

Prevalence of Current and Chronic Pain and Their Influences Upon Work and Healthcare-Seeking: A Population Study

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ABSTRACT. Objective. To investigate the prevalence of current and chronic pain and their relationship to pain intensity, sex, age, income, employment status, citizenship, marital status, urban residence, occupational activity, and healthcare-seeking based on a representative sample from a Swedish county.

Methods. A cross-sectional survey using a postal questionnaire was sent to a representative sample (n = 9952) of the target population (284,073 people, age 18–74 yrs) in a county (Östergötland) in southern Sweden. A questionnaire was mailed and followed by 2 postal reminders if necessary.

Results. The participation rate was 76.7% (n = 7637); nonparticipants were on average younger, male, and earned less money. The overall point prevalence of pain was 48.9%. The corresponding one-month period prevalence was 63.0%, and pain on several occasions during the previous 3 months was reported by 61.3% of participants. The prevalence of chronic pain (pain > 3 months) was 53.7%. Female sex, age, and sick leave/early retirement were generally of significant importance in the regressions of pain. No sex factor was found in the regressions of pain frequency and pain intensity. Chronic pain — especially frequent and intensive pain — showed clear associations with healthcare-seeking and occupational activity.

Conclusion. High prevalence of current pain (48.9%) and chronic pain (53.7%) were found in this community-based study. Being female, older, and on sick leave or early retirement were generally of significant importance in the regressions of pain. Chronic pain showed clear associations with healthcare-seeking and occupational activity, indicating considerable socioeconomic costs. (J Rheumatol 2004;31:1399–406)

Key Indexing Terms:

EPIDEMIOLOGY HEALTHCARE PAIN PREVALENCE WORK

Chronic pain can be associated with important personal consequences such as disability, poor health, and inferior quality of life¹⁻³ and considerable societal and economic consequences^{4,5}. Health-related quality of life in subjects with chronic pain has been reported to be among the lowest for any medical condition⁶. Chronic pain was a commonly reported health problem (21.5%, range 5–33%) among primary care patients according to a World Health Organization study of 15 primary care centers in Asia, Africa, Europe, and the United States⁷. In that study, pain

was consistently associated with psychological illness (a 4-fold increase). Comorbidity is common^{2,8-10}.

The epidemiology of pain has not been studied as much as the epidemiology of cancer and cardiovascular disease¹¹. The complex psychology and pathophysiology of pain, the diversity of pain conditions, and practical problems in doing research on pain in healthcare settings and in the community contribute to this lack of data¹¹. Elliott, *et al* summarized the literature concerning the prevalence of chronic pain in the general population and found large differences between studies, with prevalence estimates ranging from 2% to 45%¹². Bergman, who focuses on musculoskeletal pain, also reported great variation in a literature review¹³. In part, methodological differences might contribute to these differences^{13,14}. Veerhaak, *et al* suggested 10% as a very cautious estimate of the prevalence of chronic pain in the population¹⁴.

The literature debates whether female sex is associated with higher prevalence of chronic pain. Most population-based studies found higher prevalence in women than in men^{1,2,12,14-16}, but there are studies that have found no differences^{17,18}. Le Resche stresses that there is not a simple relationship between gender and the occurrence of pain¹⁹.

Several studies report that the prevalence of chronic pain increases with age^{12,15,17,20}, which suggests either progressive, degenerative conditions and/or accumulation of cases

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occur as people age¹⁹. In some studies, the peak prevalence occurs between 45 and 65 years^{2,14}. Most studies of the prevalence of chronic pain report an association with lower income groups¹⁴ and/or socioeconomic status². However, Elliott, *et al* found no significant relationship with social class (occupation-based)¹², but reported a significant relationship for housing tenure. There exists a relationship between chronic pain and employment status; people unable to work due to illness/disability have increased prevalence of pain^{2,12}.

Pain is among the most personally compelling reasons for seeking medical attention^{7,12,21}. There are many factors influencing healthcare-seeking: pain perception, intensity of pain, ethnicity, age, sociodemographic level, and depressive symptoms²². According to clinical experience, perceived activity limitations and participation restrictions also contribute.

