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Chronic musculoskeletal pain in European older adults: Cross-national and gender differences

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Abstract

Background: In an ageing Europe, chronic pain is a major public health problem, but robust epidemiological data are scarce. This study aimed to analyse the prevalence of and factors associated with chronic musculoskeletal pain by gender in older adults of 14 European countries.

Methods: A cross-sectional study was performed from wave 5 of the Survey of Health, Ageing and Retirement in Europe (SHARE). The study included people ≥50 years residing in Austria, Belgium, Czech Republic, Denmark, Estonia, France, Germany, Italy, Luxembourg, the Netherlands, Slovenia, Spain, Sweden and Switzerland. Chronic pain was defined as being bothered by joint and/or back pain for the previous 6 months. Multivariable Poisson regression models with robust variance were performed to analyse prevalence ratio by covariates, stratified by sex.

Results: A total of 61,157 participants were included. Overall prevalence of chronic musculoskeletal pain was 35.7% (28.8–31.7), ranging from 18.6% (17.1–20.1) for Switzerland to 45.6% (43.3–47.8) for France. Prevalence was higher in women than in men: 41.3% (40.2–42.4) versus 29.1% (28.0–30.3). Chronic musculoskeletal pain was lower in men aged >75 years (PR = 0.82; 0.72–0.92) than the younger (50–59) group. Separated/divorced status presented opposite effects among men (PR = 0.85; 0.76–0.96) and women (PR = 1.12; 1.03–1.21) compared with married, and unemployment was a significant factor in men (PR = 1.21; 95% CI 1.02–1.43) compared with employed.

Conclusions: Musculoskeletal pain in older European adults is very frequent, especially in women, with large differences depending on the country of residence. Health policy makers should prioritize strategies aimed at improving the prevention and management of chronic musculoskeletal pain in Europe.

Significance: This study provides epidemiological data of chronic musculoskeletal pain in older adults. Reported differences contribute to highlight the relevance of considering a gender perspective in chronic musculoskeletal pain research. Cross-national comparison also offers a map of differences that improves the knowledge of this chronic condition in Europe.

1. Introduction

Chronic pain is considered not only a symptom but a disease in its own right (Niv and Devor, 2004). The impact of chronic pain on frailty, well-being and socio-economic burden associated both at individual and society level makes it a major public health issue in an ageing Europe. Eurostat population data estimate that the population of people over 65 years old in Europe will increase from 18% in 2013 to 28% in 2060 (European Commission, 2015). This demographic reality entails a relevant challenge for healthcare systems, policy makers and general society who have to deal with a progressive increase in the prevalence and impact of chronic conditions and comorbidities.

Epidemiological studies of non-cancer chronic pain have been mostly oriented to the general population. A prevalence of 37.3% has been reported in developed countries (Tsang et al., 2008). An European survey revealed a prevalence of moderate to severe chronic pain of 19%, reporting wide country differences and high levels of healthcare utilization (Breivik et al., 2006). Studies about the epidemiology of chronic pain conducted in a sample of older European adults are scarce. Furthermore, these studies are often focused on the prevalence of a particular region (Miró et al., 2007; Rapo-Pylkkö et al., 2016) or on the analysis of specific problems related to chronic pain (Silva et al., 2013; Mänty et al., 2014). Besides, methodological variation in the assessment of pain and the unclear representativeness of many epidemiological studies (Reid et al., 2011) also contribute to the lack of reliable epidemiological data about the prevalence of chronic pain in Europe.

The most frequent system affected by chronic pain in older populations is the musculoskeletal system, with the back and joints being the most common location of pain in older adults (Loeser, 2010; Novotny et al., 2015; Rottenberg et al., 2015). Musculoskeletal pain in the elderly has been associated with disability, occurrence of falls, sleeping disorders or depression (Leveille et al., 2009; Chen et al., 2011; Hermsen et al., 2014; Calvó-Perxas et al., 2016). These conditions, added to the severity of pain, lead to reduced quality of life (Silva et al., 2013).

Complexity of chronic pain roots in its multidimensionality. The biopsychosocial model of chronic pain discussed by Gatchel et al. presents an integral approach of chronic pain attending differences in nociception process and in psychosocial factors (Gatchel et al., 2007). Although ageing has been traditionally considered a risk factor of chronic pain (Blyth, 2010), this association in older adults is still not clearly demonstrated (Helme and Gibson, 2001). Differences in the prevalence of chronic pain between men and women have been previously described (Breivik et al., 2006; Reitsma et al., 2012). Many studies support differences in perception of pain due to biological features (Paller et al., 2009), but also gender differences in roles, beliefs or coping strategies could contribute to the observed differences between men and women (Fillingim et al., 2009; Ramírez-Maestre and Esteve, 2014). An exploratory analysis stratified by sex could give relevant information to better understand these differences in chronic pain. In addition, as Europe includes regions with different cultural and social constructions that present various supportive welfare models with differences in social support or healthcare access, a cross-national comparison could provide a global vision of this issue in older adults around Europe.

Generating robust epidemiological data is essential to provide health policy makers with information to make decisions and prioritize strategies aimed at improving the prevention and management of chronic pain in older adults. In this sense, the goals of this study are to analyse the prevalence and characteristics of chronic joint and/or back pain in adults over 50 years old in 14 European countries by gender and to explore the possible associated factors at individual level, using a representative sample of older adults residing in Europe.

