

# Chronic Musculoskeletal Pain, Prevalence Rates, and Sociodemographic Associations in a Swedish Population Study

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**ABSTRACT. Objective.** To estimate the prevalence of chronic regional and widespread musculoskeletal pain in a sample of the general adult population and study the association to age, sex, socioeconomic class, immigration, and housing area.

**Methods.** A cross sectional survey with a postal questionnaire to 3928 inhabitants on the west coast of Sweden.

**Results.** The age and sex adjusted prevalence of chronic regional pain (CRP) was 23.9% and chronic widespread pain (CWP) 11.4% among 2425 subjects who responded to the complete questionnaire. Odds ratio (OR) for CWP showed a systematic increasing gradient with age and was highest in the age group 59–74 yrs (OR 6.36, 95% CI 3.85–10.50) vs age group 20–34 yrs. CWP was also associated with female sex (OR 1.91, 95% CI 1.41–2.61), being an immigrant (OR 1.83, 95% CI 1.22–2.77), living in a socially compromised housing area (OR 3.05, 95% CI 1.48–6.27), and being an assistant nonmanual lower level employee (OR 1.92, 95% CI 1.09–3.38) or manual worker (OR 2.72, 95% CI 1.65–4.49) vs being an intermediate/higher nonmanual employee. OR for CRP showed a systematic increasing gradient with age and was highest in the age group 59–74 yrs (OR 2.22, 95% CI 1.62–3.05) vs age group 20–34 yrs. CRP was also associated with being a manual worker (OR 1.63, 95% CI 1.19–2.23) vs being an intermediate/higher nonmanual employee.

**Conclusion.** Chronic musculoskeletal pain is common in the general population. Sociodemographic variables were overall more frequently and strongly associated with CWP than with CRP, which indicates different pathophysiology in the development or preservation of pain in the 2 groups. (J Rheumatol 2001;28:1369–77)

## Key Indexing Terms:

MUSCULOSKELETAL                      PAIN                      PREVALENCE                      WIDESPREAD

Disorders of the musculoskeletal (MSK) system are a major health problem in many industrialized countries<sup>1</sup>. The economic costs of MSK disorders in the United States and Canada have been described as an escalating problem<sup>2</sup>. In The Netherlands the direct and indirect costs of back pain to society have been estimated at 1.7% of the gross national product (GNP)<sup>3</sup> and in Sweden they amount to 5% of GNP<sup>4</sup>. Since the 1960s MSK diseases have been the most common causes for sick leave and disability pension in Sweden, placing great demands on the health services and social security systems<sup>5</sup>. Moreover, there is a considerable effect on the well being of affected individuals, whose symptoms are not always properly alleviated by current therapeutic methods including sick leave<sup>4</sup>.

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According to international and Swedish studies the prevalence of chronic MSK pain varies from 11% to 50% in different populations<sup>6–12</sup>. This variation is partly due to differences in the definition of chronic pain and on the methods used for its estimation. This is particularly true for reports on chronic widespread MSK pain and the subgroup known as fibromyalgia syndrome, FM<sup>13</sup>.

Etiological factors behind nonmalignant but long-standing pain in the MSK system are not fully understood and identified. The causes of low back pain may include physical stress and previous back injury<sup>14,15</sup>. Smokers have been shown to have an increased risk of cervical, upper limb, and low back pain<sup>14,16,17</sup>. Psychosocial factors and “job strain,” i.e., high demands and poor control over one’s work and work dissatisfaction are also important factors that promote pain<sup>4,18,19</sup>. Similar importance is attributed to “social networks” and the “social support” outside the workplace<sup>20</sup>.

The primary aim of this study was to estimate the prevalence of chronic regional and widespread MSK pain in a sample of the general adult population. A second aim was to assess and evaluate differences between chronic regional pain (CRP) and chronic widespread pain (CWP) with

respect to association with age, sex, socioeconomic group, being an immigrant, and housing area.

## MATERIALS AND METHODS

**Design.** The study was designed as a cross sectional survey with a postal questionnaire to a representative sample of the general adult population of 2 municipalities in southwest Sweden. A comprehensive questionnaire was mailed in May 1995. It was followed by 2 postal reminders, the second giving the opportunity to answer only a key question about the experience of chronic pain. The postal surveys were followed by a telephone interview with a random sample of nonresponders. Collaboration between general practitioners and specialists in rheumatology was established in the planning phase of the study to shed light on different aspects of chronic musculoskeletal pain.