In 1988, Andersson, *et al* investigated the prevalence of chronic pain using a postal questionnaire sent to 1806 individuals (aged 25–74 yrs; response rate 89.9%) in the general population in a southern county of Sweden¹⁷. According to this study, chronic pain was very prevalent; chronic pain (> 3 months' duration) was reported by 55.2%, and 13% of the population had a severe condition (labelled dysfunctional chronic pain, i.e., pain > 6 months, high pain intensity, and impairment of activities of daily living and/or sick leave the past 3 months). Chronic pain also significantly influenced healthcare-seeking and medication²². For public planners it is important to have reliable estimates of chronic pain in the population when planning healthcare, prevention, and social security systems, but the figures presented for instance by Veerhaak, *et al*¹⁴ and Andersson, *et al*¹⁷ show a marked difference.

Our study from Sweden more than 10 years after the study of Andersson, *et al*¹⁷ investigates the prevalence of current and chronic pain and their relationship to pain intensity and pain frequency, sex, age, income, employment status, citizenship, marital status, and urban residence based on a large representative sample from a Swedish county. In particular, we investigated to what extent chronic pain influences healthcare-seeking and occupational activity.

MATERIALS AND METHODS

The study was a cross-sectional survey using a postal questionnaire to collect data from a representative sample of the population (aged 18–74 yrs) from a county (Östergötland) in southern Sweden. The target population was 284,073 persons in the age group 18–74 years. A representative sample of 9952 subjects was selected from the register of Statistics Sweden (SCB). A questionnaire was mailed in September 1999 and was followed by 2 postal reminders if necessary. The first reminder was mailed after about 4 weeks and the second reminder after 7 weeks. The Ethics Research Committee, Linköping University, approved the study.

Questionnaire. The questionnaire contained the following items:

1. Do you have pain anywhere in the body today? [yes/no]
2. Have you had pain anywhere in the body during the previous month? [yes/no]
3. Have you had recurring pain during the previous 3 months? [yes/no]
4. Have you had pain (a) at rest? [yes/no]; (b) on movement? [yes/no]
5. Have you now, or have you had during the previous 3 months (a) pain in your back [yes/no]; (b) pain in the neck and shoulders [yes/no]

6. How long have you had the pain? [more than 3 months; less than 3 months]
7. How often have you felt pain during the previous 3 months? [all or practically all the time (in the following *constant* pain); often (in the following *frequent* pain); now and then; only occasionally/a few times only]
8. What is the usual intensity of your pain? [mild, insignificant; moderate; severe; unbearable; varying]
9. Have you sought healthcare for your pain? [yes/no]
10. Gender [male/female]
11. What is your present occupational situation? [gainfully employed; temporary disability pension; studying; parental leave; in search of work; early retirement/disability pension or old age pension; other]
12. How much do you work? [0; 1–15; 16–24; 25–34; 35 or more hours per week]
13. If you are receiving temporary disability pension (or sick leave), to what extent? [0; 1–25%; 50%; 75%; 100%]

In addition to the above questions, nationality, marital status, age, income, and municipality of each subject were available. In the questionnaire no definition of pain was made and thus the subjective perception of the concept "pain" was reported.

Statistics. All analyses were performed using the statistical package SPSS for Windows (v 10.0). Characteristics of the participants (as well as nonparticipants) were presented as proportions (binary variables) or as medians and 10th–90th percentiles (counts or continuous variables). The associations between sex, age, annual income, marital status, urban residence, citizenship, sick leave or early retirement, and occupational activity and various pain variables from the questionnaire were modelled multivariately using exponential Cox regression with a constant risk period of unit length²³. Cox regression was used in order to estimate prevalence ratios instead of prevalence odds ratios (obtained in logistic regression), which are more difficult to interpret. The Cox regression model is multiplicative, which is an advantage when the outcome (i.e., the prevalence) has an upper limit. As an example, if the (pain) prevalence ratio for females versus males is 1.20 and the prevalence ratio for the age group 30–49 versus the age group 18–29 is 1.31, then the prevalence ratio for females of the age group 30–49 versus males of the age group 18–29 is $1.20 \times 1.31 \approx 1.57$ (see Table 3). A multivariate additive model is more likely to yield unrealistic prevalence estimates outside the range 0–100% for some combinations of covariate values. The adequacy of the multiplicative model can be checked versus real data. We regarded 95% confidence intervals (95% CI) for the prevalence ratio that included unity as nonsignificant.