2. Methods

2.1 Study design and participants

A cross-sectional study was performed using data from wave 5 of the Survey of Health, Ageing and Retirement in Europe (SHARE) conducted in 2013 (Börsch-Supan et al., 2013). SHARE is a multidisciplinary and cross-national study based on probability samples designed to be representative of non-institutionalized European people aged ≥50 years old. Calibrated individual weights have been designed to tackle unit non-response and sample attrition providing an accurate estimation of national populations. Besides, an imputation dataset has been performed to mitigate problems of missing data. More methodological details of SHARE project can be consulted in Börsch-Supan et al. (2005), SHARE wave 5: innovations and methodology (Malter and Börsch-Supan, 2015) and the web page of the

project (www.share-project.org) which offers extensive information and free data access. Wave 5 of SHARE project has been reviewed and approved by the Ethics Council of the Max-Planck-Society for the Advancement of Science.

The study included 61,980 people aged ≥50 years old who resided in 14 European countries: Austria, Belgium, Czech Republic, Denmark, Estonia, France, Germany, Italy, Luxembourg, the Netherlands, Slovenia, Spain, Sweden and Switzerland. Participants were surveyed at home by trained interviewers. We excluded cases whose calibrated individual weight was not available (n = 629; 1.0%) or if they had missing data in the dependent variable, presence or absence of chronic joint and/or back pain (n = 194; 0.3%).

2.2 Measures

2.2.1 Variables

The dependent variable, chronic joint or back pain was determined by asking first if participants had been bothered by pain. If the response was affirmative, they were asked to locate the pain. Subjects who expressed that pain was located in their back, knees, hips or another joint were asked to assess chronicity through the following question: 'Have you been bothered for the past 6 months at least by any of these joint pains?'(Yes/no). This multi-item indicator of pain was partially based on the Brief Pain Inventory (Cleeland and Ryan, 1994). Independent variables were structured according to the biopsychosocial model of chronic pain (Gatchel et al., 2007).

2.2.1.1 Biological factors. Although there were no data about physiological variables of nociception process, we selected the following variables due to its possible relation with biological conditions related to nociception response or as proxies of tissue damage: age (due to its asymmetric distribution, it was categorized in quartiles to create groups that had approximately the same size, 50–59; 60–66; 67–76; >75); sex; number of chronic diseases (from 0 to >3, four categories; chronic pain not included); falling down; and mobility limitations (no limitations and 1 or more limitations) (Yezierski, 2012; Bartley and Fillingim, 2013).

2.2.1.2 Psychological and behavioural factors. We selected the following variables to explore psychological factors: self-reported health status; trouble with sleeping; mental health assessed with the EURO-D, a 12-item questionnaire of depression, depression cases were classified using a cut-off score ≥4 (Castro-Costa et al., 2007). Time orientation and difficulty in concentrating (reading) were included as proxies of cognitive impairment. Well-being was assessed in SHARE through the CASP-12 questionnaire (Borrat-Besson et al., 2015), a short version of CASP-19 (Hyde et al., 2003), which is a well-validated instrument to measure positive quality of life. Scores were categorized in tertiles (0–23; 24–28; 29–36). Higher scores represent better quality of life (Okely et al., 2016).

A short version of R-UCLA Loneliness Scale (Neto, 2014) included three questions about how much of the time participants felt a sense of being left out, a lack of companionship, and isolation categorized from 1 (hardly ever) to 3 (often) and the total score was the sum of the three items (3–9). We categorized it into tertiles: not lonely (3), sometimes lonely (4) and often/very lonely (5–9).

Behavioural risks explored were smoking (ever smoke daily), drinking (more than two glasses of alcohol almost every day), body mass index (BMI) and physical inactivity. Dietary factors associated with BMI or the lower intake of vitamins have been related with an increase of osteoarthritis (Musumeci et al., 2015). The questionnaire included four-diet items aimed at exploring the intake frequency of dairy products such as milk, legumes or eggs, meat, fish or poultry and fruit or vegetables in a normal week. Despite its limitations, we generated a dichotomous diet variable (normal/poor diet). Poor diet was considered if people ate dairy products such as milk, legumes or eggs, meat, and fruit or vegetables twice a week or less.

2.2.1.3 Social factors. Social factors were country of residence; marital status (married/registered, separated/divorced, single or widowed); migration status, assessed by asking if the country of residence was the country where individual was born; number of children; area of residence and employment status (employed, unemployed, retired or permanently sick or disabled). Educational level (primary or lower; secondary; and post-secondary educational level) was used as a proxy of socio-economic status (Börsch-Supan, 2008). SHARE used the International Standard Classification of Education (ISCED-97) to generate educational achievement (ISCED-1997, 2006). Socio-economic status was also explored using a wealth index in quintiles calculated as the sum of household assets: value of main residence; value of any other real state; value of bank accounts, bond,

stock and mutual funds; value of share part of a business and value of cars, minus mortgage on main residence and financial liabilities (Börsch-Supan, 2005; Allin et al., 2009). Limitations in activities of daily living (ADL; no limitations and one or more limitations) were explored. Active ageing was assessed through a question that listed several leisure and social activities such as done voluntary work, courses, read books or playing games such as crossword or cards. From this multi-option variable, we generated a dichotomous variable of leisure and social activities: none of the listed activities and one or more activities.

We also explored additional information about characteristics of chronic joint and/or back pain related to location (multisite was considered when three or more locations were selected among those included in the response options: back, hips, knees, other joints); intensity of pain was assessed through an item with three categories: low, moderate, severe; treatment; and pain-related diseases included in wave 5 of SHARE.

2.3 Statistical analysis

We used the imputation dataset generated by SHARE project that only included those variables considered suitable for imputation under criteria of SHARE statistical technical support. Simple imputation was conducted by assigning a value for each missing value obtained from the own variable or other variables to complete the database (Malter and Börsch-Supan, 2015). A sensitivity analysis showed no differences in the distribution of results between original and imputed variables. After that, there were no covariates with more than 5% of missing data and these were thus maintained.