**Subjects.** The target population was all 70,704 inhabitants aged 20–74 years in Halmstad and Laholm, 2 municipalities and healthcare districts on the west coast of Sweden. Halmstad is a middle size town (83,488 inhabitants December 31, 1995) with rural surroundings. Occupational opportunities are dominated by commerce, sea trading, light industry, military and civilian education, and health services. Laholm is a smaller town (23,120 inhabitants December 31, 1995) where occupations within light industry and agriculture dominate.

A representative sample of 3928 subjects was selected from the official computerized population register. In each of the 2 municipalities every 18th man and woman was selected.

**Questionnaire.** The questionnaire was divided in 2 parts: The first part consisted of the validated Swedish version of the well established SF-36 Health Survey<sup>21</sup>. Results from this first part are not reported here. The second part consisted of 52 questions and focused on the experience and location of chronic pain in the MSK system. There was an overall key question on chronic MSK pain: Have you experienced pain lasting more than 3 months during the last 12 months? It was explained in an introduction that the pain should be persistent or regularly recurrent in the MSK system. Location of pain was reported by a drawing of the body with predefined regions (Figure 1). There were also questions on history of arthritis and

psoriasis, family history of chronic pain or fibromyalgia, sleep disturbance, consumption of health care service, and sociodemographic background factors.

Education level was dichotomized in 2 groups: more than 2 years of education after comprehensive school or not. Based on their occupation, responders were classified according to the Swedish socioeconomic classification system, SEI<sup>22</sup>. The 18 basic socioeconomic classes were merged to 4 groups: manual workers, assistant nonmanual employees, intermediate/higher nonmanual employees including upper level executives, and others. The group “others” included self-employed, farmers, housewives, and students. Immigration status (immigrant or native born Swede) was evaluated from the question: Have you or your parents moved to Sweden from another country? The country could also be specified. Social support and social network were evaluated from 2 questions: Do you feel that you have one or more persons that can give you a thorough personal support to cope with distress and problems in life? Are you a member in a group of friends that have or do something together? The answers to these 2 questions were separately included in the analysis. Smoking habits, alcohol consumption, and physical activity were evaluated from separate questions with multiple choice alternatives. Family history of chronic pain was assessed with one question: Do you have someone close to you (parents or siblings) with chronic pain?

**Definitions of chronic pain.** The American College of Rheumatology (ACR) in 1990 presented criteria for FM<sup>23</sup>. These include criteria for chronic widespread pain that could be adapted for use in a postal survey. In addition to chronic widespread pain, a subject needs to have an abnormal number of “tender points” for the diagnosis of FM. The prevalence of this condition could therefore not be estimated by a postal survey alone.

Pain was considered to be chronic when it had been persistent or regularly recurrent for more than 3 months during the last 12 months. CWP was evaluated from the drawing in Figure 1. According to the 1990 ACR criteria, pain was considered widespread when present in both the left and right side of the body and also above and below the waist. Shoulders and buttocks were considered separately for each side. In addition, axial skeletal pain (i.e., in the cervical spine, the anterior chest, the thoracic spine, or the lower back) should be present. When criteria for widespread

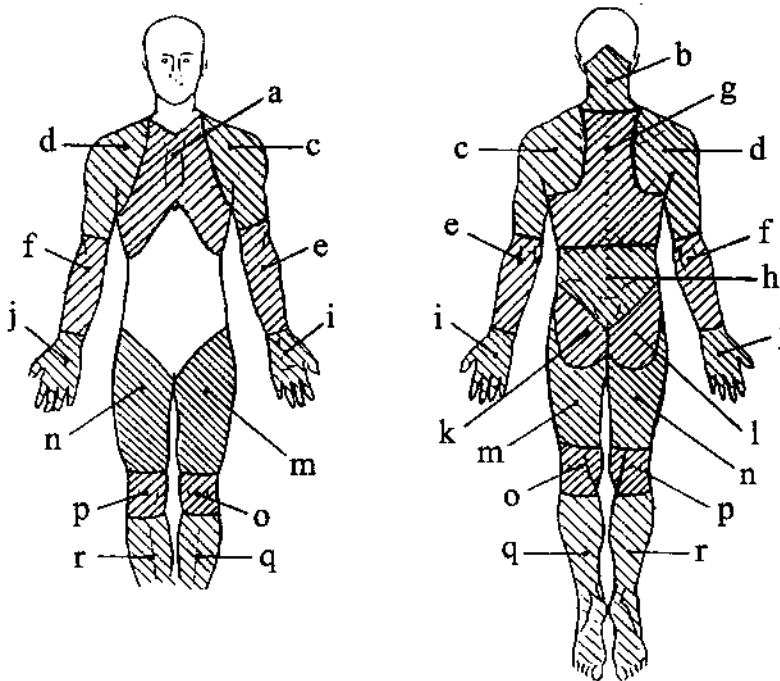


Figure 1. The pain drawing with predefined body regions used in the questionnaire. Letters refer to explanation of the areas in the questionnaire.

pain were not met, the subject was regarded having chronic regional pain, CRP.