RESULTS

Participation rate. The participation rate was 76.7% (n = 7637). Background characteristics of the participants and nonparticipants are presented in Table 1; nonparticipants were younger and earned less money. The proportions of men or non-Nordic citizenship were also higher among nonparticipants than the participants.

Pain prevalence. The overall point prevalence of pain (i.e., feeling pain currently) among the participants was 48.9% (Table 2). The corresponding one-month period prevalence was 63.0% and pain on several occasions during the previous 3 months was reported at 61.3%. The prevalence of chronic pain (pain with duration > 3 months) was 53.7%. The prevalence of pain was consistently higher among women than among men and was associated with age. The highest prevalence was observed in the age group 50–64 years (Table 2).

In the multivariate analysis, chronic pain was associated with females, older age, and being on sick leave or early retirement (Table 3). For instance, women within the age

Table 1. Characteristics of participants and nonparticipants.

	Participants			Nonparticipants		
	All	Men	Women	All	Men	Women
n (%)	7637 (100)	3623 (47.4)	4014 (52.6)	2315 (100)	1387 (59.9)	928 (40.1)
Age, median (10–90%)*	46 (24–67)	46 (24–67)	46 (24–68)	38 (21–64)	37 (21–62)	40 (21–66)
Married/cohabiting, %	51.1	51.9	50.4	36.6	33.0	41.9
Nordic citizen, %	97.4	97.2	97.5	93.8	94.6	92.7
Urban residence, %	71.7	71.2	72.2	73.0	73.3	72.6
Income [†] , median (10–90%)*	160 (19–285)	193 (21–335)	136 (18–228)	131 (0–254)	152 (0–278)	105 (0–204)
Sick leave or early retirement, %	9.5	8.0	11.0	Unknown	Unknown	Unknown

* Median (10th – 90th percentiles). [†] 1000 Swedish kronor.

group 50–64 years, with early retirement, are estimated to have 91.1% prevalence of chronic pain (i.e., $38.2\% \times 1.2 \times 1.37 \times 1.45 = 91.1\%$) compared to 38.2% of the reference category (men < 30 years, not on sick leave and urban residence). Urban residences had a slightly significant influence in the regression of chronic pain. No significant association with annual income, marital status, or citizenship was discerned. The same pattern was observed in the multivariate analyses for the point prevalence of pain, the one-month period prevalence, and the prevalence of pain on several occasions during the previous 3 months (data not shown).

Characteristics of the group with pain. The pain group, people that reported current pain at some time during the previous month, or on several occasions during the previous 3 months, made up 65.8% of all participants (60.5% of all men, 70.6% of all women). Within the pain group, pain at rest was reported by 67.6% and pain during motion by 90.4%. Pain located in the neck/shoulder and back were reported by 58.2% and 57.0%, respectively, of the pain group. Fifty-eight percent (58.2%) of the pain group had seen a medical professional such as a physician or physiotherapist due to their pain. In the pain group, 83.0% reported duration > 3 months. This proportion increased with age and was highest in the oldest age group (90.2%).

Fifty-six percent (55.9%) of the pain group reported constant or frequent pain. In the multivariate analysis the prevalence of constant/frequent pain was associated with

higher age and being on sick leave or early retirement (Table 4). For instance, subjects in the age group 50–64 years and with early retirement are expected to have an 86.9% prevalence of constant/frequent pain compared to the 32.4% of the reference group (i.e., age < 30 years and not on sick leave).

Twenty percent (20.5%) of the pain group reported unbearable or severe pain intensity. Increased prevalence of unbearable/severe pain was associated with older age, low income, being on sick leave or early retirement, and being a non-Nordic citizen (Table 4).