First, we calculated the prevalence and 95% confidence intervals (95% CI) of chronic joint and/or back pain for the total sample and for each independent variable by estimating the proportion of individuals with self-reported chronic joint and/or back pain. We analysed characteristics of chronic joint and/or back pain by location (back, knee, hips, other joints or multisite when three or more location were selected), severity (mild, moderate or severe), treatment for pain, sleep problems, anxiety or depression and pain-related diseases (hip or other fractures, rheumatoid arthritis and osteoarthritis/other rheumatism) through proportions and 95% CI. Overlapping 95% CI indicated non-significant associations.

We performed a univariable analysis to explore which covariates presented a significant association with chronic joint and/or back pain. After that, we carried out a Likelihood ratio test to assess if continuous variables had a linear relationship with pain, and, if not, we introduced them as categorical variables in the regression model. Independent variables with Spearman coefficients ≥ 0.6, indicating collinearity, were not included in the multivariate model.

Multivariable Poisson regression models with robust variance were conducted using generalized linear models with a backward stepwise procedure in order to estimate the adjusted prevalence ratio (PR) of variables associated with chronic joint and/or back pain (Barros and Hirakata, 2003). In order to estimate if the association between chronic musculoskeletal pain and covariates differed by sex, we assessed the interaction of sex with explanatory variables. A $p \leq 0.1$ was considered significant in the interaction test. Multiple interactions were observed. Therefore, we performed a stratified analysis by sex using the final model previously described. Regarding the aim of assessing cross-national differences, a multi-level approach was planned using country as the level. However, the first model, tested to provide information about variability between countries without explanatory variables (empty model), showed no significant variability, and multi-level analysis was, therefore, not conducted.

All analyses were conducted using calibrated individual weights. Analyses were performed using the statistical package Stata 14.0.

3. Results

3.1 Prevalence of chronic joint and/or back pain

A total of 61,157 participants were included in the analysis. The sample had an overall mean age of 66.1 (standard deviation, SD, 10.7) years and 53.9% were women. Table 1 shows descriptive characteristics and the prevalence of chronic joint and/or back pain for some selected independent variables (continuation of Table 1 is available in supporting information). The global prevalence of pain was 35.7% (95% CI 34.9–36.5). This prevalence was significantly higher in women than in men: 41.3% (95% CI 40.2–42.4) versus 29.1% (28.0–30.3), respectively.

In the total sample, there was a significant progressive increase of prevalence from the youngest group of 50–59 years old, 30.2% (95% CI 28.8–31.7), to the oldest group over 75 years old, 45.1% (95% CI 43.4–46.8). This rising tendency was also observed in women. In men, a similar prevalence

Table 1 Characteristics of the sample and prevalence of chronic joint and/or back pain (CP) by sex.