**Response rate.** After 2 postal reminders, 2425 (61.7%) answers to the complete questionnaire were returned. Another 330 (8.4%) returned the simple form with an answer to the key question about experience of chronic pain. Thus the overall response rate was 70.1%. Forty-nine (1.2%) questionnaires were returned because of unknown address, 12 (0.3%) subjects were dead or too ill to answer, and 50 (1.3%) subjects responded that they did not want to participate or answered anonymously. There was no response at all from 1062 (27.0%). The response rate of the complete questionnaire was higher for women, 65.9%, than for men, 57.6% ( $p < 0.001$ ). It also varied with age from 54.1% in the youngest age group, 20–24 years, to a maximum of 71.2% among those 60–64 years old ( $p < 0.001$ ). The response rates were not significantly different ( $p = 0.3$ ) between the 2 municipalities studied (Halmstad 61.5% vs Laholm 63.5%). There was no significant difference ( $p = 0.22$ ) in response rate between immigrants (57.7%) and subjects born in Sweden (61.9%).

Analysis of nonresponders was performed among 109 randomly selected subjects. In a telephone interview 77 of them answered selected questions from the questionnaire. Twenty subjects could not be reached and 12 refused to participate. The main reasons for not answering the initial postal survey were lack of time and interest (61.0%,  $n = 77$ ) or that the questionnaire was too extensive (7.8%,  $n = 77$ ).

**Statistics.** Statistical analysis was done with the SPSS package. Statistical comparison of prevalence was by chi-square test. Age, sex, socioeconomic group, immigration status, and housing area were included in multivariable logistic regression analyses, together with other possible background factors that could confound the results. These variables were education level, physical exercise, smoking habit, alcohol consumption, personal support, being a member in a group of friends, and having a family history (parents or siblings) of chronic pain. The 2 variables physical exercise and group of friends were not significantly associated with either CWP or CRP and were rejected from the final models. The analyses were done with

simple contrast to a reference group for each of the variables. The models were systematically checked for interactions between all the variables. Subjects with missing values for any of the variables were rejected from the analyses. Age adjusted and age–sex adjusted prevalence rates were adjusted by the direct method using the Swedish census population of 1997 as a standard.

The study was approved by the Ethics Research Committee, Faculty of Medicine, University of Lund, Sweden. The computerized registration was approved by the Swedish Data Inspection Board.

## RESULTS

**Prevalence of chronic musculoskeletal pain in the population.** Among the 2755 subjects who responded either to the complete questionnaire or to the simple form, 989 reported chronic MSK pain. This represented an age and sex adjusted prevalence of chronic pain (regional or widespread) of 34.5% (95% CI 32.3–36.7%;  $n = 2755$ ). Assuming that nonresponders had no chronic pain at all would give a minimum prevalence of 24.7% (95% CI 23.2–26.3%;  $n = 3928$ ) in the whole sample. The telephone interviews with 77 of 109 randomly selected nonresponders showed a prevalence of 20.8%. If this is representative for all nonresponders it suggests a prevalence of 31.4% in the whole study sample ( $n = 3928$ ).

The prevalence of chronic MSK pain varied with age, and the age adjusted prevalence differed significantly ( $p < 0.002$ ) between men and women, being 38.3% for women (95% CI 35.1–41.4%;  $n = 1451$ ) and 30.9% for men (95% CI 27.8–33.9%;  $n = 1304$ ). As illustrated (Figure 2) there

