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Differences in health related quality of life between men and women with chronic pain: results from a nationwide cross-sectional survey in the general Spanish population

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Abstract

Background Taking into account the differences between sexes/genders in the chronic pain (CP) process and the influence of the biopsychosocial factors in the health-related quality of life (HRQL), this study aims to determine the differences between women and men with CP and the factors associated with their mental and physical HRQL.

Methods A nationwide cross-sectional study was carried out in 7,058 participants representative of the Spanish adult population. Sociodemographic variables, presence and characteristics of CP, daily living limitations, sleep problems, anxiety and depression (HADS), quality of life (SF-12v2), social support (DUKE-UNC-11) were collected. Four linear regression models were generated.

Results 1,825 people had CP with an average 51.52 years old (SD:15.58), 58.7% being women. The variables associated with lower scores on physical component (PCS-12) were older age (women B=-0.196;men B=-0.151), higher pain intensity (women B=-1.557;men B=-1.435), higher depression (women B=-0.404;men B=-0.322), needed sick leave (women B=-3.816;men=-3.439), reported disability (women B=-10.541;men B=-7,544), retired (women B=-2.454;men B=-1.937), unemployed women (B=-3.394), fibromyalgia diagnostic (B=-4.787), men with arthrosis (B=-2.521), neuropathy (B=-3.871) and low back pain (B=-2.199). Men with university studies obtained higher scores on PCS-12 (B = 2.079). The variables associated with mental component (MCS-12) showed that younger people (women B = 0.111;men B = 0.058), higher anxiety (women B=-1.067;men B=-0.101), and depression (women B=-0.817;men B=-1.004), women with herniated disc (B=-5.324), and endometriosis (B=-3.975), scored lower on MCS-12. Women with secondary studies (B = 1.699), men with pain located in neck (B = 3.785), back (B = 3.108), and joints (B = 4.375) and men with higher social support (B = 0.073) obtained higher score on MCS-12.

Conclusions CP affects HRQL among both sexes. However, differences exist depending on the variables. Identifying subjects with these factors is fundamental to preventing their HRQL from worsening.

Keywords Chronic pain, Sex/gender, Mental health, Physical health, Health related quality of life

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Background

Chronic pain (CP) has been considered an illness itself [1] and it is a health problem that has reached pandemic proportions [2, 3]. The prevalence of CP ranges from 10% to 30% in Europe [4, 5] and around 25.9% in Spain [6].

Several studies have been focused on sex and gender differences in CP, showing that women generally experience more pain across their lifespan compared with men [7, 8]. Experimental research in laboratory environments shows that women are more sensitive to pain, report higher pain intensity, use more analgesic medication, and more often report widespread pain. Likewise, some studies have examined biological differences in response to the treatment of chronic pain [9], and how pain influences psychological aspects, making women more directly affected [10]. These characteristics of pain could be explained by neurological and genetic factors, but also by hormonal factors, which can act as sex-specific pain mediators.

Additionally, there are studies that take gender role influence into account in the perception of pain and the way it is reported. Boys and men are taught to be tough, tolerate pain and endure painful experiences, while girls and women are socialized to be sensitive, careful and to verbalize discomfort [11]. Additionally, the sex/gender differences related to work and family tasks have been analyzed, showing them to have an impact on health and on the painful disease, women being worse affected since they are exposed to more precarious tasks and conditions [12–14].

The need to include both sex and gender in pain research has been argued critically [11]. It is difficult to dissociate sex and gender since both influence the experience of pain. Thus, the term sex/gender used by the authors of this study has started to be used, highlighting the continuing difficulty in disassociating them, and the need to consider them interacting factors [15].

The experiences of people living with CP have been widely studied because of their impact on daily life and their quality of life. The health-related quality of life (HRQL) of people with CP has been shown to be worse than that of the general population, usually related to physical limitations and disability conditions, as well as their impaired mental well-being. Previous studies have investigated whether HRQL differs in women and men, reporting that women's HRQL is almost always lower than men's [16, 17]. HRQL is a multidimensional and complex construct that is determined by a set of factors that differ depending on sex/gender such as biological, sociodemographic (marital status, professional status.), and psychological factors [18, 19]. For this reason, it is important to gain a better understanding of the differences in HRQL in people with CP according to sex/gender. Furthermore, despite the high prevalence of CP in Spain, which has been reported to be increasing (from 16.6% to 25.9% in recent years) [6, 20], and the significant sex/gender disparity observed [21], a knowledge gap persists regarding the characteristics, consequences, and factors between women and men in this country.