	Men			Women			Total		
	N	% CP	95% CI	*N*	% CP	95% CI	*N*	% CP	95% CI
Sample	27,247	29.1	28.0–30.3	33,910	41.3	40.2–42.4	61,157	35.7	34.9–36.5
Age									
50–59	6883	27.8	25.6–30.0	9478	32.6	30.7–34.5	16,361	30.2	28.8–31.7
60–66	7058	27.7	25.7–29.8	8246	39.2	36.9–41.4	15,304	33.7	32.2–35.2
67–76	6909	27.8	25.6–30.2	7776	44.4	42.1–46–7	14,685	36.5	34.8–38.2
>75	6397	34.8	32.5–37.2	8410	51.5	49.1–53.8	14,807	45.1	43.4–46.8
Number of chronic diseases									
0	6340	12.7	10.8–14.9	7292	17.6	15.3–20.1	13,632	15.2	13.7–16.8
1	8391	23.2	21.4–25.1	9729	33.4	31.5–35.4	18,120	28.4	27.1–29.8
2 or 3	9350	38.5	36.3–40.7	12,062	51.7	49.9–53.6	21,412	45.9	44.4–47.3
More than 3	3166	54.7	51.5–57.9	4827	67.3	64.8–69.8	7993	62.4	60.4–64.3
Mobility limitations									
None	16,246	16.5	15.3–17.8	15,340	20.1	18.8–21.5	31,586	18.2	17.3–19.1
1 or more	11,001	48.9	46.8–50.9	18,570	58.6	57.1–60.1	29,571	54.9	53.7–56.2
Self-reported health status									
Very good/excellent	7245	10.4	9.1–11.8	8293	15.8	14.1–17.7	15,538	13.1	12.0–14.3
Less than very good	20,002	35.7	34.3–37.1	25,617	48.5	47.2–49.8	45,619	42.7	41.8–43.7
Depression									
Yes	5172	46.1	43.3–48.9	10,997	56.1	54.1–58.1	16,169	52.9	59.3–54.5
No	22,075	24.9	23.7–26.2	22,913	33.1	31.8–34.4	44,988	28.9	28.0–29.8
Trouble with sleeping									
Yes	7068	40.6	38.4–42.8	14,074	50.7	49.0–52.4	21,142	47.3	45.9–48.6
No	19,737	25.2	23.8–26.5	19,463	34.4	32.9–35.8	39,200	29.5	28.6–30.5
Body mass index									
Underweight	123	53.2	22.4–81.8	241	31.7	22.8–42.2	364	40.1	24.3–58.3
Normal	8669	23.6	21.8–25.5	13,685	34.2	32.6–35.9	22,354	30.1	28.9–31.4
Overweight	12,932	29.4	27.7–31.2	12,372	43.9	41.9–45.9	25,304	36.1	34.7–37.4
Obese	5523	37.3	34.8–39.8	7612	52.3	50.0–54.5	13,135	45.7	43.9–47.4
Country									
Austria	1767	24.6	22.1–27.2	2376	32.8	30.6–35.1	4143	29.1	27.4–30.7
Belgium	2456	25.0	22.8–27.4	2996	32.5	30.3–34.8	5452	29.0	27.4–30.6
Czech Republic	2279	29.6	27.1–32.2	3209	39.7	37.3–42.0	5488	35.1	33.4–36.9
Denmark	1877	18.8	16.9–20.8	2159	27.3	25.3–29.4	4036	23.2	21.9–24.7
Estonia	2219	34.8	32.6–37.2	3392	40.9	39.1–42.7	5611	38.5	37.1–39.9
France	1855	42.0	38.4–45.7	2449	48.5	45.5–51.5	4304	45.6	43.3–47.8
Germany	2605	26.7	24.9–28.6	2860	35.2	33.3–37.1	5465	31.2	29.9–32.6
Italy	2098	30.4	27.6–33.4	2499	52.1	48.8–55.3	4597	42.2	39.9–44.5
Luxembourg	748	32.0	28.7–35.5	839	39.2	35.9–42.6	1587	35.8	33.4–38.2
The Netherlands	1818	13.4	11.6–15.5	2220	25.1	23.0–27.3	4038	19.6	18.1–21.1
Slovenia	1204	33.0	29.6–36.6	1585	48.5	45.3–51.7	2789	41.4	38.9–43.8
Spain	2903	27.4	24.2–30.9	3363	44.4	41.2–47.7	6266	36.6	34.2–39.0
Sweden	2074	20.7	18.7–22.8	2360	30.9	28.9–33.1	4434	26.1	24.6–27.5
Switzerland	1344	14.7	12.7–16.8	1603	22.0	19.9–24.3	2947	18.6	17.1–20.1
Migration status									
Native	24,271	28.9	27.7–30.2	30,160	40.9	39.8–42.1	54,431	35.4	34.6–0.36
Migrant	2711	31.2	27.6–34.9	3476	44.5	41.2–47.7	6187	38.3	35.9–40.8
Marital status									
Married/registered	21,390	29.7	28.4–31.1	21,431	38.4	37.1–39.8	42,821	33.9	33.0–34.9
Separated/divorced	2400	26.1	23.1–29.3	3789	42.3	38.9–45.7	6189	35.1	32.7–37.5
Single	1756	27.0	22.6–31.9	1745	39.0	34.5–43.7	3501	32.7	29.6–36.1
Widowed	1701	28.7	24.4–33.5	6945	50.0	47.4–52.6	8646	45.7	43.4–48.1
Number of children									
None	2869	26.1	23.1–29.3	3092	36.9	33.8–40.2	5961	31.6	29.4–33.8
1	4525	27.4	24.9–30.0	6276	42.2	39.5–44.9	10,801	35.7	33.8–37.6
2 or 3	16,616	29.5	27.9–31.0	20,472	40.1	38.7–41.5	37,088	35.2	34.1–36.2

Table 1 (*Continued*)

	Men			Women			Total		
	N	% CP	95% CI	*N*	% CP	95% CI	*N*	% CP	95% CI
More than 3	3237	33.6	29.8–37.5	4070	49.4	45.9–52.9	7307	42.5	39.8–45.1
Educational level									
Primary or lower	9778	33.6	31.7–35.6	14,652	49.1	47.4–50.9	24,430	43.0	41.7–44.4
Secondary	9456	30.6	28.6–32.7	10,801	35.7	34.1–37.5	20,257	33.2	31.9–34.6
Post-secondary	8013	21.2	19.3–23.2	8457	31.7	29.6–33.9	16,470	26.1	24.7–27.6
Employment status									
Employed	8242	23.0	21.3–24.8	13,629	36.7	35.0–38.3	21,871	31.8	29.9–32.4
Retired	16,941	31.6	30.0–33.2	17,800	45.3	43.7–46.9	34,741	38.4	37.3–39.6
Unemployed	893	37.4	30.9–44.4	841	42.1	35.9–48.4	1734	39.2	34.6–44.1
Permanently sick or disable	918	46.4	40.4–52.5	1176	53.9	48.6–59.1	2094	50.2	46.2–54.2
ADL									
None	24,330	26.5	25.3–27.7	29,664	37.3	36.1–38.4	53,994	32.2	31.3–33.0
1 or more	2917	53.4	49.6–57.3	4246	66.9	63.7–69.9	7163	61.8	59.3–64.2

More explanatory variables were explored, but this table is limited to selected representativeness variables.
The sum of categories sample in some variables may not result the total sample because of the presence of missing values.

was observed in all age groups except the oldest one, who showed a significantly higher prevalence of 34.8% (95% CI 32.5–37.2) than the rest of the age groups.

Country differences in chronic joint and/or back pain were observed. Overall prevalence of chronic joint and/or back pain in older adults ranged from 18.6% (95% CI 17.1–20.1) for Switzerland to 45.6% (95% CI 43.3–47.8) for France. Women in Italy had the highest prevalence, 52.1% (95% CI 48.8–55.3). In addition, Italy presented the widest gap of prevalence (21.7%) between men and women. Men in the Netherlands had the lowest prevalence, 13.4% (95% CI 11.6–15.5), while women in Switzerland presented the lowest prevalence, 22.0% (19.9–24.3). All countries showed significant differences by sex. The prevalence distribution among participant countries is represented in Fig. 1.