The group with chronic pain (i.e., duration > 3 months). Among those with pain > 3 months' duration (the chronic pain group), 23.7% reported constant pain, 39.0% frequent pain, 32.0% pain now and then, and 5.3% pain only occasionally. Thus, 62.7% of those with chronic pain reported constant or frequent pain. The following distribution of answers concerning the pain intensity was reported: mild: 3.5%, moderate: 44.1%, severe: 12.7%, unbearable: 1.3%, and varying: 38.4%.

Healthcare-seeking in the group with chronic pain. In the group with chronic pain, 64.8% had sought health care due to their pain. There were significant relationships between frequency and intensity of pain and healthcare-seeking. Thus, in the subgroup that reported constant pain 86.3% had sought healthcare, in contrast to 34.3% in the subgroup with pain only occasionally. In the subgroup that had severe pain, 79.5% had sought healthcare, while in the subgroup with

Table 2. Point prevalence (i.e., current pain, %), one-month period prevalence (%), prevalence of pain on repeated occasions during the previous 3 months (%), and prevalence of chronic pain (> 3 mo duration, %) stratified by age and sex.

Age group	Point Prevalence			One-month Period Prevalence			Repeated Occasions, Previous 3 mo			Chronic Pain (> 3 mo duration)		
	All	Men	Women	All	Men	Women	All	Men	Women	All	Men	Women
All	48.9	44.4	52.9	63.0	57.2	68.2	61.3	55.6	66.5	53.7	48.2	58.7
≤ 29	32.0	28.8	35.0	55.0	49.0	60.5	50.3	44.4	55.7	40.4	34.8	45.4
30–49	49.1	44.6	53.2	63.8	57.9	69.1	62.0	56.2	67.3	54.2	48.1	59.7
50–64	57.7	52.7	62.3	67.8	62.1	73.0	68.0	62.7	72.9	60.9	55.3	66.0
≥ 65	53.0	47.8	57.2	61.6	56.0	66.2	60.7	54.4	65.9	56.0	52.4	59.0

Table 3. Cox regression of the association between prevalence of chronic pain (> 3 mo duration) and sex, age, sick leave, and rural residence.*

Explanatory Variable	Prevalence Ratio	95% CI
Reference category†	1.0	—
Female	1.20	1.13–1.28
Age		
30–49	1.31	1.19–1.44
50–64	1.37	1.24–1.51
≥ 65	1.38	1.24–1.55
Sick leave/early retirement	1.45	1.32–1.59
Rural residence	1.07	1.00–1.15

* Civil status, annual income, and citizenship had no significant influence on pain prevalence and were omitted from the regression model. † The model-based estimate of the prevalence for the reference category, i.e., for males below age 30, not on sick leave, and with an urban residence, was 38.2% (95% CI 34.6–42.3%).

mild pain intensity 32.4% had sought care. When healthcare-seeking was regressed, pain frequency and pain intensity were significant factors — together with age > 65 years and sick leave/early retirement (Table 5). For subjects below age 30, not on sick leave and with at most occasional chronic pain and of at most moderate intensity, the model estimate of prevalence of healthcare-seeking was 38.1%. In contrast, subjects the same age and not on sick leave but with frequent pain and severe pain, the estimate of prevalence was nearly doubled (70.2%, i.e., 38.1% × 1.44 × 1.28; Table 5).

The influence of pain upon occupational activity

In the population. In the age groups below age 65 (i.e., below age of retirement in Sweden) it was found that chronic pain was significantly associated with a lower prevalence of working ≥ 25 hours per week (Table 6). The presence of chronic pain per se lowered the prevalence of subjects working ≥ 25 hours per week to 11% (i.e., prevalence ratio = 0.89, 95% CI 0.84–0.95). In contrast, pain not

being chronic had no significant influence; the estimated prevalence ratio associated with pain at repeated occasions during the last 3 months (but not chronic) was 1.00 (95% CI 0.90–1.11). Age 50–64 years, income below median, and non-Nordic citizenship showed stronger associations with occupational activity than chronic pain (Table 6). The combined effect of these significant regressors resulted in a considerably lower estimated prevalence of subjects working ≥ 25 hours per week [$100\% - (100\% \times 0.89 \times 0.76 \times 0.61) = 41.2\%$], i.e., ~60% decrease compared to the reference category (Table 6).