Taking into account the differences between sexes/genders in the CP process and the influence of the biopsychosocial factors in the HRQL, this study aims to determine the sociodemographic differences, characteristics and consequences of the pain, state of health, and the use of the health system among women and men with CP in the Spanish population and the factors associated with their HRQL.

Methods

Study design

This study is a secondary analysis of the data collected in a cross-sectional study called "Barometro del Dolor" (Pain Barometer) carried out on a representative sample of the general Spanish population (18–85 years). The data were obtained to determine the prevalence and characteristics of CP in the Spanish population.

Study population

The original study included 7,058 subjects. Here, we restricted the population to those with CP, a subsample of 1,825 participants (1,072 women and 753 men).

Sampling method

The study population was obtained through volunteer sampling from a census property of the company CINT (platform for gathering digital information oriented exclusively to purposes related with market research, providing access to panels of participants that comply with the requirements of the European Society for Opinion and Marketing Research, ESOMAR and the International Organization for Standardization, ISO) collected by "*More than Research*", a Spanish market research agency [22].

For the aim of the original study [6] a sample size was calculated to estimate a prevalence of CP of 28.4% (estimated from preliminary results from a pilot study in the target population), with a 95% confidence level and accuracy (or margin of error) of 13%. The term accuracy indicates how close the sample estimate is expected to be to the true population value. To guarantee representativeness by sex, age and Autonomous Community (specific territorial boundaries in Spain), quotas by strata were established proportionally to the general population distribution. For the objective of this study, taking into account our sample of 1,825 (1,072 women and 753 men) and the data obtained in Casals et al. in the scores of MCS and PCS of the SF-12 in men and women with CP [23], with a 95% confidence level, it has been estimated

a power of 48% for the mean difference in MCS and a power of almost 100% for PCS.

Data was collected using a mixed-mode approach. For individuals aged 18 to 75, we used Computer-Assisted Web Interviewing (CAWI), a self-administered data collection method where respondents complete a questionnaire online via an electronic device. For the older demographic (individuals aged 76 to 85), we used Computer-Assisted Telephone Interviewing (CATI), where participants are asked via phone call. A total of 7,058 interviews were obtained (6,394 CAWI and 664 CATI). The study was performed in line with the principles of the Declaration of Helsinki. Participants are members of a panel that complies with the requirements of the ESOMAR, and are already doubly committed to participating in market research studies. All interviewees provided explicit informed consent at the start of the questionnaire. While initial contact (via CATI or CAWI platform) meant the data collectors were aware of participants' identities, all data were processed using pseudonymization. This means that personal identifiers were immediately stripped from the survey responses and stored separately. In this way, the company that conducted the interview provided us the data anonymized. This process guarantees the confidentiality and privacy of the information obtained, as no personal information was linked to the final analysis dataset, in accordance with all ethical standards.

Data collection and measures

Data were collected between June 13th and June 20th, 2022. Two screening questions were used to identify the people with CP in accordance with the criteria of the International Association for the Study of Pain (IASP), and an individual was considered to have CP if the frequency of their pain was at least 4 or 5 days a week during the previous month and if their pain had lasted for three or more months. They were considered to have CP if they answered "yes" to both questions. The data collected included: sociodemographic data (age, gender/sex and educational level, employment status); the characteristics of the pain (intensity, duration and location of the painful sites and diagnoses). Pain intensity over the past week was measured using a 0–10 numerical rating scale, where 10 is the worst imaginable pain. The limitations to activities of daily living due to pain referred to the four previous week were also collected (feeding, sitting, getting up from a chair or bed, lying down, dressing and undressing, going to the bathroom, showering or bathing). The response options provided for each activity were: "Yes, a lot," "Yes, somewhat," or "No, I have not limited them." Additionally, Sleep problems due to pain (yes/no), presence and level of anxiety and depression, quality of life and social support were also collected. Healthcare information was also collected (number of medical consultations and specialty where had been attended in the previous year and length of time on the waiting list).

