Clinical pain research

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Association between health care utilization and musculoskeletal pain. A 21-year follow-up of a population cohort

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Abstract

Background and aims: Few studies have reported the long-term impact of chronic pain on health care utilization. The primary aim of this study was to investigate if chronic musculoskeletal pain was associated with health care utilization in the general population in a 21-year follow-up of a longitudinal cohort. The secondary aim was to identify and describe factors that characterize different long-term trajectories of health care utilization.

Methods: A prospective cohort design with a baseline sample of 2,425 subjects (aged 20–74). Data were collected by self-reported questionnaires, and three time points (1995, 2007, and 2016) were included in the present 21-year follow up study. Data on health care utilization were dichotomized at each time point to either high or low health care utilization. High utilization was defined as >5 consultations with at least one health care provider, or ≥1 consultation with at least 3 different health care providers during the last 12 months. Low health care utilization was defined as ≤5 consultations with one health care provider and <3 consultations with different health care providers. The associations between baseline variables and health care utilization in 2016 were analyzed by multiple logistic regression. Five different trajectories for health care utilization were identified by visual analysis,

whereof four of clinical relevance were included in the analyses.

Results: Baseline predictors for high health care utilization at the 21-year follow-up in 2016 were chronic widespread pain (OR: 3.2, CI: 1.9–5.1), chronic regional pain (OR: 1.8, CI: 1.2–2.6), female gender (OR: 2.0, CI: 1.4–3.0), and high age (OR: 1.6, CI: 0.9–2.9). A stable high health care utilization trajectory group was characterized by high levels of health care utilization, and a high prevalence of chronic pain at baseline and female gender (n=23). A stable low health care utilization trajectory group (n=744) was characterized by low health care utilization, and low prevalence of chronic pain at baseline. The two remaining trajectories were: increasing trajectory group (n=108), characterized by increasing health care utilization, chronic pain at baseline and female gender, and decreasing trajectory group (n=107) characterized by decreasing health care utilization despite a stable high prevalence of chronic pain over time.

Conclusions: The results suggest that chronic pain is related to long-term health care utilization in the general population. Stable high health care utilization was identified among a group characterized by female gender and a report of chronic widespread pain.

Implications: This cohort study revealed that chronic widespread pain predicted high health care utilization over a 21-year follow-up period. The results indicate the importance of early identification of musculoskeletal pain to improve the management of pain in the long run.

Keywords: musculoskeletal pain; health care utilization; chronic pain; pain prevalence; epidemiology.

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1 Introduction

Musculoskeletal pain is a major health problem in the general population worldwide [1, 2]. The prevalence is between 12 and 50% of the population in western countries, depending on definition and duration of pain [3–5].

Chronic pain can be defined as persistent or recurrent pain >3 months [6], and can further be categorized into chronic regional pain (CRP) and chronic widespread pain (CWP) [7, 8]. However, the long-term courses of chronic pain are often more complex regarding the interaction between biopsychosocial factors, and different trajectories of pain intensity and frequency, psychological variables, and disability have been identified [9, 10]. Long-term trajectories of pain have also been associated with life-style factors such as sleep-duration, smoking, and obesity [10]. Chronic pain is more common in women, increases with age, and is associated with initial high pain intensity, psychological distress, lower socio-economic status, and being an immigrant [11–13].

Musculoskeletal pain is a common reason for seeking health care in the general population, but there are also other factors associated with health care utilization. Major determinants of health care utilization are female gender, high age [14–16], degree of disability [15], and fear-avoidance beliefs related to pain [17]. Low education level is also associated with higher health care utilization. Pain frequency and pain intensity are associated with health care seeking in chronic pain [18]. Individuals with CWP, chronic low back pain [19], and fibromyalgia [20, 21] reported a high health care utilization compared to individuals with other musculoskeletal pain conditions [14, 15, 21]. However, few studies have reported how the course of chronic pain impacts on health care utilization over time.