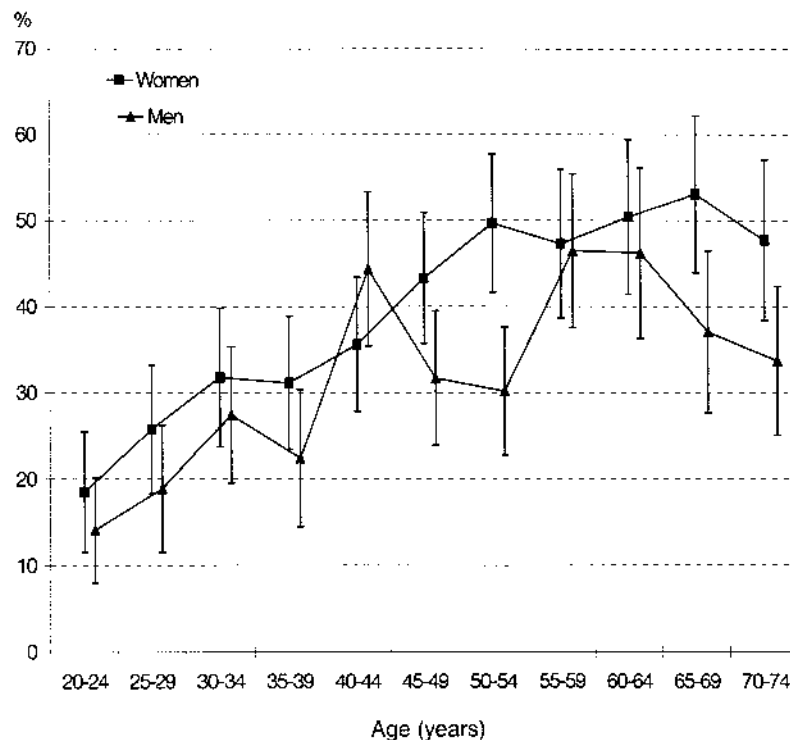


Figure 2. The age and sex-specific prevalence of chronic musculoskeletal pain (95% CI) among all respondents ( $n = 2755$ ).

was a peak in prevalence at 55–64 years of age for men and 65–69 years of age for women. After that it declined. Men had a secondary peak at 40–44 years of age.

**Chronic regional and widespread MSK pain.** The comprehensive questionnaire was answered by 2425 subjects (1134 men, 1291 women). The mean age was 46.5 years with no significant difference between sexes. This sample was divided into 4 subgroups: Group 1 with no chronic pain (NCP; n = 1466), group 2 with chronic regional pain (CRP; n = 588), group 3 with chronic widespread pain (CWP; n = 303), and group 4 (Unknown) with 68 responders that could not be categorized.

The 303 subjects who fulfilled the criteria for CWP represented an age and sex adjusted prevalence of 11.4% (95% CI 10.1–12.6%). The age adjusted prevalence was about twice as great for women, 15.3% (95% CI 13.2–17.4%), as for men, 7.5% (95% CI 6.0–9.1%). This difference was statistically significant ( $p < 0.001$ ). In contrast, the age adjusted prevalence of CRP for men was 23.8% (95% CI 20.9–26.7%) and for women 24.1% (95% CI 21.4–26.8) with no significant difference ( $p = 0.86$ ). The age and sex-specific prevalence of CWP and CRP is presented in Table 1. The variation with age, with a relatively higher prevalence in older age groups, was more pronounced in the group with CWP compared to the group with CRP. Chi-square test for trend was significant for both CWP ( $p < 0.001$ ) and CRP ( $p = 0.01$ ) with no difference between sexes.

The same pattern of pain prevalence with respect to age and sex was found among telephone interviewed nonresponders, although the figures were lower than among the responders. The prevalence was 17.4% for men aged 20–44, 19.0% for women aged 20–44, 21.1% for men aged 45–74 and 28.6% for women aged 45–74.

Among responders with chronic MSK pain, women reported chronic pain in more regions than men (mean 5.7 vs 4.4;  $p < 0.001$ ) and had a higher prevalence ( $p < 0.05$ ) of chronic pain in all regions except for the knees (Table 2). When cases fulfilling the criteria of CWP were excluded there was no longer any female predominance. In this restricted analysis regional pain in the elbow, lower arm, or hand was more prevalent in women ( $p = 0.004$ ), and regional pain in the knee was more prevalent in men than in women ( $p = 0.002$ ). This indicated that the significant predominance for women could be attributed to the higher prevalence of CWP among women. In a separate analysis of respondents with CWP (not shown in Table 2) it was confirmed that women in this group had significantly ( $p < 0.05$ ) higher prevalence of pain in all regions except for the knees. The most common region for chronic pain in both sexes was the “lower back,” which was reported by 23.0% of those who responded to the complete questionnaire.