Anxiety and depression were measured with the Hospital Anxiety and Depression Scale (HADS) [24]. It consists of 14 items grouped in two subscales (one for anxiety and one for depression), each with seven items. Each subscale is scored from 0 to 21, where higher scores denote higher levels of anxiety/depression. Scores over 10 indicate the presence of these pathologies, and scores between 8 and 10 are considered to be doubtful cases of anxiety or depression [25]. Internal consistency for the sample was satisfactory, with Cronbach's alpha values of 0.856 for anxiety and 0.860 for depression.

To evaluate health related quality of life, the 12-item Short-Form Health Survey version 2 (SF-12v2) was used. This tool includes 12 elements that make up its profile of eight dimensions: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional and mental health. It also includes two global ratings: the PCS-12 for physical health and the MCS-12 for mental health. The scores for these two summary dimensions range from 0 to 100 with the highest scores indicating a better quality of life [26]. Reliability analysis for our sample indicated that both the PCS-12 and MCS-12 subscales exhibited acceptable internal consistency (alpha = 0.812 and alpha = 0.756, respectively). For this analysis, only the PCS and MCS scores were included, which were standardized with a median of 50.

Perceived social support was measured using the Duke-UNC-11 functional social support questionnaire [27]. It consists of 11 items grouped into two subscales: confidential support (7 items) and affective support (4 items). The former represents the ability to communicate with other people, and the latter evaluates the affection and empathy received, as well as the readiness of people to welcome or meet with them. It has a global score ranging from 11 to 55, where higher scores indicate higher perceived social support. Scores below 32 are considered a sign of low perceived social support. In our sample, the scale showed a good reliability with a Cronbach's alpha of 0.94.

Statistical analysis

The differences between women and men were evaluated with bivariate analyses. The $\chi 2$ test was used for categorical variables and a Mann-Whitney U test for continuous variables with a non-normal distribution. Variable distribution was tested using the Kolmogorov-Smirnov test. No correction for multiple testing was applied, as the bivariate analyses were designed to assess distinct pairwise associations rather than to test a unified hypothesis. Each comparison was considered an independent exploratory analysis intended to provide descriptive insight

rather than to yield jointly interpretable inferential conclusions. A significance level $\alpha = 0.05$ was established.

Initially, to address the second objective (analysing the factors associated with HRQOL) two multiple regression models were constructed in the whole sample. The PCS-12 and MCS-12 scores served as the dependent variables, with gender and other variables included as covariates. Interactions of gender with other covariates were also evaluated to determine differential effects. However, the results in both models showed no statistical significance when including gender as a covariate or with the addition of interaction terms. On the other hand, given our research question, we were also interested in allowing the set of covariates potentially associated with HRQOL to differ between men and women. Consequently, we constructed four separate multiple linear regression models to analyse the factors associated with HRQOL:

- The physical component PCS-12 of women with CP (Model 1).
- The physical component PCS-12 of men with CP (Model 2).
- The mental component MCS-12 of women with CP (Model 3).
- The mental component MCS-12 of men with CP (Model 4).

Targeting the mental and physical components as the dependent variable. The criteria used to select the covariates included in these models were both statistical (a significant difference observed in the bivariate analysis: $p < 0.05$) and clinical (previously shown in the literature [21, 28–30]). In addition, to facilitate the interpretation of the model, the categories of the variables related to the diagnosis were dichotomised as 'yes' or 'no'.