A longitudinal register-based population study reported that musculoskeletal pain (≤ 2 week duration) could have a considerable impact on health care utilization in the longer term [22]. A cross-sectional register-based population study including four measurement time points concluded that musculoskeletal disorders were associated with an increased use of both primary and specialist health care in Norway [16]. It is also important to identify individual factors associated with health care utilization in relation to musculoskeletal pain and variations over time, which can contribute to better understanding of individual conditions for managing pain. Such knowledge is also valuable when allocating health care resources and differentiating treatment methods.

The primary aim of this study was to investigate if chronic musculoskeletal pain was associated with health care utilization in the general population in a 21-year follow-up of a longitudinal cohort. The secondary aim was to identify and describe characteristics associated with different long-term trajectories of health care utilization.

2 Methods

2.1 Design

A population-based longitudinal cohort study (part of the EPIPAIN study) conducted over 21 years, including measurements at three time points (1995, 2007, and 2016).

2.2 Sample and data collection

At the start in 1995, a systematic sample of 3,928 subjects, every 18th man and woman from each municipality, was selected from the computerized Swedish national population register. The target population was all 70,704 inhabitants aged 20–74 years in two municipalities in the south of Sweden: Halmstad and Laholm. Data were collected over a 21-year period by postal surveys. In 2016, participants also had the option to answer a web-based survey. Two reminders were sent out on each occasion. There were 2,425 subjects (62%) who responded to the initial questionnaire in 1995 [23]. Follow-up surveys were sent out in 1998, 2003, 2007, and 2016 to all participants who responded to the baseline study (Fig. 1). The EPIPAIN project is previously described in more detail [23, 24]. In the present study, data for chronic pain, health related quality of life and demographic variables in 1995, and for health care utilization in 2016 were used for the primary aim. For the secondary aim, data for chronic pain and health care utilization in 1995, 2007, and 2016 were used.

2.3 Instruments

The questionnaire survey consisted of two parts, including several validated self-reported instruments assessing the impact of physical and mental health.

The first part included the Swedish version of SF-36 Health Survey [25], which measures health related quality of life across eight generic health concepts representing basic human functions and well-being. The SF-36 consists of 36 items grouped into the following eight categories: physical functioning, role function – physical aspects, bodily pain, general health perception, vitality, social functioning, role function – emotional aspects, and mental health. For each item, raw scores were coded, summed, and transformed into a subscale according to a scoring algorithm [25], ranging from 0 to 100, where a higher score indicates better health. The Swedish version of the SF-36 used in the current study has been reported to

Fig. 1: Flow diagram of the surveys in the study cohort.

be reliable and valid in general adult and elderly populations [26–28].

The second part was a pain mannequin of the body, including questions about the experience and distribution of chronic musculoskeletal pain. The pain mannequin was developed within the EPIPAIN project, constructed in accordance with the American College of Rheumatology 1990 criteria for fibromyalgia and widespread pain [7]. The pain experience and distribution were categorized into three groups: chronic widespread pain (CWP), chronic regional pain (CRP), or no chronic pain (NCP). The prevalence of chronic musculoskeletal pain was assessed by the following question: *Have you experienced pain for more than three months during the last 12 months?* The participants were categorized as the CWP group if they had pain symptoms for at least 3 months during the past 12 months, and reported widespread pain in the mannequin, that is, pain in the axial skeleton, in both sides of the body and in the upper and lower part of the body. If

they had experienced pain symptoms for the same duration but did not report widespread distribution, they were categorized as the CRP group. If no pain was experienced for at least 3 months during the past 12 months, they were categorized as the NCP group.

Other questions included in the survey were assessing health care utilization, demographic variables including socio-economic factors, general health and lifestyle factors (i.e. sleep, alcohol consumption, smoking, and physical activity). Questions about health care utilization during the last 12 months were responded to in a multiple-choice format with four categories for each health care provider: 0 consultations, 1 consultation, 2–5 consultations, and >5 consultations. The ordinal data on health care utilization included consultations with physiotherapists, general practitioners, rheumatologists, orthopedic surgeons/general surgeons, pain physicians, emergency room physicians, occupational physicians, and other physicians.

