) [11] were calculated.

## Results

Table 1 shows the demographic characteristics for study participants. In both studies there was a higher proportion of females (Study 1: 52%; Study 2: 57%) and participants in Study 1 were older (median age 45 yr, inter quartile range (IQR) 33–35 yr) than those in Study 2 (median age 42 yr, IQR 32–52 yr). Table 2 shows the number of subjects who reported each symptom by age group and gender for the two study populations. In Study 1 low back pain was more prevalent in females, whilst shoulder and widespread pain were more common in men. In Study 2 all three syndromes were more common in women. In both studies there was a general trend of increasing prevalence by age group for all syndromes.

Table 3 shows the age standardized prevalence rates by gender for each syndrome. Rates have been standardized to the 1991 Greater Manchester population, as derived from the 1991 census [3]. In Study 2 we observed a substantial increased rate of between 2- to 3-fold for each syndrome. For example, in men the prevalence rate ratio (PRR) of low back pain in Study 2 was 2.6 (95% CI 1.8–3.8) compared with Study 1. Similarly, the prevalences of shoulder pain (PRR 2.2, 95 CI 1.6–3.1) and widespread pain (PRR 1.7, 95% CI 1.1–2.8) were increased by approximately 2-fold in Study 2. In women, there was a larger increase in the magnitude of rates from Study 1 to Study 2. Low back pain was twice as prevalent in Study 2 (PRR 2.0, 95% CI 1.4–2.8), while shoulder pain was almost four times (PRR 3.9, 95% CI 2.7–5.7) and widespread pain was three and a half times more common (PRR 3.6, 95% CI 2.2–5.8).

Table 1. Characteristics of study subjects

| | Study 1 | Study 2 |
|---|---|---|
| Age (yr) | | |
| Median (IQR) | 45 (33–53) | 42 (32–52) |
| Gender [*n* (%)] | | |
| Males | 505 (48) | 835 (43) |
| Females | 547 (52) | 1118 (57) |
| Marital status[a] [*n* (%)] | | |
| Married/cohabiting | 902 (86) | 1369 (71) |
| Widowed | 18 (2) | 55 (3) |
| Divorced/separated | 4 (0) | 134 (7) |
| Single | 122 (12) | 381 (20) |

[a]Does not add to study total due to missing values.

Table 2. Numbers and percentage of subjects reporting musculoskeletal pain by age group, gender and study

| | Study 1 | | Study 2 | |
|---|---|---|---|---|
| Age (yr) | Males [*n* (%)] | Females [*n* (%)] | Males [*n* (%)] | Females [*n* (%)] |
| Low back pain | | | | |
| 18–24 | 0 (0.0) | 2 (5.6) | 5 (7.8) | 13 (11.6) |
| 25–34 | 2 (1.7) | 6 (5.7) | 29 (15.7) | 35 (14.8) |
| 35–44 | 9 (8.6) | 12 (9.8) | 28 (14.1) | 36 (12.9) |
| 45–54 | 23 (15.2) | 20 (13.2) | 42 (22.1) | 61 (24.6) |
| 55–64 | 7 (7.1) | 10 (7.5) | 41 (22.9) | 55 (24.7) |
| All ages | 41 (8.1) | 50 (9.1) | 145 (17.8) | 200 (18.2) |
| Shoulder pain | | | | |
| 18–24 | 1 (2.9) | 0 (0.0) | 4 (6.3) | 8 (7.1) |
| 25–34 | 9 (7.5) | 0 (0.0) | 18 (9.7) | 32 (13.5) |
| 35–44 | 4 (3.8) | 6 (4.9) | 23 (11.6) | 46 (16.5) |
| 45–54 | 11 (7.3) | 10 (6.6) | 41 (21.6) | 62 (25.0) |
| 55–64 | 10 (10.1) | 16 (11.9) | 44 (24.6) | 57 (25.6) |
| All ages | 35 (6.9) | 32 (5.8) | 130 (15.9) | 205 (18.7) |
| Widespread pain | | | | |
| 18–24 | 1 (2.9) | 0 (0.0) | 2 (3.1) | 4 (3.6) |
| 25–34 | 3 (2.5) | 1 (0.9) | 12 (6.5) | 13 (5.5) |
| 35–44 | 3 (2.9) | 4 (3.3) | 9 (4.5) | 25 (9.0) |
| 45–54 | 8 (5.3) | 5 (3.3) | 25 (13.2) | 40 (16.1) |
| 55–64 | 11 (11.1) | 11 (8.2) | 26 (14.5) | 47 (21.1) |
| All ages | 26 (7.4) | 21 (5.8) | 74 (9.1) | 129 (11.7) |

## Discussion

We have demonstrated that there was a large difference in the prevalence of musculoskeletal pain, over the 40-yr period under investigation. For each symptom examined the prevalence in the later study, Study 2, was in the region of two to three times higher than that reported in Study 1. Generally, the observed increases were apparent across all age groups and were particularly marked amongst females. However, it must be emphasized that these were two population-based studies conducted 40 yr apart using similar, but not identical, populations and methodologies. As such the comparability of the data collected can be questioned. Can the higher rates in the 1990s therefore be explained by methodological factors?