In the group with chronic pain. In subjects below age 65 years with chronic pain, factors associated with work less than 25 hours/week were: unbearable/severe pain intensity, constant/frequent pain (borderline significant), age 50–64 years, and income below the median (Table 6). Based on this model it can be concluded that the prevalence of subjects working ≥ 25 hours/week will decrease by 25% (i.e., prevalence ratio: $0.91 \times 0.83 = 0.755$) when both unbearable/severe pain intensity and constant/frequent pain are reported.

DISCUSSION

The major findings of this community-based study were:

1. High prevalence of current pain (48.9%) and chronic pain (53.7%).
2. Being female, older, and on sick leave or early retirement were of significant importance in the regressions of chronic pain.
3. No gender factor was found in the regressions of pain frequency and pain intensity.
4. Chronic pain — especially frequent and intensive pain — showed clear associations with healthcare-seeking and occupational activity.

The advantages with our study were the large size and the relatively high participation rate. In contrast to most other epidemiological studies concerning pain we also investigated intensity of pain. It has been pointed out that there is

Table 4. Cox regression of the prevalence of constant/frequent pain* (left panel) and prevalence of unbearable/severe pain intensity** (right panel) in the pain group (n = 5025).

Explanatory Variable	Constant/Frequent Pain		Explanatory Variable	Unbearable/Severe Pain Intensity	
	Prevalence Ratio	95% CI		Prevalence Ratio	95% CI
Reference category†	1.0	—	Reference category††	1.0	—
Age			Age		
30–49	1.62	1.42–1.85	30–49	1.20	0.94–1.54
50–64	1.85	1.61–2.12	50–64	1.12	0.85–1.47
≥ 65	1.95	1.67–2.27	≥ 65	1.48	1.11–1.97
Sick leave/early retirement	1.45	1.31–1.61	Sick leave/early retirement	2.60	2.09–3.24
			Income below median	1.24	1.05–1.48
			Non-Nordic citizen	1.99	1.40–2.82

* Sex, annual income, civil status, urban residence, and citizenship had no significant influence on the pain frequency and were omitted from the regression model. † The model-based estimate of prevalence for the reference category, i.e., for persons < age 30 and not on sick leave or pre-retired, was 32.4% (95% CI 28.8–36.4%). ** Sex, civil status, and urban residence had no significant influence on the pain frequency and were omitted from the regression model.

†† The model-based estimate of prevalence for the reference category, i.e., for Nordic citizens < age 30 with an income above median and not on sick leave or pre-retired, was 13.2% (95% CI 10.3–16.9%).

a need for better understanding of help-seeking behavior in chronic pain in the general population²⁴. Another advantage compared with several other community-based studies was that we investigated to what extent pain influences health-care-seeking and occupational activity.

Selection bias. The size of the study implies that the sampling error generally will be small. As an example, the 95% confidence interval around the estimated prevalence of pain on several occasions during the previous 3 months (61.3%) was 60.2–62.4% (data not shown). Selection bias may be of more concern. Bergman, *et al* reported that subjects with pain were more prone to answer¹⁶. As an example from our study, under the assumption of zero pain prevalence among the nonparticipants, the estimated prevalence of pain on several occasions during the previous 3 months would decrease from 61.3% to 47.1%. Similarly, the corresponding pain prevalence for the 50–64 age group, in

Table 5. Cox regression of the association between the prevalence of healthcare-seeking and duration and frequency of pain, age, and sick leave/pre-retirement in the group with chronic pain (n = 4101)*.

Explanatory Variable	Prevalence Ratio	95% CI
Reference category [†]	1.0	—
Constant/frequent pain	1.44	1.28–1.63
Unbearable/severe pain intensity	1.28	1.13–1.45
Age		
30–49	1.10	0.93–1.32
50–64	1.10	0.92–1.33
≥ 65	1.30	1.07–1.59
Sick leave/early retirement	1.26	1.07–1.48

* Sex, annual income, civil status, rural residence, and citizenship had no significant influence on prevalence of healthcare-seeking and were omitted from the regression model. [†] The model-based estimate of prevalence for the reference category, i.e., for persons with, at most, occasional chronic pain of, at most, moderate intensity, below age 30, and not on sick leave was 38.1% (95% CI 32.5–44.7%).