3.2 Location, intensity, treatment and pain-related diseases

Table 2 shows the characteristics of chronic joint and/or back pain. Overall, the most frequent location of chronic musculoskeletal pain was back, 65.1% (95% CI 63.7–66.4), with no significant differences by sex. Women presented significantly more multisite pain (3 or more) than men: 22.2% (95% CI 20.7–23.7) and 15.6% (95% CI 14.1–17.3), respectively. Accordingly, women reported the intensity of pain more frequently as severe, 29.1% (95% CI 27.5–30.8), than men, 23.4% (95% CI 21.6–25.4). Rates of moderate or severe pain ranged from 68.0% (95% CI 64.1–71.7) in the Netherlands to 90.0% in Germany (95% CI 88.3–91.4). Intensity of chronic joint and/or back pain by sex and country of residence is shown in Table S2.

Regarding the consumption of analgesics, medication for sleep problems, anxiety or depression, women presented significantly higher rates of consumption than men for all treatments. Overall rate of consumption of analgesics for joint and other pain (including back pain) was 49.6% (95% CI 48.1–51.1) for the total sample and it ranged from 33.1% in the Netherlands (95% CI 29.3–37.2) to 65.9% in Spain (95% CI 61.9–69.7; Fig. 2). Despite the highest prevalence of chronic pain in France, this was not translated into an overall higher analgesic consumption. The most frequent pain-related diseases were osteoarthritis and other rheumatism 38.6% (95% CI 37.2–40.1), with a prevalence for the total sample ranging from 4.9% (95% CI 3.5–6.7) in Slovenia to 63.5% (95% CI 59.4–67.5) in Luxembourg.

3.3 Factors associated with chronic joint and/or back pain

Regression analysis was performed to estimate the independent association of independent variables with PR (Table 3). Overall, women suffered chronic joint and/or back pain 1.18 times more frequently than men (95% CI 1.13–1.24). The following covariates presented a significant interaction by sex: age, number of chronic diseases (such as diabetes, hypertension, chronic bronchitis, Parkinson disease, cancer or osteoarthritis among others), trouble with sleeping, BMI, country, marital status, employment status

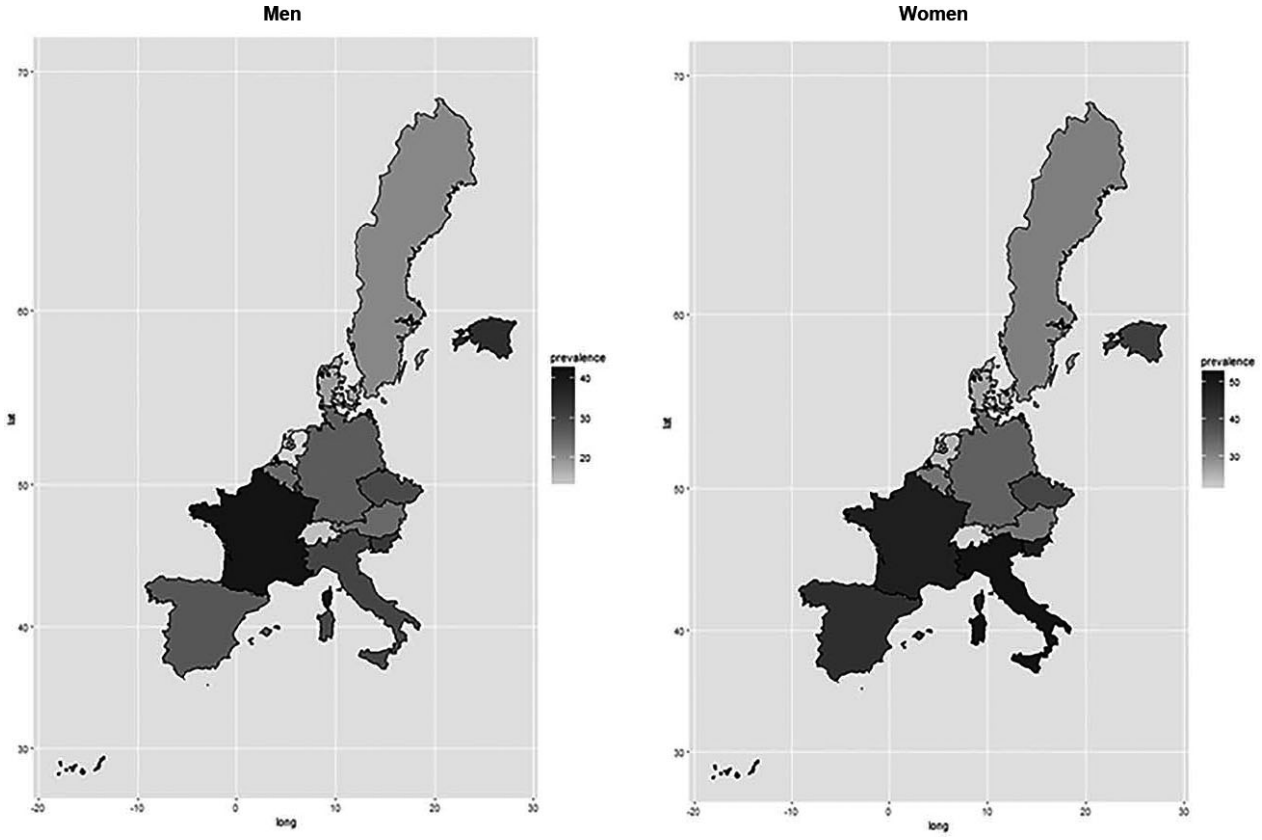

Figure 1 Chronic joint and/or back pain prevalence distribution in 14 European countries by sex.

and limitations of ADL. The effect of age on prevalence observed in the total sample was no longer observed. After adjusting the final model, older adults especially the oldest men (PR = 0.82; 95% CI 0.72–0.92) presented a lower PR than younger ones, while age in women did not present a significant association with chronic musculoskeletal pain. Men with three or more chronic diseases showed higher PR of chronic joint and/or back pain (PR = 2.12; 95% CI 1.80–2.50) than women (PR = 1.90; 95% CI 1.66–2.17), taking as reference those without chronic diseases but the difference was not statistically significant. Marital status presented an opposite effect in the separated/divorced category among men and women (PR = 0.85; 95% CI 0.76–0.96 vs. PR = 1.12; 95% CI 1.03–1.21) compared with the reference category (married/registered). Regarding employment status, chronic musculoskeletal pain was associated with unemployment in men (PR = 1.21; 95% CI 1.02–1.43), while no association was observed in women for this category (PR = 1.07; 95% CI 0.93–1.23). The highest level of well-being was a protective factor for the total sample.