### *Comparison of survey methodologies*

There were three main differences in the survey methodologies of Study 1 and Study 2. First, the mode of data collection differed between the two surveys, with the earlier study being conducted by means of face-to-face interviews, while Study 2 was conducted using a self-administered questionnaire. Is it possible that the different survey methods may have elicited different responses in subjects and have influenced the reporting of symptoms? Previous authors have reported that the agreement between information collected at face-to-face interview and self-administered questionnaires is unsatisfactory [12, 13]. Consequently, in the earlier survey we may have underestimated the prevalence of these pain syndromes. However, agreement between different modes of data collection generally depends on the type of information requested. For example, some authors have demonstrated that, during

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TABLE 3. Age standardized rates for musculoskeletal pain by gender and study

| | Study 1 | | Study 2 | | | |
|---|---|---|---|---|---|---|
| | Males [% (95% CI)] | Females [% (95% CI)] | Males [% (95% CI)] | Females [% (95% CI)] | Males [PRR (95% CI)] | Females [PRR (95% CI)] |
| Low back pain | 6.3 (4.3–8.2) | 8.6 (5.9–11.3) | 16.3 (13.5–19.1) | 17.3 (14.8–19.7) | 2.6 (1.8–3.8) | 2.0 (1.4–2.8) |
| Shoulder pain | 6.3 (4.1–8.5) | 4.4 (2.8–5.9) | 14.0 (11.5–16.5) | 17.1 (14.7–19.6) | 2.2 (1.6–3.1) | 3.9 (2.7–5.7) |
| Widespread pain | 4.6 (2.7–6.4) | 2.9 (1.6–4.2) | 7.9 (6.1–9.8) | 10.5 (8.6–12.3) | 1.7 (1.1–2.8) | 3.6 (2.2–5.8) |

PRR, prevalence rate ratio.

interview-administered surveys, respondents are more likely to respond in a way that is thought to be socially acceptable for certain aspects of lifestyle behaviours such as smoking and alcohol use [14–16], whereas others have found the agreement between interviewer and self-administered questionnaires on less sensitive issues to be good [17–19]. For example, Staes *et al*. [18] found that the percentage of agreement between a self-administered questionnaire and interview was 90 and 96% respectively for severity and location of low back pain in adolescents. However, that study only conducted face-to-face interviews in those who initially reported low back pain symptoms and did not determine the false negative rate of symptom reporting. Nevertheless, the influence of the mode of data collection is likely to be minimal since the focus of that study was on general health and did not contain questions on what could be considered sensitive topics.

Secondly, the studies used different definitions for identifying pain syndromes. Study 1 used direct questions in order to ascertain whether pain was present for each of the pain syndromes. By contrast, subjects in Study 2 were asked to shade any aches and pain on a blank body manikin. Pain manikins have been shown to have good agreement with information gathered from direct questions for other musculoskeletal symptoms [20]. Hence, the effect of different definitions is probably minimal and may have only accounted for a small change in the prevalence over time.

Thirdly, the increased prevalence may be due to differences in the socio-demographic characteristics of the study populations. This is also important in terms of the external validity of the current study and the study results are likely to be limited to the northwest region of England. The surveys were conducted in two different regions of the northwest of England and, despite changes over time, included people of different social status. Altrincham is a relatively affluent region south of Manchester, whereas Leigh is a more deprived area northwest of Manchester. Much of the evidence linking socio-economic status with pain outcomes is inconsistent; however, some authors have shown that people from regions of lower socio-economic status are more likely to report pain at a number of pain sites including the low back [21, 22] and oro-facial pain [23]. Similarly, a review by Dionne *et al*. [24] found that individuals with lower educational status had longer and more recurrent episodes of back pain. Although the link between social class and pain outcome is a tenuous one, this would have favoured a higher prevalence of musculoskeletal pain in Study 1, which was in contrast to our findings. Subsequently, socio-economic status is unlikely to be responsible for the change in the prevalence over time. What therefore are the possible explanations for the current findings?

## *Possible explanations for the observed increase in prevalence*

*Increasing rates of psychological distress*. An increase in the proportion of the population who are psychologically distressed may have led to an increase in the prevalence of musculoskeletal pain. We have previously shown that individual psychological distress and other features of somatization predict future episodes of pain onset [25, 26]. Other studies have found that the proportion of the population with high levels of psychological distress has marginally increased over time by approximately 8% [27, 28]. However, it is doubtful whether such a small increase in psychological distress would account for such a large increase in pain prevalence. Similarly, increased rates could be partly explained by the 'worried well'. The 'worried well' are those patients who are concerned about their health, and attend their GP to seek reassurance about their well-being [29]. The impact of the 'worried well' is likely to have led to an increase in the reporting of symptoms due to the rise in the availability of medical information via sources such as the internet. Furthermore it is estimated that by 2020 the 'worried well' will increase the need for additional primary care consultations by 11 million [30].