Table 6. Cox regression of the prevalence of working ≥ 25 hours per week among persons below age 65 in the population (n = 6596; left panel) *[†] and in the group with chronic pain (n = 3498; right panel)*^{††}.

Population < 65 years			Chronic pain < 65 years		
Explanatory Variable	Prevalence Ratio	95% CI	Explanatory Variable	Prevalence Ratio	95% CI
Reference category***	1.0	—	Reference category [#]	1.0	—
Chronic pain	0.89	0.84–0.95	Constant/frequent pain	0.91	0.82–1.00
Age			Unbearable/severe pain	0.83	0.72–0.95
30–49	0.98	0.90–1.08	Age		
50–64	0.76	0.70–0.84	30–49	1.01	0.87–1.17
Income below median	0.61	0.56–0.65	50–64	0.81	0.69–0.95
Non-Nordic citizen	0.72	0.56–0.93	Income below median	0.60	0.54–0.67

* Pain at repeated occasions during the last 3 months (but not chronic), sex, civil status, and rural residence had no significant influence on the prevalence of working at least 25 hours per week and were omitted from the regression model. [†] Full-time students and persons on full-time parental leave were excluded (n = 803). *** The model-based estimate of the prevalence for the reference category, i.e., for Nordic citizens without chronic pain, below age 30, and an income above median was 100% (lower 95% confidence limit 90.6%). ** Sex, civil status, rural residence, and citizenship had no significant influence on the prevalence of working at least 25 hours per week and were omitted from the regression model. ^{††} Full-time students and persons on full-time parental leave were excluded (n = 321). [#] The model-based estimate of the prevalence for the reference category, i.e., persons with, at most, occasional chronic pain of, at most, moderate intensity, below age 30, and an income above median was 100% (lower 95% confidence limit 86.4%).

which the participation rate was 82.9%, would decrease from 68.0% to 56.4%. Thus, even under the extreme and unrealistic assumption that the nonparticipants were completely free from pain, the pain prevalence would still be high. It might be more realistic to assume that, stratified for age and sex, the prevalence of pain was the same among participants and nonparticipants. Under this assumption, the estimated prevalence of pain on several occasions during the last 3 months decreased only marginally from 61.3% to 60.6%.

Prevalence of pain. In an Israeli study, 44% reported pain on the day of the interview¹, which is somewhat lower than the point prevalence of 48.9% we observed.

Ten percent of the population with chronic pain has been suggested as a very cautious estimate by Veerhaak, *et al*¹⁴. Our findings definitely indicate that the estimate of 10% is too low (Table 2). We can to some extent validate our results concerning prevalence of chronic pain by comparing our results with other epidemiological studies from Sweden and other countries. Brattberg, *et al* found a prevalence of 40–65%¹⁸ and Andersson, *et al* reported 55%¹⁷ in Sweden. A Danish study found a prevalence of unspecified chronic pain of 30%²⁵. In addition, studies from the United Kingdom and Australia reported rather similar data on chronic pain — 46.5%¹², 50.4%²⁶, and 51%²⁷. These studies reasonably agree with our finding of prevalence of chronic pain, 53.7%. As noted, there are many differences in the estimates of prevalence of chronic pain in the general population. Andersson suggests that lower figures from North America could be because more specific conditions were examined (i.e., not the total pain experience)⁹.

Data concerning musculoskeletal pain might be relevant in this context because such pain constitutes the majority of pain. Bergman, *et al* reported an age-adjusted prevalence of 38.3% for women and 30.9% for men in chronic musculoskeletal pain. After attempts to control for prevalence in

the nonresponders, they calculated a prevalence of 31.4%¹⁶. In the study of Andersson, *et al*, 90% of those with chronic pain (55% of the population) localized it to the musculoskeletal system¹⁷. Both these studies were based on postal questionnaires, and the validity with respect to the origin of the pain (i.e., musculoskeletal) can to some extent be questioned due to factors such as referred pain from viscera and other areas.