2.4 Data management

Data on health care utilization were dichotomized at each time point to either high or low health care utilization. High utilization was defined as >5 consultations with at least one health care provider, or ≥ 1 consultation with at least 3 different health care providers during the last 12 months. Low health care utilization was defined as ≤ 5 consultations with one health care provider and <3 consultations with different health care providers. The definitions of high and low health care utilization were based on prior knowledge of an average number of consultations with health care providers in the population in the current geographic area in the south of Sweden. Missing items on health care utilization for any of the health care providers were considered as 0 consultation. Data for health care utilization for physiotherapists and for general practitioners were selected for separate analyses, as these professions had the most frequent consultation rates among the health care providers.

Five trajectories for health care utilization over time were identified using visual analyses, based on low or high total health care utilization at each time point. Three points of measurements were included in the analyses: 1995, 2007, and 2016 to represent an extensive period of time. In the case of missing data in 2007, data from 2003 were used instead in the analyses according to the method last value carried forward [29]. In the case of missing data at baseline in 1995 or in 2016, the case was excluded from the analyses. In the trajectory analysis, data from five individuals were replaced from 2003 to 2007. One trajectory fluctuated between the high and low levels of health care utilization without a specific direction over time ($n = 88$) and was not included in the further analyses.

The four trajectories included in the analyses were:

1. Low: low health care utilization at all three points of measurement
2. High: high health care utilization at all three points of measurement
3. Decreasing: high health care utilization in 1995 and low in 2016 and/or in 2007
4. Increasing: low health care utilization in 1995 and high in 2016 and/or in 2007

Data on NCP, CRP, and CWP were included in the analyses. Missing data or chronic pain not possible to define as CRP or CWR according to the predefined criteria because of incomplete marking on the pain mannequin on the body were excluded.

2.5 Statistics

Descriptive statistics, i.e. numbers and percentages for categorical data and mean and standard deviations for numerical data were used to present demographic variables, the SF-36, the prevalence of chronic pain, and health care utilization. Binary logistic regression analysis was used to calculate the odds ratios and 95% confidence intervals for the association between potential predictive baseline variables, i.e. chronic pain, gender, age, immigrant status and the SF-36, with health care utilization in 2016 as outcome variable. Each variable was entered in separate analyses together with age and gender. Comparisons of pain prevalence and health care utilizations in 1995, 2007, and 2016 were performed with McNemar's test. Comparisons between those who responded and those who did not respond to the 2016 follow-up and associations between baseline variables and health care utilization in 2016 were performed using chi-2 tests. Comparisons between different trajectories were performed using a chi-square test or Fisher's exact test for categorical data and with Student's *t*-tests for numerical data (SF-36). Complete case analysis was used, except for calculating the health care utilization trajectories. No other methods were used for imputation of missing data.

The analyses were performed using the IBM Statistical Package for the Social Sciences (SPSS) version 24.0.

3 Results

3.1 Attrition at follow-up

There were 1,184 subjects who responded to the follow-up questionnaire in 2016. Attrition from baseline 1995 ($n = 2425$) was due to actively declining participation (17%), not responding to the questionnaire (44%), death of the participant (36%) or not having a valid address (4%) (Fig. 1). Baseline characteristics and pain prevalence for those who responded in 1995 and those who responded to the follow-up in 2016 are presented in Table 1.

Subjects responding to the follow-up in 2016 had a higher prevalence of chronic pain ($p < 0.001$) and there was a higher proportion of women ($p = < 0.001$) compared to baseline. The responders were also older ($p < 0.001$) and reported higher scores in all domains of the SF-36 Health Survey ($p < 0.001$). Native-born Swedes were more likely to respond to the follow-up compared to immigrants ($p < 0.001$).

Table 1: Baseline characteristics and pain prevalence for participants in 1995 and at follow-up in 2016.