4. Discussion

This study describes the prevalence and characteristics of chronic joint and/or back pain and explores its associated factors using a representative sample of the population 50 years and over in 14 European countries. Overall prevalence of chronic musculoskeletal pain was 35.7%. Prevalence was significantly higher in women than in men in all countries. Due to the socio-economic impact and the suffering associated with chronic pain (Dueñas et al., 2016), our results suggest that Europe has a major public health problem affecting older adults, especially women.

Differences in the assessment of chronic pain may be contributing to the large range of pain prevalence reported by other epidemiological studies (Helme and Gibson, 1999; Reid et al., 2011). Although the International Association for the Study of Pain (IASP) considers the last 3 months in its definition of chronic pain, our survey asked about chronic joint and/or back pain in the last 6 months as the American Society of Interventional Pain Physicians

Table 2 Chronic joint and/or back pain characteristics, treatments and prevalence of pain-related diseases.

	Men		Women		Total	
	%	95% CI	%	95% CI	%	95% CI
Location						
Back	63.1	60.8–65.4	66.2	64.6–67.9	65.1	63.7–66.4
Hip	20.9	19.2–22.8	26.2	24.7–27.8	24.3	23.1–25–5
Knee	41.5	39.2–43.8	47.6	45.8–49.5	45.3	43.9–46.8
Other joints	36.9	34.6–39.2	42.4	40.6–44.2	40.3	38.9–41.7
Multisite (3 or more)	15.6	14.1–17.3	22.2	20.7–23.7	19.7	18.6–20.9
Intensity						
Mild	22.1	20.3–24.1	17.8	16.4–19.2	19.4	18.3–20.5
Moderate	54.4	52.0–56.8	53.0	51.2–54.8	53.6	52.1–55.0
Severe	23.4	21.6–25.4	29.1	27.5–30.8	27.0	25.7–28.3
Treatment (at least once a week) for						
Joint pain	34.3	32.1–36.5	42.2	40.4–44.0	39.2	37.8–40.6
Other pain (including back pain)	18.0	16.3–19.8	24.7	23.0–26.4	22.2	20.9–23.4
Sleep problems	7.4	6.3–8.7	14.8	13.5–16.2	12.0	11.1–13.0
Anxiety or depression	5.4	4.5–6.4	12.7	11.6–13.8	9.9	9.1–10.7
None	15.4	13.7–17.4	10.5	9.2–11.8	9.8	8.8–10.9
Pain-related diseases						
Hip fractures	2.2	1.8–2.8	3.1	2.6–3.7	2.8	2.4–3.2
Other fractures	9.6	8.4–11.1	8.8	7.8–9.9	9.1	8.3–10.0
Rheumatoid arthritis	13.8	12.3–15.4	21.6	20.0–23.1	18.6	17.5–19.8
Osteoarthritis/other rheumatism	31.9	29.6–34.3	42.6	40.9–44.4	38.6	37.2–40.1

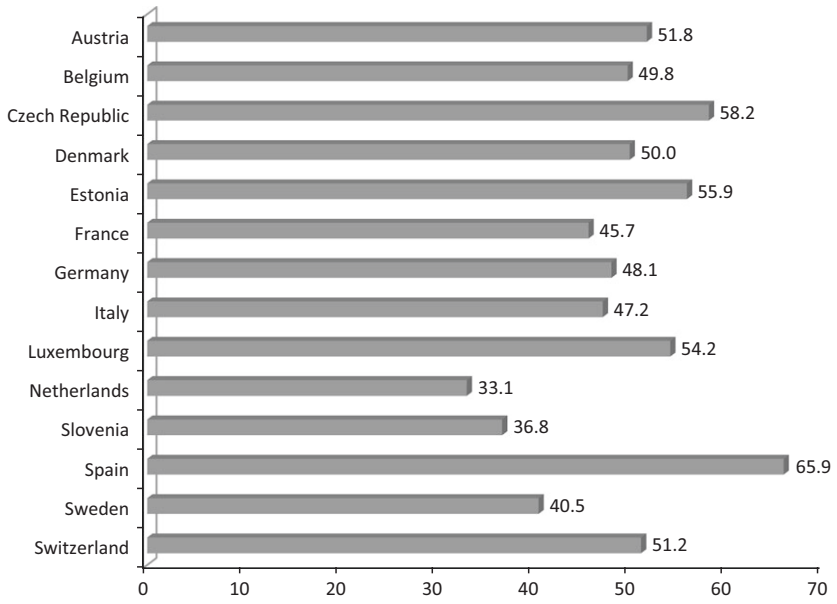

Figure 2 Percentage of analgesic consumption for joint pain and other pain (including back pain) in 14 European countries (overall rate 49.6%).

suggested. It is desirable to achieve a consensus among studies to determine a unique definition of chronic pain.