**Chronic MSK pain and sociodemographic associations.** The prevalence of MSK pain in socioeconomic groups based on occupation (i.e., manual workers, assistant nonmanual employees, intermediate/higher nonmanual employees or upper level executives) is shown in Table 3. There was a gradient in the prevalence of both CRP and CWP in relation to socioeconomic group, with the highest prevalence in manual workers. Chi-square test for trend was significant for both CWP ( $p < 0.001$ ) and CRP ( $p = 0.03$ ). The age and sex adjusted prevalence of CWP was significantly lower in the group of intermediate/higher nonmanual employees or upper level executives than in the groups with manual workers ( $p < 0.001$ ) and assistant nonmanual employees ( $p = 0.001$ ). The difference between workers and assistant nonmanual employees was not significant ( $p = 0.083$ ). The age and sex adjusted prevalence of CRP differed signifi-

Table 1. Age and sex-specific prevalence of chronic widespread pain (CWP) and chronic regional pain (CRP).

Age, yrs	Men			Women		
	n	CWP, %	CRP, %	n	CWP, %	CRP, %
20–24	111	0.0	15.3	109	0.9	18.3
25–29	96	5.2	15.6	122	9.8	16.4
30–34	106	4.7	23.6	109	7.3	27.5
35–39	95	1.1	23.2	119	11.8	20.2
40–44	102	8.8	34.3	133	16.5	20.3
45–49	117	7.7	22.2	149	14.8	30.2
50–54	128	10.9	20.3	132	24.2	25.0
55–59	108	13.0	32.4	109	23.9	28.4
60–64	87	19.5	27.6	108	25.0	27.8
65–69	88	12.5	25.0	100	22.0	31.0
70–74	96	10.4	27.1	101	21.8	23.8
All	1134			1291		
Crude prevalence (95% CI)		8.4 (6.7–10.1)	24.1 (21.2–26.9)		16.1 (13.9–18.3)	24.4 (21.7–27.1)
Age adjusted prevalence (95% CI)		7.5 (6.0–9.1)	23.8 (20.9–26.7)		15.3 (13.2–17.4)	24.1 (21.4–26.8)

Table 2. Prevalence of chronic pain in different body regions by sex. Results are given for all respondents to the complete questionnaire and for all respondents excluding subjects with CWP.

	All Respondents			CWP Excluded		
	Women n (%)	Men n (%)	p	Women n (%)	Men n (%)	p
Anterior chest	72 (5.6)	43 (3.8)	0.044	19 (1.5)	21 (1.9)	0.524
Neck	296 (22.9)	164 (14.5)	< 0.001	129 (10.0)	95 (8.4)	0.182
Dorsal chest	155 (12.0)	81 (7.1)	< 0.001	61 (4.7)	48 (4.2)	0.624
Low back	341 (26.4)	216 (19.0)	< 0.001	165 (12.8)	146 (12.9)	0.952
Shoulder/upper arm	307 (23.8)	175 (15.4)	< 0.001	136 (10.5)	96 (8.5)	0.097
Elbow/lower arm/hand	276 (21.4)	129 (11.4)	< 0.001	116 (9.0)	67 (5.9)	0.004
Hip/upper leg	198 (15.3)	121 (10.7)	< 0.001	65 (5.0)	62 (5.5)	0.649
Knee	189 (14.6)	146 (12.9)	0.216	61 (4.7)	89 (7.8)	0.002
Lower leg/foot	192 (14.9)	108 (9.5)	< 0.001	64 (5.0)	56 (4.9)	1.000

Statistical comparison by chi-square test.

Table 3. Number of subjects and age and sex adjusted prevalence (95% CI) of chronic regional pain (CRP) and chronic widespread pain (CWP) by socioeconomic group. In addition, the number of subjects with no chronic pain (NCP) and subjects that could not be categorized (Unknown) are given.

Socioeconomic Group	n	NCP n	Pain Subgroup				
			CRP n	CRP Prevalence	CWP n	CWP Prevalence	Unknown n
Manual workers	1167	634	311	26.7% (23.6–29.7%)	186	14.7% (12.6–16.9%)	36
Assistant nonmanual employees	337	202	78	21.5% (16.3–26.8%)	46	11.0% (7.4–14.5%)	11
Intermediate/higher nonmanual employees and upper level executives	586	413	129	20.0% (16.2–23.7%)	34	5.3% (3.3–7.3%)	10
Others	335	217	70	23.6% (17.5–29.8%)	37	10.7% (6.9–14.5%)	11

cantly ( $p = 0.002$ ) between manual workers and the highest socioeconomic group. There was no significant difference in age and sex adjusted prevalence of CRP between assistant nonmanual employees and the other 2 groups ( $p > 0.05$ ).