Baseline characteristics	1995 (n=2,425)	2016 (n=1,184)
Gender n (%)		
Male	1,098 (47)	509 (43)
Female	1,259 (53)	675 (57)
Age (years) n (%)		
20–33	597 (25)	284 (25)
34–47	617 (26)	366 (32)
48–59	586 (25)	359 (32)
60–75	557 (24)	122 (11)
Immigrant n (%)		
No	2,062 (88)	1,014 (90)
Yes	277 (12)	109 (10)
SF 36 health survey mean		
PF	86	90
RP	78	84
BP	72	74
GH	74	77
VT	68	68
SF	88	90
RE	83	87
MH	80	82
Pain prevalence n (%)		
Non chronic pain	1,466 (62)	590 (51)
Chronic regional pain	588 (25)	346 (30)
Chronic widespread pain	303 (13)	233 (19)

PF=physical functioning; RP=role function – physical; BP=bodily pain; GH=general health; VT=vitality; SF=social functioning; RE=role function – emotional; MH=mental health.

The prevalence of CRP and CWP increased from 1995 to 2007 but remained stable from 2007 to 2016 (Table 2). Total healthcare utilization was stable between the three time points. Consultations with physiotherapists

decreased from 1995 to 2007 and there was an increase of consultations with general practitioners between 2007 and 2016 (Table 2).

3.2 Baseline predictors of high health care utilization in 2016

Female gender was significantly associated to high total health care utilization in 2016, mainly and significantly due to high utilization of physiotherapist (Table 3). A report of chronic pain and especially CWP at baseline predicted high health care utilization in 2016, both regarding total health care utilization, and separately for physiotherapists and general practitioners. Low scores in health-related quality of life (SF-36) at baseline were for all domains associated with high total health care utilization and with consultations with general practitioners. Low scores in bodily pain, general health, vitality, and mental health were associated with high health care utilization based on physiotherapist consultations. CRP and CWP remained significant predictors of high health care utilization when controlled for age and gender in e logistic regression analyses (Table 4).

3.3 Health care utilization trajectories

Health care utilization from baseline to the 21-year follow-up in 2016 developed into different patterns of trajectories. Five different trajectories of high or low total health care utilization were identified based on visual

Table 2: Comparisons of chronic pain prevalence and health care utilization between the measurements at 1995, 2007 and 2016 of the individuals who responded to all three time points.

	1995 n (%)	2007 n (%)	1995 vs. 2007 p-value	2016 n (%)	1995 vs. 2016 p-value	2007 vs. 2016 p-value
Pain group n=977			<0.01		<0.01	0.26
Non chronic pain	606 (62)	528 (54)		501 (51)		
Chronic regional pain	244 (25)	273 (28)		293 (30)		
Chronic widespread pain	127 (13)	176 (18)		186 (19)		
Total health care utilization n=949			0.70		0.78	0.46
High	131 (14)	137 (14)		126 (13)		
Low	818 (86)	812 (86)		823 (87)		
Physiotherapist n=235			<0.01		<0.01	0.75
High	44 (19)	19 (8)		22 (9)		
Low	191 (81)	216 (92)		213 (91)		
General practitioner n=922			0.87		0.01	0.01
High	25 (3)	23 (2)		44 (5)		
Low	897 (97)	899 (98)		878 (95)		

High=high health care utilization according to the criteria. Low=low health care utilization according to the criteria.

Table 3: Differences between baseline variables with regard to health care utilization at 2016 dichotomized into high or low health care utilization.