*Increased reporting*. The observed increase may reflect an increase in the willingness to report musculoskeletal pain symptoms. Waddell *et al*. [31] suggest a number of social reasons, including cultural, social class and legal factors, which may influence low back pain and disability [31]. Previous generations may have been more reluctant to report musculoskeletal symptoms than generations of today. This may be due to cultural factors such as changes in individuals' attitudes to health reporting and health seeking behaviours. Furthermore, a willingness to report symptoms may be due to changes in the way society perceives these symptoms. Indeed, there is much evidence to suggest that sickness reporting and invalidity benefits have increased dramatically over time [31]. Within the UK, sickness benefits were introduced in the late 1940s and they were initially set up for short-term sicknesses; however, over time the social security system has evolved [31]. The rate (days/thousand population) of sickness and invalidity benefits for back pain in 1991–92 was approximately 7.5 and 11 times that in 1953–54 for men and women respectively [31]. These changes not only reflect an increase in the number of new benefits but also an increasing number of individuals claiming long-term benefits. Furthermore, in the US and Australia, the proportions of individuals claiming compensation for fibromyalgia have 'reached near epidemic proportions' [7, 8]. This has partly been fuelled by the perception that work factors have contributed to the onset of such syndromes [8] and hence the possibility that individuals may make claims for possible 'financial gain' [32, 33]. The number of practising solicitors within the UK has increased substantially over this time period. Data from the Law Society show that the number of practitioners has increased from under 20,000 in the early 1950s to over 60,000 in the mid-1990s [34]. However, compensation claims, although increasing, are less likely to be an issue within the UK than in the US. In Study 2 a relatively large proportion of subjects reported having seen their GP as a result of their pain (63%). Nevertheless, the proportion taking sick leave and reporting litigation was likely to have been much smaller, although no

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such information was recorded in that study. Yet in an earlier study we found that only 2% of those reporting low back pain reported a litigation claim (unpublished data).

*Increased awareness.* It may reflect an increased awareness of certain pain syndromes, not only by patients but also by health professionals. Whether the recent 'epidemic' of fibromyalgia, for example, indicates a true increase in the prevalence of that musculoskeletal syndrome or simply reflects an increase in the diagnosis is unclear. White *et al.* [35] reported that fibromyalgia, of which chronic widespread pain is a distinguishing feature, is now one of the commonest reasons for patient referrals to rheumatology clinics and it is the only disorder rheumatologists believe to have increased substantially in the past 5 yr. Similarly, Andersson *et al.* [6] found that in the primary care setting consultations for musculoskeletal pain increased between the years 1987 and 1996, and this was mainly attributed to fibromyalgia [6]. As a consequence, the reporting of pain symptoms may be higher in Study 2, although whether this explains such marked increases over time, and whether it explains the differential increases observed between men and women, is debatable.

The above factors may have contributed to the increase in prevalence of musculoskeletal pain over time; however, they are unlikely to explain fully the magnitude of difference between the two studies. Hence, a real increase in the prevalence, although difficult to quantify, seems plausible. This could be explained by an increase in the duration of symptoms or a change in the aetiology of these symptoms. Changes in exposure to risk factors for musculoskeletal pain are the most probable explanation for a true increase in prevalence. Both studies comprised individuals from the working and non-working population, the composition of which have changed substantially over time. At the time of the first survey Leigh was an industrial area with many of the study population being employed in coal mining or the cotton industry, which undoubtedly placed high physical demands on workers. There is much evidence to suggest that workers from manual occupations and those who perform manual handling activities have a higher prevalence of musculoskeletal pain [36–38]. By contrast, Study 2 was conducted in a suburban area and subjects were employed in a wide range of occupational settings, the physical demands of which were likely to be less than those of 40 yr ago. Intuitively, therefore, we might expect a decrease in the prevalence of musculoskeletal pain over time. However, occupations today have more psychosocial demands which have also been shown to be important risk factors for musculoskeletal pain [39–41]. We have recently demonstrated that aspects of work-related psychosocial factors are more important than manual handling activities in the new onset of low back, shoulder and widespread pain [42–44]. Therefore, the effect of changes within the workplace is unclear but may offer a plausible explanation for a real increase in symptoms.

In conclusion, we have demonstrated that the prevalence of low back, shoulder and widespread musculoskeletal pain in the northwest region of England is much higher than that reported over 40 yr ago. A number of factors may have contributed to this increase in prevalence, but overall the evidence suggests that a real increase, albeit smaller than that observed, is likely. The results from this study may help our understanding of why these symptoms are becoming more common.

The authors have declared no conflicts of interest.

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