Of those who responded to the comprehensive questionnaire, 285 subjects (11.8%) were immigrants or first degree relatives of immigrants. Their mean age was 42.9 years. The age and sex adjusted prevalence of CWP was significantly higher ( $p < 0.001$ ) for immigrants, 20.0% (95% CI 14.6–25.5%), than for native born Swedes, 10.2% (95% CI 8.9–11.5%). On the other hand there was no significant difference ( $p = 0.81$ ) regarding CRP, 23.3% (95% CI 17.4–29.1%) versus 23.9% (95% CI 21.7–26.0%).

As we intended to study the influence of social and economic differences within a municipality, we compared subjects living in a housing area of Halmstad known for poor economic conditions and social problems to all other participants. There was a significantly higher ( $p < 0.001$ ) age and sex adjusted prevalence of CWP in the socially compromised area, 28.2% (95% CI 14.5%–41.9%), than among all others, 10.8% (95% CI 9.5%–12.0%). The difference was not signif-

icant ( $p = 0.32$ ) for CRP, 28.4% (95% CI 14.2%–42.6%) versus 23.8% (95% CI 21.8%–25.8%), respectively.

In the multiple logistic regression analysis (Table 4), CWP was independently and significantly associated with female sex, older age, the 2 lower socioeconomic groups, being an immigrant, living in a compromised housing area, lower education level, never or seldom drinking alcohol, not having personal support, and family history of chronic pain. CRP, on the other hand, was independently and significantly associated with older age, being a manual worker, being a current or former smoker, not having personal support, and having a family history of chronic pain.

The one significant interaction between the evaluated variables was a positive association between CRP and being a manual worker for men (OR 2.47, 95% CI 1.54–3.97), but not for women (OR 1.09, 95% CI 0.70–1.68).

## DISCUSSION

This study showed that chronic musculoskeletal pain was a common condition in a representative sample of a population in 2 areas of Sweden. It also showed significant differ-

Table 4. Results from the logistic regression analyses. Odds ratios (95% CI) for having chronic regional pain (CRP) or chronic widespread pain (CWP) compared to having no chronic pain (NCP) are given for possible risk factors and confounders.

	Crude <sup>a</sup> Analysis OR (95% CI)		Multivariable <sup>b</sup> Analysis OR (95% CI)	
	CRP vs NCP, n = 1960	CWP vs NCP, n = 1685	CRP vs NCP, n = 1960	CWP vs NCP, n = 1685
Sex				
Men	1.00	1.00	1.00	1.00
Women	1.15 (0.95–1.41)	2.25 (1.71–2.97)	1.16 (0.94–1.43)	1.91 (1.41–2.61)
Age, yrs				
20–33	1.00	1.00	1.00	1.00
34–46	1.44 (1.08–1.92)	2.58 (1.60–4.16)	1.40 (1.04–1.90)	2.62 (1.57–4.37)
47–58	1.85 (1.39–2.45)	4.90 (3.11–7.71)	1.97 (1.45–2.68)	5.61 (3.41–9.21)
59–74	2.13 (1.60–2.82)	6.26 (3.99–9.82)	2.22 (1.62–3.05)	6.36 (3.85–10.50)
Socioeconomic group <sup>c</sup>				
Group A	1.00	1.00	1.00	1.00
Group B	1.24 (0.89–1.73)	2.63 (1.60–4.35)	1.23 (0.85–1.77)	1.92 (1.09–3.38)
Group C	1.69 (1.31–2.16)	4.18 (2.77–6.31)	1.63 (1.19–2.23)	2.72 (1.65–4.49)
Others	1.16 (0.81–1.66)	2.69 (1.57–4.61)	1.09 (0.74–1.60)	1.81 (0.98–3.33)
Immigrant status				
Swede	1.00	1.00	1.00	1.00
Immigrant	1.25 (0.91–1.71)	2.59 (1.79–3.73)	1.00 (0.72–1.40)	1.83 (1.22–2.77)
Housing area <sup>d</sup>				
All other	1.00	1.00	1.00	1.00
Area A	1.96 (1.08–3.56)	5.05 (2.66–9.58)	1.71 (0.91–3.19)	3.05 (1.48–6.27)
Education level <sup>e</sup>				
High	1.00	1.00	1.00	1.00
Low	1.34 (1.07–1.68)	2.97 (2.05–4.31)	0.97 (0.73–1.29)	1.67 (1.05–2.67)
Smoking habit <sup>e</sup>				
Never	1.00	1.00	1.00	1.00
Ever	1.41 (1.15–1.72)	1.34 (1.02–1.75)	1.34 (1.08–1.64)	1.31 (0.98–1.76)
Alcohol habit <sup>e</sup>				
Never/rare	1.00	1.00	1.00	1.00
Monthly	0.75 (0.60–0.95)	0.41 (0.30–0.56)	0.79 (0.62–1.00)	0.45 (0.32–0.63)
Weekly	0.80 (0.61–1.04)	0.38 (0.26–0.55)	0.89 (0.67–1.17)	0.56 (0.37–0.85)
Personal support <sup>e</sup>				
Yes	1.00	1.00	1.00	1.00
No	1.60 (1.20–2.13)	2.69 (1.93–3.76)	1.48 (1.10–1.99)	2.03 (1.41–2.92)
Family history of chronic pain <sup>e</sup>				
No	1.00	1.00	1.00	1.00
Yes	1.86 (1.47–2.35)	3.64 (2.68–4.96)	1.70 (1.34–2.14)	2.87 (2.10–3.93)