Variables 1995	Total health care utilization n=1,138 n (%)			Physiotherapist n=1,078 n (%)			General practitioner n=1,115 n (%)		
	High	Low	p-value	High	Low	p-value	High	Low	p-value
Gender			<0.01			0.02		461 (43.7)	0.93
Male	43 (27.4)	447 (45.6)		25 (28.1)	443 (44.8)		20 (32.8)		
Female	114 (72.6)	534 (54.4)		64 (71.9)	546 (55.2)		41 (67.2)	593 (56.3)	
Immigrant			0.08			0.45			0.58
No	131 (84.5)	890 (91.3)		77 (88.5)	894 (90.9)		51 (83.6)	951 (90.9)	
Yes	24 (15.5)	85 (8.7)		10 (11.5)	89 (9.1)		10 (16.4)	95 (9.1)	
Age			0.10			0.29			0.09
20–33	34 (21.7)	263 (26.8)		22 (24.7)	268 (27.1)		15 (24.6)	276 (26.2)	
34–47	48 (30.6)	317 (32.3)		36 (40.4)	316 (32.0)		12 (19.7)	347 (32.9)	
48–59	50 (31.8)	305 (31.1)		26 (29.2)	305 (30.8)		17 (27.9)	332 (31.5)	
60–75	25 (15.9)	96 (9.8)		5 (5.6)	100 (10.1)		17 (27.9)	99 (9.4)	
Pain-group			<0.01			<0.01			<0.01
NCP	74 (47.1)	669 (68.2)		42 (47.2)	673 (68.0)		24 (39.3)	705 (66.9)	
CRP	47 (29.9)	228 (23.2)		26 (29.2)	227 (23.0)		18 (29.5)	253 (24.0)	
CWP	36 (22.9)	84 (8.6)		21 (23.6)	89 (9.0)		19 (31.1)	96 (9.1)	
SF 36*	Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)	
PF	83.5 (20.6)	91.4 (13.6)	<0.01	88.3 (15.7)	90.8 (14.8)	0.13	74.8 (24.2)	91.2 (13.8)	<0.01
RP	75.0 (37.6)	85.6 (29.9)	<0.01	79.9 (34.0)	84.9 (30.6)	0.15	60.6 (42.5)	85.6 (29.9)	<0.01
BP	64.2 (27.4)	75.7 (24.5)	<0.01	66.6 (26.6)	75.3 (24.9)	<0.01	56.0 (26.9)	75.2 (24.7)	<0.01
GH	68.8 (23.6)	79.0 (19.8)	<0.01	72.1 (19.9)	78.4 (20.5)	<0.01	61.8 (26.4)	78.5 (20.0)	<0.01
VT	61.2 (24.0)	70.1 (21.7)	<0.01	61.9 (21.5)	70.1 (22.0)	<0.01	58.2 (25.2)	69.9 (21.9)	<0.01
SF	84.1 (22.2)	91.1 (17.3)	<0.01	86.6 (18.5)	90.4 (18.2)	0.06	80.3 (25.4)	90.7 (17.6)	<0.01
RE	77.1 (37.0)	88.5 (26.1)	<0.01	80.6 (34.1)	87.6 (27.2)	0.03	66.1 (42.9)	88.0 (26.7)	<0.01
MH	74.5 (22.1)	83.3 (16.4)	<0.01	74.9 (19.4)	82.9 (17.1)	<0.01	71.5 (24.9)	82.8 (16.8)	<0.01

*The score from each of the eight scales ranges from 0 to 100, where a higher score indicates better health in that aspect. NCP=non chronic pain; CRP=chronic regional pain; CWP=chronic widespread pain; PF=physical functioning; RP=role function – physical; BP=bodily pain; GH=general health; VT=vitality; SF=social functioning; RE=role function – emotional; MH=mental health.

Table 4: Predictive variables at baseline 1995 for high health care utilization at the 21-year follow-up.

Variables 1995	Total health care utilization n=1,130		Physiotherapist n=1,070		General practitioner n=1,107	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Gender						
Male	1		1		1	
Female	2.0 (1.4–3.0)	<0.01	1.9 (1.2–3.1)	0.01	1.3 (0.7–2.3)	0.36
Immigrant						
No	1		1		1	
Yes	1.6 (1.0–2.7)	0.07	0.9 (0.5–2.0)	0.87	1.6 (0.8–3.4)	0.21
Age						
20–30	1		1		1	
32–47	1.0 (0.6–1.7)	0.87	1.2 (0.7–2.1)	0.54	0.5 (0.2–1.2)	0.12
48–59	1.2 (0.7–1.8)	0.69	0.8 (0.4–1.5)	0.50	0.7 (0.4–1.6)	0.43
60–75	1.6 (0.9–2.9)	0.12	0.4 (0.2–1.2)	0.12	2.2 (1.0–4.8)	0.04
Pain-category						
NCP	1		1		1	
CRP	1.8 (1.2–2.6)	<0.01	1.9 (1.1–3.1)	0.02	2.0 (1.1–3.8)	0.03
CWP	3.2 (1.9–5.1)	<0.01	3.9 (2.1–7.1)	<0.01	4.8 (2.4–9.5)	<0.01

NCP=non chronic pain; CRP=chronic regional pain; CWP=chronic widespread pain. Each of the variables were entered in separate analyses together with age and gender.

analyses of data at the three time points of measurement. Clinically relevant patterns were identified in four of these trajectories: stable low or stable high health care utilization, and increasing or decreasing health care utilization (Table 5).