Based on a biopsychosocial approach of chronic pain, we explored several factors associated with chronic musculoskeletal pain in older adults. Our descriptive results showed that pain prevalence increased with age, but this relationship was no longer significant when controlling for other factors in multivariable analysis. Some studies have shown no increased prevalence of chronic pain with age (Mobily et al., 1994; Grimby et al., 1999; Parsons

Table 3 Associated factors to chronic joint and/or back pain in 50+ European residents using a Poisson multivariate regression model with robust variance by sex.

	Men		Women		Total	
	PR[a]	95% CI	PR[a]	95% CI	PR[a]	95% CI
Age						
50–59	1		1		1	
60–66	0.89	0.80–0.97	1.05	0.98–1.13	0.99	0.93–1.05
67–76	0.81	0.71–0.92	1.01	0.93–1.10	0.93	0.86–1.00
>75	0.82	0.72–0.92	0.94	0.86–1.02	0.90	0.84–0.97
Number of chronic diseases						
0	1		1		1	
1	1.35	1.15–1.58	1.38	1.21–1.57	1.37	1.23–1.52
2 or 3	1.78	1.52–2.07	1.68	1.48–1.91	1.72	1.55–1.90
More than 3	2.12	1.80–2.50	1.90	1.66–2.17	1.99	1.79–2.21
Fallings						
No	1		1		1	
Yes	1.1	0.98–1.24	1.13	1.06–1.19	1.12	1.06–1.18
Mobility limitations						
None	1		1		1	
1 or more	1.99	1.81–2.19	1.98	1.83–2.13	1.99	1.87–2.11
Self-reported health status						
Very good/excellent	1		1		1	
Less than very good	1.9	1.64–2.21	1.66	1.47–1.88	1.76	1.60–1.94
Trouble with sleeping						
No	1		1		1	
Yes	1.16	1.08–1.25	1.14	1.09–1.20	1.14	1.10–1.19
Body mass index						
Normal	1		1		1	
Underweight	1.57	0.70–3.60	1.04	0.79–1.36	1.32	0.78–2.24
Overweight	1.13	1.03–1.23	1.07	1.01–1.14	1.09	1.04–1.15
Obese	1.14	1.04–1.26	1.10	1.03–1.16	1.11	1.06–1.17
Physical inactivity						
Yes	1		1		1	
No	0.9	0.81–0.99	0.94	0.87–1.00	0.93	0.87–0.98
Migration status						
Native	1		1		1	
Migrant	1.12	0.99–1.25	1.10	1.02–1.18	1.10	1.03–1.17
Marital status						
Married/registered	1		1		1	
Separated/divorced	0.85	0.76–0.96	1.12	1.03–1.21	1.01	0.94–1.08
Single	0.94	0.77–1.15	1.02	0.90–1.16	0.99	0.89–1.12
Widowed	0.85	0.71–1.01	1.03	0.97–1.09	0.99	0.93–1.05
Number of children						
None	1		1		1	
1	1	0.86–1.18	1.05	0.95–1.17	1.04	0.95–1.13
2 or 3	1.09	0.94–1.26	1.08	0.98–1.19	1.09	1.00–1.18
More than 3	1.09	0.92–1.30	1.16	1.03–1.30	1.14	1.03–1.26
Employment status						
Employed	1		1		1	
Retired	0.98	0.88–1.10	0.97	0.91–1.03	0.95	0.90–1.01
Unemployed	1.21	1.02–1.43	1.07	0.93–1.23	1.14	1.01–1.28
Permanently sick or disable	0.96	0.83–1.10	0.89	0.80–0.98	0.91	0.83–0.98
ADL						
None	1		1		1	
1 or more	1.11	1.02–1.21	1.14	1.08–1.21	1.13	1.07–1.18
Leisure/social activities						
Yes	1		1		1	
No	0.96	0.88–1.06	0.89	0.83–0.95	0.92	0.87–0.98

Table 3 (*Continued*)

	Men		Women		Total	
	PR[a]	95% CI	PR[a]	95% CI	PR[a]	95% CI
Well-being (CASP-12)						
Lowest tertile	1				1	
Middle tertile	0.96	0.88–1.05	1.02	0.96–1.08	1	0.95–1.05
Highest tertile	0.82	0.73–0.90	0.83	0.76–0.90	0.82	0.77–0.88

[a]Values of prevalence ratio are adjusted by variables included in the model and country of residence.

et al., 2007). Several health-related factors strongly associated with chronic pain such as the number of chronic diseases, self-related health status or mobility limitations could explain the change in the effect of age on prevalence in the multivariable analysis. Thus, a comprehensive assessment of pain in older population is needed considering all factors that possibly interact with pain (Jakobsson et al., 2003). Although some biological changes in nociception have been described related to the ageing process, there is not enough evidence to affirm that perception of pain decreases with age (Yezierski, 2012). However, multiple psychosocial factors or attitudes could lead to underreporting of pain in older adults. These could include, among others, stoical behaviour, the consideration of pain as a normal experience of ageing, or fears to treatment-related adverse events (Pautex et al., 2013).