<sup>a</sup> Univariate except that sex is age adjusted, age is sex adjusted, and all others are age–sex adjusted.

<sup>b</sup> Adjusted for all other variables in the table.

<sup>c</sup> Group A: Intermediate/higher nonmanual employees and upper level executives. Group B: Assistant nonmanual employees. Group C: Manual workers.

<sup>d</sup> Area A: Socially compromised area (see text).

<sup>e</sup> Variables included to control for confounding.

ences in associated sociodemographic background factors between subjects with chronic widespread pain compared to chronic regional pain.

The overall prevalence of MSK pain in our study (34.5%) is equal to or lower than the prevalence presented in several other studies<sup>11,12,24,25</sup>. Study design, definitions, and presentation of results may explain most of the differences. This problem is illustrated in our study by the difference in prevalence, 24.7% versus 34.5%, depending on whether nonresponders were assumed to have chronic pain

to the same extent as responders or not having chronic pain at all. The analysis of nonresponders and late responders showed that subjects with pain were more prone to answer, giving a higher estimate of the prevalence. The crude prevalence of pain among those who answered the comprehensive questionnaire was 37.4%, among those who after the second reminder answered the simple question 25.2%, and among telephone interviewed nonresponders 20.8%. According to this it is reasonable to assume that 34.5% represents the upper estimate of prevalence in our study sample.

There is an interesting difference in the prevalence of chronic pain between our study and findings from another area in the south of Sweden. Andersson, *et al* reported a prevalence of chronic MSK pain of 50%<sup>12</sup>. The study design and key question concerning chronic pain were similar to ours and the difference persists after correction for age and sex. This could indicate that there is a regional difference in the prevalence of chronic pain between these 2 geographically close areas in Sweden. Regional differences have previously been described in Sweden<sup>26</sup>. Comparing the distribution of possible risk factors in the 2 regions could give further clues to the etiology of the evaluated pain syndrome. Another explanation of the difference could be a variation of the prevalence over time.

We found an age and sex adjusted prevalence of CWP of 11.4% among those who responded to the complete questionnaire. Due to factors discussed above this could be considered as a maximum prevalence. Croft, *et al* also reported a high prevalence of CWP, 11.2%, in Manchester, England<sup>25</sup>. They described a strong association to other somatic and psychological symptoms. Wolfe, *et al* in Wichita, Kansas, USA, found a similar high prevalence of widespread pain, 10.6%, in a study where the ACR 1990 criteria were used<sup>24</sup>. In contrast, Jacobsson, *et al*<sup>27</sup> reported an absence of CWP and a low prevalence of shoulder disorders among the Pima Indians in Arizona, USA, although this population is known to have high prevalence of both osteoarthritis and rheumatoid arthritis (RA). Jacobsson proposed that clues to etiology and predictive factors for widespread pain might be obtained from studies in different racial and ethnic groups. A study among African-American and Caucasian women with RA<sup>28</sup> reported that ethnic differences could be related to the use of different coping strategies.