The stable low trajectory (n=744) was characterized by low health care utilization at all three time points. A majority (80%) of subjects in the low group reported NCP at baseline. There was no difference in the proportion of men and women in this group (Table 5).

The stable high trajectory (n=23) was characterized by high levels of health care utilization at all three time

points. Most subjects in the stable high group reported chronic pain at baseline, with a prevalence of 35% for CRP and 61% for CWP. The prevalence of chronic pain increased over time. There were significantly more women (74%) than in the stable low trajectory (Table 5).

The increasing trajectory (n=108) was characterized by low levels of health care utilization at baseline, followed by an increasing trend. The prevalence of CRP and CWP were higher at baseline than in the stable low trajectory. The prevalence of chronic pain increased over time, and there were significantly more women (72%) than in the stable low trajectory (Table 5).

Table 5: Prevalence of chronic pain in 1995, 2007, and characteristics at baseline associated with trajectories for total health care utilization based on three measurements; 1995, 2007 and 2016.

Pain prevalence	1. Stable low (n=744) n (%)	2. Stable high (n=23) n (%)	Group 1 vs. 2 p-value	3. Increasing (n=108) n (%)	Group 1 vs. 3 p-value	4. Decreasing (n=107) n (%)	Group 1 vs. 4 p-value
Pain group 1995			<0.01		<0.01		<0.01
NCP	594 (80)	1 (4)		61 (56)		23 (22)	
CRP	116 (15)	8 (35)		29 (27)		55 (51)	
CWP	34 (5)	14 (61)		18 (17)		29 (27)	
Pain group 2007			<0.01		<0.01		<0.01
NCP	460 (67)	1 (4)		34 (36)		27 (28)	
CRP	165 (24)	5 (23)		31 (33)		32 (33)	
CWP	56 (8)	16 (73)		30 (35)		38 (39)	
Pain group 2016			<0.01		<0.01		<0.01
NCP	460 (63)	1 (4)		14 (13)		32 (30)	
CRP	199 (27)	4 (17.5)		50 (48.5)		32 (30)	
CWP	74 (10)	18 (78.5)		40 (38.5)		41 (40)	
Baseline variables							
Gender			0.05		<0.01		0.13
Women	399 (54)	17 (74)		78 (72)		71 (66)	
Men	345 (46)	6 (26)		30 (28)		36 (34)	
Immigrant			0.41		0.11		0.09
Yes	56 (8)	3 (13)		13 (12)		13 (12)	
No	684 (92)	20 (87)		95 (88)		94 (99)	
Age-group			0.47		0.02		0.15
20–33	203 (27)	3 (13)		22 (20.5)		24 (22)	
34–47	243 (33)	10 (43)		29 (27)		34 (32)	
48–59	236 (32)	8 (35)		36 (33)		33 (31)	
60–75	62 (8)	2 (9)		21 (19.5)		16 (15)	
SF 36 mean (SD)							
PF	94.2 (9.9)	66.0 (17.9)	<0.01	88.2 (17.1)	<0.01	76.9 (20.3)	<0.01
RP	91.6 (22.6)	40.5 (38.3)	<0.01	82.6 (32.7)	<0.01	54.3 (41.3)	<0.01
BP	81.3 (21.5)	37.1 (14.6)	<0.01	70.5 (26.9)	<0.01	50.3 (24.4)	<0.01
GH	83.3 (16.6)	47.4 (18.6)	<0.01	74.6 (21.0)	<0.01	58.4 (23.3)	<0.01
VT	75.0 (19.1)	42.3 (21.2)	<0.01	65.4 (22.7)	<0.01	49.6 (23.8)	<0.01
SF	93.4 (14.7)	73.6 (22.6)	<0.01	88.2 (20.4)	0.01	77.8 (25.0)	<0.01
RE	91.7 (21.9)	60.3 (40.4)	<0.01	81.3 (34.6)	<0.01	74.5 (37.0)	<0.01
MH	85.8 (14.9)	67.4 (16.4)	<0.01	77.4 (20.8)	<0.01	71.9 (20.0)	<0.01