Several authors have pointed out problems with performing community-based studies¹². Considerable heterogeneity exists with respect to methodology², and Linton and Ryberg reported that the large variations in prevalence rates are mainly due to methodological differences²⁸. A criticism of our results could be that our postal questionnaire did not consist of a validated instrument, even though it appeared to have both content and face validity according to both professionals and patients that answered the questionnaire when tested before the survey was mailed. The length of the questionnaire will reasonably influence the participation rate, and the optimal length versus participation rate is unknown. To obtain comparable results across studies there is obviously a need to develop brief and valid instruments. In several studies the questions are only briefly reported, which also makes it difficult to make comparisons between studies. Another methodological aspect could be whether any definition of pain was given in the questionnaire or not (as in our study).

However, differences in prevalence rates between studies might not only reflect methodological differences but also ethnographic factors, social differences, and differences in insurance systems⁹. For example, regional differences in the prevalence of rheumatic complaints in Sweden have been reported, and physically strenuous working conditions were found more frequently in geographical regions of low population density²⁹.

In contrast to the estimate by Veerhaak, *et al*¹⁴, we conclude that a more valid estimate of chronic pain in the community is 40–50%.

Frequency and intensity of pain. In this study, 56% of the pain group reported constant or frequent pain according to our 4-grade scale. Epidemiological studies seldom study pain intensity. In contrast to this and some other studies^{18,30}, Andersson, *et al*¹⁷ found that women reported higher pain intensity for the total pain experience than men.

Elliott, *et al* asked the respondents to rate the severity of pain according to a 4-grade scale, and found that 16% had the most severe grade and that 28% reported the highest level of expressed need (i.e., demand for and use of health service resources)¹², which the authors suggest indicated a disparity between severity of chronic pain and the expressed need. In our study, 58% of the pain group had seen a medical professional due to their pain, which indicates that chronic pain for the majority had direct social and economic consequences. Others have reported a similar finding^{15,31}.

Age. The prevalence of pain increased with age up to 50–64 years, but pain prevalence was somewhat lower in the age group ≥ 65 years (Table 2). Other studies of chronic pain conditions have reported similar patterns, with peak prevalence below retirement age^{17,18,32,33}. Bergman, *et al* also reported peaks in prevalence, but they found that this occurred after retirement in women¹⁶. Andersson, *et al*, however, reported that women reached the peak earlier than men¹⁷. Two reasons for the somewhat lower prevalence in the highest age group compared to the age group before retirement could be related to the expected higher mortality in this age group (i.e., selection effects) and to lower demands on the musculoskeletal system due to retirement⁹. Other reasons suggested are impaired function of the nervous system, greater acceptability of pain, or cohort effects⁹. However, in our study no peak prevalences in pain frequency and pain intensity were found before retirement; the highest proportions with high frequency and intensity were found in the oldest age group (Table 4). This might indicate that the consequences for people with pain are greatest in the oldest age group. This observation and interpretation confuses the issue of whether the age group above retirement age has greater acceptability of pain.

Sex. Our findings confirm studies that report sex differences in prevalence of chronic pain. For the whole body of data we found 8.5–11.0 percentage points higher prevalence of pain in women (Table 2). In 2 earlier epidemiological studies in Sweden no gender differences were found^{17,18}. Different factors such as biological differences in pain perception, occupation, work tasks, possibility of achieving treatment and rehabilitation, double work of women (occupational/household), etc., might contribute to the higher prevalence in women. In a review, Le Resche noted possible contributors such as anatomical/physiological factors, perceptual factors, cognitive and emotional experiences, coping abilities, willingness to report pain, different socialization and occupational roles, and social expectations¹⁹. She also noted a probable multifactor etiology¹⁹. We were able to control for some of these factors (i.e., employment status and income) in the multivariate models of prevalence of pain (Table 3), but the gender factor remained significant. Bergman, *et al* reported significantly higher prevalence in women than in men, and they attributed the differences to higher prevalence of chronic widespread pain in women than in men, while no difference existed for chronic regional pain¹⁶. Rollman and Lautenbacher suggested the existence of a sex-dependent state of increased sensitivity for deep tissue pain might be the cause of musculoskeletal pain and make many women vulnerable to the development and maintenance of such pain³⁴. One interesting finding was that gender had no significant influence on frequency or intensity of pain (Table 4). In other words, not all aspects of chronic pain showed gender dependency.