In our study there was an increasing prevalence of chronic MSK pain with age up to 55–64 years for men and up to 65–69 years for women. After that it declined. This variation with age is also described by Andersson<sup>12</sup>, although in that study the peak is reached earlier for women than for men. We also found that the association with a higher age was more pronounced in the group with CWP compared to the group with CRP. This is compatible with the idea that factors associated with CWP could be cumulative with regard to their effect, whereas factors associated with regional pain syndromes may exert their effect over a shorter time period.

The total prevalence of chronic MSK pain was significantly higher among women than men. This could chiefly be attributed to a 2-fold higher prevalence of CWP in women compared to men. There was no difference between sexes in the prevalence of CRP. Women also reported more regions with pain. This suggests a sex difference in developing or preservation of CWP that could give clues to etiology.

Manual workers and assistant nonmanual employees had

higher prevalence of CWP than intermediate/higher nonmanual employees and upper level executives. This gradient in prevalence relative to socioeconomic group was less pronounced for CRP, and multiple logistic regression analysis showed an association to manual workers for men but not for women. This inconsistency between CRP and CWP indicates that factors other than heavy workload may be important in developing or preservation of chronic MSK pain. These factors could include work dissatisfaction, sickness benefits, other psychosocial factors, and neurohormonal changes<sup>4,18,19</sup>.

The prevalence of CWP was considerably higher in a restricted housing area with known social problems. The association persisted after adjusting for factors concerning known problems in the area. Such uneven geographic distribution has implications when health services are planned.

Immigrants had a higher prevalence of CWP than native born Swedes. In contrast, there was no difference concerning CRP. Due to sample size, subanalysis concerning the effect of country of origin was not performed. The possible influence of ethnic background factors indicated by the higher prevalence of chronic MSK pain among immigrants that we found is supported by a previous study in Sweden<sup>29</sup>. There is also a high rate of sick leave and disability pension in Sweden due to such conditions among immigrants from south Europe. Interestingly, one study indicates that the need to seek medical treatment for chronic MSK pain in southern Europe is lower than that in Sweden<sup>30</sup>. Possible explanations of such differences may be selection bias among immigrants and difficulties of adjustment in a new environment.

Associations with CRP or CWP were seen for variables included to control for confounding, such as education level, smoking habit, alcohol consumption, personal support, and having a family history (parents or siblings) of chronic pain. These results are not discussed further here.

In particular, the association between CWP and the different sociodemographic variables is consistent with a theory of multifactorial etiology where physical, psychological, social, and neurobiological factors interact<sup>31,32</sup>. The criteria for CWP that we used included by definition subjects with the fibromyalgia syndrome. It was not possible to distinguish subjects with FM in our study since a clinical examination is necessary for diagnosis. Recently it has also been questioned if FM is to be considered as a disease entity or if it is instead one end of a continuous scale of somatic expressions of distress<sup>33-35</sup>. In a recent study from Manchester<sup>36</sup> more stringent criteria for CWP were used. The findings in that study give further support to the hypothesis that CWP is one feature of somatization. Our results are not in conflict with this hypothesis.

One possible concern with this study was the relatively high rate of nonresponders. Efforts were made to gain a high response rate and we are confident we obtained the response

rate that could be expected. There were few missing responses on different questions among those who responded to the comprehensive questionnaire. The effect of nonresponse on the estimates of pain prevalence is discussed above. The lower response rate especially in younger men is likely to bias the results, but the relatively large number of subjects with CRP and CWP recruited from a general population gives strength to the study. The same pattern of pain prevalence with respect to age and sex was found among telephone interviewed nonresponders, although the figures were lower than among the responders. The higher response rate among older women is thus unlikely to explain the difference in prevalence between the sexes. There were no differences in response rates between the 2 municipalities or between immigrants and subjects born in Sweden.

This study shows that prevalence of chronic MSK pain is related to age, sex, socioeconomic group, and ethnic background. Overall the associations were more frequent and strong with chronic widespread than with chronic regional pain, which indicates different pathophysiology in the 2 groups. A plausible explanation is that chronic widespread pain, to a higher extent than regional pain, is an expression of somatized distress.

Future studies should further examine the background factors and qualitative differences between subjects with chronic regional and widespread MSK pain, and should include clinical examination to distinguish between subgroups of cases that by questionnaire data were classified as having a chronic widespread pain. Predictors of chronic pain and its remission within a defined population are also important issues to investigate.

Better knowledge of the characteristics of chronic pain in the musculoskeletal system would promote clear recommendations on how to optimize resources for prevention, treatment, and rehabilitation of these conditions.

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