Trajectories for the stable low group were compared with the stable high, the increasing, and the decreasing group, respectively. Stable low = low at three measurements; Stable high = high at three measurements; increasing = go from low to high; decreasing = go from high to low; NCP = non chronic pain; CRP = chronic regional pain; CWP = chronic widespread pain; SF 36: PF = physical functioning; RP = role function – physical; BP = bodily pain; GH = general health; V = vitality; SF = social functioning; RE = role function – emotional; MH = mental health.

The decreasing trajectory ($n=107$) was characterized by high levels of health care utilization at baseline, followed by a decreasing trend. The prevalence of CRP and CWP were higher at baseline than in the stable low trajectory and remained high over time. There was no significant difference in the proportion of men and women in this group compared to the stable low trajectory (Table 5).

Health related quality of life (SF-36) was significantly higher in the stable low trajectory compared with each of the other trajectories regarding all domains (Table 5).

4 Discussion

The present longitudinal cohort study demonstrated that chronic pain (CRP and CWP) at baseline was a predictor for high health care utilization over a period of 21 year in a sample from the general population. Individuals who reported chronic pain at baseline in 1995 were more likely to follow a trajectory of high or increasing health care utilization over the 21-year follow-up compared with those who reported NCP at baseline. Female gender was also associated with high or increasing trajectories for health care utilization over time.

The results from our study indicate that chronic pain can affect health care utilization after 21 years. Similar results have been reported previously, but not over such a long follow-up period. Hartvigsen et al. [22] found that 2-weeks prevalence of musculoskeletal pain predicted an increased use of health care from general practitioners and hospital services. In two cross-sectional population-based studies, associations between musculoskeletal pain and the impact on the use of primary care and specialist health care [16], and between chronic pain and an increased health care utilization [30] have been reported.

The prevalence of chronic pain increased over the 21-year follow-up period, but no corresponding increase was seen in the total health care utilization during the same period. An increasing prevalence of chronic musculoskeletal pain in the general population has been reported during the last few decades [31], but less than 60% of people with low back pain seek care for their problem [15, 22]. Among elderly persons with low back pain, less than half seek care for their problem [32]. These findings are in line with our results. One explanation could be that individuals with chronic pain adapt to their pain condition over time, resulting in decreased health care utilization.

Female gender was a predictor for a high level of total health care utilization and consultations with

physiotherapists in 2016, which is consistent with previous studies that have reported that female gender is associated with high health care utilization due to musculoskeletal pain conditions [14–16, 33].

Age was a predictor of high health care utilization, based on consultations with general practitioners in the oldest age-quartile (60–75 years at baseline). Health problems generally increase with age, leading to more consultations with general practitioners. The associations between high age and high health care utilization were reported in previous studies [33–36], while other studies did not find such associations [14, 15]. The divergent results can be explained by different definitions of health care utilization, different analyses of prevalence, and varying ages of the subjects among the studies.

Health related quality of life (SF-36) scores at baseline were low in all domains according to the normative values for the Swedish population [28], both in the high health care utilization group in 2016, and in the stable high health care utilization trajectory. For low health care utilization in 2016 and the stable low trajectory group, the scores were comparable or above normative scores. In 2016, clinically important differences [37, 38] were found for bodily pain (BP) and physical function (PF) between the high and the low health care utilization group, except for health care utilization based on physiotherapist consultations for which no clinically relevant differences were found in PF. The results indicate an association between low health-related quality of life and high health care utilization in the long-term. Previous studies using this cohort have reported that both physical and mental health status measured by SF-36 predict the development of chronic pain [39].