Healthcare-seeking. Our study confirms earlier reports that

pain is associated with a considerable amount of healthcare use^{35,36}. Sex was not a significant regressor variable in the models of healthcare, in agreement with other studies^{22,37,38}. Both frequency of pain and intensity of pain are related to healthcare-seeking (Table 5). These aspects of pain are as important as the other significant variables (age, sick leave/early retirement, or income below median) in the models presented. As well, other studies have reported that pain intensity is correlated with healthcare-seeking^{22,37,39}. Von Korff, *et al* reported that severity, persistence, and recent onset of pain were associated with healthcare contact³⁸. Andersson, *et al*²² found that pain intensity was related to healthcare-seeking (physician visits) but was also related to factors such as age, socioeconomic level, immigration status, depression, and chronic disease.

Occupational activity and employment status. Our findings clearly show that chronic pain per se, but not acute pain, is significantly related to occupational activity (Table 5), which implies considerable social and economic consequences of chronic pain. However, the model in Table 5 also showed that a complex pattern of factors related to age, income, and citizenship must be analyzed in order to understand the mechanisms related to sick leave in the Swedish society.

In several regressions (Tables 3–5), sick leave/early retirement was a significant variable, in agreement with reports of the official statistics of Sweden⁵. In addition, studies from the UK and Australia report similar results: individuals who were retired/not able to work were more likely to report chronic pain^{2,12}. Especially in the regression of unbearable/severe pain, the variable had strong influence, which could indicate that those with the highest pain intensities are more likely to stop working.

Annual income and citizenship. Several potentially interesting variables such as annual income, marital status, urban residence, and citizenship had little or no significant effect on prevalence of pain (Table 3) and frequency of pain (Table 4). In contrast, some studies report associations between blue-collar work, low income, or low level of education and chronic musculoskeletal pain^{5,17,32,33,40-43}. However, the Nuprin study found no striking differences with respect to income groups⁴⁴. Localized chronic pain is in some instances work-related, and annual income was selected in order to reflect the socioeconomic position. It can be argued that this variable might not be sufficiently specific when trying to determine socioeconomic position, or that the effect of income differs across countries. On the other hand, low annual income was associated with higher pain intensity within the pain group, according to the regression data in Table 4, which should be confirmed in other studies, but which could imply that socioeconomic position as indicated by annual income only influences certain aspects of pain. The multivariate models that we used to evaluate the effect of annual income on pain prevalence included sick leave,

which can be viewed as a consequence rather than a predictor of pain. Since sick leave and annual income are correlated, including sick leave as a predictor variable may hide a possible association between annual income and pain prevalence. However, we conducted analyses of annual income and prevalence of pain at repeated occasions during the last 3 months and chronic pain, respectively, in bivariate settings and we still found no such association (data not shown).

In addition, non-Nordic citizenship showed a similar pattern to low income; citizenship was only important in the regression of pain intensity (Table 4). Together, these 2 variables illustrate different aspects of social circumstances, and they independently influence pain intensity. Several studies from Sweden show that immigrants have more musculoskeletal disorders and are overrepresented among those who are on early retirement^{5,45-47}. Experimental studies have shown some ethnocultural influences in aspects of pain, but there appears not to be a consistent pattern⁴⁸⁻⁵⁰. There are studies that have found no significant differences in prevalence⁵¹.

Our observation that 53.7% of the general population had chronic pain confirms earlier reports. For example in Sweden and the UK very high prevalences of chronic pain are described in the general population — 55.2%¹⁰ and 46.5%¹⁷. Our results also show that chronic pain (especially when frequent and intensive) has very prominent effects upon occupational activity and healthcare-seeking. Thus the estimate of 10% suggested by Veerhaak, *et al*¹⁴ appears to be too low and cannot be used as a basis for planning healthcare and prevention of chronic pain or to predict the effects upon social security systems and working life.

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