Higher prevalence of pain in women has been widely reported in epidemiological studies (Helme and Gibson, 2001; Fillingim et al., 2009; Reitsma et al., 2012). Besides, we also found that women have higher prevalence of multisite pain, osteoarthritis, severe pain and higher consume of analgesics, suggesting a possible gender difference in the diagnosis and treatment of women. Multiple biopsychosocial factors seem to be implicated in this phenomenon linked to sex (biological differences) and gender (role and cultural differences). Related to sex, higher sensibility of pain receptors or the influence of sexual hormones is biological factors that could be mediating a more painful experience in women than in men (Bartley and Fillingim, 2013). Psychosocial factors related to gender differences could also contribute to these differences. In our study, separated/divorced women suffered more frequently chronic musculoskeletal pain compared with men. A longitudinal study of chronic pain stratified by sex in the general population showed that widowed, separated or divorced women experienced chronic pain for more years than men (Reitsma et al., 2012). Although there was no significant interaction by sex, migrant women and having more than three children showed a significant association with chronic joint and/or back pain. This could suggest that these women might be exposed to greater family burden, stressing female life-time and larger working domestic and occupational burden, leading to a higher risk of developing painful diseases such as osteoarthritis (Harris et al., 2013). A poorer health status in older women was revealed by a health inequality study in Europe (Rueda et al., 2008), which is consistent with our findings. Our study indicated that unemployed men had higher chronic joint and/or back pain than employed men, with no significant association in women. The unemployment status is considered an indicator of pain-related disability (Valkanoff et al., 2012).

Our results showed wide differences in the prevalence of chronic musculoskeletal pain between countries. The overall prevalence for older adults was higher in South European Mediterranean countries (Italy, France and Spain) and East European countries (Estonia, Slovenia), and lower levels were observed in North European countries (Denmark, the Netherlands and Sweden) and Switzerland. Furthermore, the extent of differences among men and women varied among countries. Accordingly, Italy and Spain presented the widest gap while Estonia and France, the smallest. In a previous European study of chronic pain prevalence in general population, Italy was also among the highest group and North European countries in the lowest levels. In contrast, Spain and France were among the lowest levels of chronic pain (Breivik et al., 2006). In another study, France also presented the highest prevalence of chronic pain in the general population among developed countries (Tsang et al., 2008).

South European Mediterranean and East European countries are very different culturally. However, a common point could be a lower socio-economic position compared with Central and North European countries (GDP Eurostat, 2014). Lower socio-economic status has been associated with

higher rates of pain in general populations (Brekke et al., 2002; Saastamoinen et al., 2005). Besides, taking unemployment rate as a proxy of the impact of economic crisis in 2013, Estonia, France, Slovenia, Italy and Spain had the highest unemployment rates, ranging from 8.6% to 26.1%, respectively (unemployment rate OECD, 2014b). In addition, the expenditure in health care (% of GDP) in 2013 was lower for Estonia, Slovenia, Italy and Spain although also Luxembourg and Czech Republic had lower percentages than the rest of the countries (Health expenditure OECD, 2014a). Conducting the multilevel analysis was not possible in this study, partly due to an insufficient number of countries. Therefore, more research is needed to estimate the real impact of contextual factors in chronic pain not only at country level. Differences between the Northern and the Southern at regional level within European countries have been also described (Breivik et al., 2006).

The cross-sectional design of the study precludes any causal inference on the associations found in this study between characteristics of participants and pain outcomes. Besides, this study has several limitations. First, data were obtained from a population survey not specifically focused on pain. Because of this, information about intensity of pain was not registered using a validated pain scale, and the type of analgesic treatment or other non-pharmacologic therapies were not recorded. Despite this, the consistency and representativeness of SHARE data and the possibility of exploring the longitudinal dimension of chronic musculoskeletal pain in future research make this survey a relevant source of epidemiological European data. Second, the specific question about chronic pain just refers to joints and did not explicitly include the word 'back' when asking participants. Although back was specified along with knee, hip or other joints as locations in pre-question indications, some people may not have considered their back when asked about their joints, and this could have led to misunderstanding. Third, we did not include an occupational variable because of missing values. Forth, the SHARE project is focused on community-dwelling older adults and institutionalized people are scarcely represented. This could be underestimating the pain prevalence observed since people living in nursing homes include the oldest-old, a group that could present a greater number of painful chronic diseases. It is desirable to have a better representation of this subpopulation in future waves. Finally, statistical significance should be interpreted with caution when using a cross-sectional design in such a large sample. This is an exploratory study and future longitudinal designs will be developed to identify risk factors and interpret findings according to its clinical relevance.

Chronic diseases are especially prevalent in older adults. Ageing of European populations is a demographic phenomenon which represents a major challenge for policy makers and health-care systems (Rechel et al., 2009). There is much research and many activities to prevent other relevant chronic conditions because of their impact on mortality. Nevertheless, less attention is paid to chronic musculoskeletal pain, a prevalent chronic disease clearly related to disability and loss of quality of life in older adults. In addition, the socio-economic burden of chronic pain is also well documented (Breivik et al., 2013), but further research is needed to better understand the relation between chronic musculoskeletal pain and mortality (Docking et al., 2015; Åsberg et al., 2016). Then, in an ageing Europe, more efforts are needed to deal with this disabling condition that is diminishing years in quality of life. Some European countries have implemented national strategies or policies as the Italian Law 38/2010 of measures to guarantee the access to palliative and pain treatments (SIP, 2016).

5. Conclusions

This article underscores the relevance of chronic musculoskeletal pain in older adults as a frequent issue, especially in women. Gender differences and a wide cross-national gap in prevalence of chronic musculoskeletal pain were observed. Our epidemiological study of chronic joint and/or back pain in older European adults could provide relevant information from an European representative sample to other pain researchers, stakeholders and policy makers.

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Author Contributions

Concept and design: Cimas, Forjaz; Statistical analysis: Cimas, Ayala; Interpretation of data: Cimas, Forjaz; Drafting the manuscript: Cimas, Forjaz; Critical revision of the manuscript: Ayala, Sanz, Agulló-Tomas, Escobar. All authors have approved the version to be published.

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Supporting Information

Additional Supporting Information may be found online in the supporting information tab for this article:

Table S1. Characteristics of the sample and prevalence of chronic joint and/or back pain (CP) by sex.
Table S2. Intensity of chronic joint and/or back pain by sex and country of residence.