Individuals who have chronic pain are expected to have greater health care utilization compared to those without pain. However, chronic pain also predicted high health care utilization 21 years later, indicating that this group likely utilizes extensive health care resources over the long-term. Chronic pain is a condition that is difficult to successfully treat, which is both challenging for health care providers and causes an increased cost to society. Early identification of individuals with musculoskeletal pain and predictive factors for a pattern of long-term health care seeking behavior is needed to improve the management of musculoskeletal pain and to decrease the economic burden of health care utilization. Lentz et al. [36] reported that among patients with musculoskeletal pain, more than one-third of the direct health care costs were concentrated among a small percentage (i.e. less than 5%) of individuals with high health care utilization. Given the design in our study, we did not analyze

the health care costs, but we identified a small group of individuals with high health care utilization over a long period of time, which also indicated an economic burden for the health care system.

Consultations due to musculoskeletal pain are more frequent with general practitioners and physiotherapists in primary health care, which is reflected in our study. Primary health care has expanded in Sweden over the last few decades and access to physiotherapists has increased as referral from a physician is no longer required. In our study, the number of consultations with physiotherapists decreased among the participants from 1995 to 2016, and a small increase was reported in visits to general practitioners. One reason for this result could be that participants were aged and had more comorbidities, which required a physician.

4.1 Strengths and limitations

The most important strength of the current study was the 21-year time period established between the proposed predictor variables and the outcomes of interest, and the repeated measurements over the long-term, which have provided useful information regarding the trajectories of health care utilization in relation to pain variables. The response rate in our study was approximately 50% in 2016, which is acceptable, considering that it was a 21-year follow-up. The dichotomized data for health care utilization included in the current study were best suited for visual analysis to identify different trajectories. In case of categorical or continuous data, latent class analysis would have been used instead to identify different trajectory patterns. The results for immigrants with regard to the high health care utilization could be questioned concerning the small group and risk for low power in the analysis.

Differences between the responders and non-responders regarding baseline variables, i.e. chronic pain, gender, age, and immigrant status, could increase the risk of selection bias in the remaining sample, considering that complete case analyses were performed. The higher response rate for females is in concordance with previous studies that used the same cohort [39, 40].

A potential risk of recall bias may have occurred regarding the items of health care utilization as the 12-month prevalence was requested, which could have influenced the results. However, the items were divided into four categories corresponding to the frequencies of consultations with each health care provider which may have reduced the risk of recall bias compared to if the

total number of health care consultations during the last year was requested. Since the initiation of this study in 1995, research has further emphasized the importance of psychological variables such as depression and anxiety [41, 42], fear-avoidance beliefs, catastrophizing, and low expectations of recovery and treatment outcomes [43, 44] regarding the development and maintenance of chronic pain and the consequences in the daily activities of life. This shift toward a more biopsychosocial approach was not yet established in clinical pain management at the start of this study, and the baseline questionnaire did not assess these potential predictors.

The criteria for classification of chronic pain has been revised since the baseline measurement in 1995 and now include pain severity based on pain intensity, pain-related distress, functional impairment, and psychosocial factors [6]. Data in the current study were collected by self-reported questionnaires. The items on health care utilization were specific to pain conditions, which differed from a previous study where data were based on health care utilization in general because pain conditions could not be identified in the register [22]. In our study, we could not determine if chronic pain predicts increased health care utilization in general, which could indicate poorer health. Self-reported data indicate higher rates of health care consultation than register data [14, 16]. On the other hand, register data do not identify individuals who have musculoskeletal disorders in the population who do not seek health care. A combination of self-reported data and register data on health care utilization would likely provide the most valid data on health care utilization.

5 Conclusion

Chronic pain and especially CWP have implications for health care utilization over 21 years and may reflect poorer general health. The majority of the population in the present study reported low health care utilization over time. A trajectory of high health care utilization over a 21-year follow-up was identified in a small group in the general population, characterized by CWP and female gender, which indicates that management of chronic pain in this group is still a challenge, not only for the individual, but also for the health care providers and society.

Authors' statements

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Informed consent: Informed consent was obtained from all individuals in this study.

Ethical approval: The research related to human use complies with all the relevant national regulations, institutional policies, and was performed in accordance with the tenets of the Helsinki Declaration. 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.

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