The stepwise method was used for variable selection in all models. Given the number of potential confounders and exposure variables available, this approach allowed for a systematic search for the most parsimonious and statistically significant combination of predictors, without relying solely on a priori subjective criteria. The Wald test was used to test the significance of the parameters of each covariate, along with its clinical relevance. The adjusted R^2 was considered as the goodness-of-fit measure in the case of the multiple linear regression. In the multiple linear regression model, tolerance and the variance inflation factor (VIF) were computed. We assumed that collinearity was not present when the VIF value was below 5 and the tolerance score over 0.2. Furthermore, the assumption of normality of residuals was assessed using the Shapiro-Wilk test, the assumption of homoscedasticity was evaluated by the Breusch-Pagan test, and the assumption of independence of errors was tested using the Durbin-Watson statistic (values near 2 indicate independent residuals).

All assumptions were met for the four multiple linear regression models (data not shown).

All the analyses were carried out with IBM SPSS V29, and the plots with Excel 365.

Results

General characteristics of people with CP

The population with CP was composed of 1,825 people and their average age was 51.52 years (SD = 15.58). This population included 1,072 women (58.7%) with a mean age of 51.51 years (SD = 16.14) (Table 1).

Differences between women and men with CP

One of the main differences between men and women is their occupational status; most of the men (56.6%) reported to be working at the time of the interview and the percentage of domestic work was higher in women (10.2%). Furthermore, significant variation was noted across the Autonomous Communities. Specifically, the highest prevalences were registered among men in Andalusia (20.6%) and Madrid (15.3%), and among women in Catalonia (19.5%) (Table 1).

Regarding health status, compared to the men, the women presented the following results: lower scores for the mental component on the SF-12 scale (MCS-12) (41.27 SD = 11.56 vs. 44.07 SD = 11.53), more cases of anxiety (31.8% vs. 21.6%), higher scores for level of anxiety (8.45 SD = 4.57 vs. 7.43 SD = 4.3) and more cases of depression (24.3% vs. 19.1%) (Table 2).

Statistical differences were also found in the characteristics of pain between men are women. The most common diagnoses among the women were related to musculoskeletal disorders such as arthrosis (35.6%), osteoporosis (35.5%), neck pain (49%) and migraine (37.4%). In the case of the men, pain related to surgical intervention (17.7%) was the most common. The location of pain also differs depending on sex/gender: women had more widespread pain (16.2%) and pain in the limbs and/or joints (33.1%). However, the back was the part of the body most affected among the men (33.4%). Additionally, women suffered more sleep problems because of their pain (66.7% vs. 62%) and severe and unbearable intensity of pain with more frequency (65% vs. 57.8%) (Table 2).

Regarding the limitations in daily activities, women were more limited ("yes, a lot, somewhat") than men in feeding themselves (29.5% vs. 21.2%). However, men were more limited in dressing and undressing (49.3% vs. 45.5%).

The use of the health system was very similar between sexes/genders. The only difference was that men were attended more frequently in the neurosurgery department than women (50.7 vs. 9.5%).

Table 1 Sociodemographic characteristics of people with chronic pain and differences by sex

Variables	Categories	Global (N=1825)		Men (N=753)		Women (N=1072)		p
		n	%	n	%	n	%	
Sociodemographic data								
Age	Mean (SD)	51.52 (15.58)		51.54 (14.77)		51.51 (16.14)		0.971[a]
	Median (IR)	5 (2)		51 (21)		52 (24)		
Age	18-34	300	16.4	116	15.4	184	17.2	0,231[b]
	35-54	719	39.4	316	42	403	37.6	
	55-75	639	35	259	34.4	380	35.4	
	76-85	167	9.2	62	8.2	105	9.8	
Autonomous Community	Andalusia	323	17.7	155	20.6	168	15.7	0,049[b]
	Aragón	54	3	28	3.7	26	2.4	
	Asturias	39	2.1	12	1.6	27	2.5	
	Balearic Islands	50	2.7	21	2.8	29	2.7	
	Canary Islands	84	4.6	37	4.9	47	4.4	
	Cantabria	21	1.2	5	0.7	16	1.5	
	Castile and León	84	4.6	34	4.5	50	4.7	
	Castile - La Mancha	64	3.5	26	3.5	38	3.5	
	Catalonia	316	17.3	107	14.2	209	19.5	
	Community of Valencia	199	10.9	84	11.2	115	10.7	
	Extremadura	51	2.8	15	2	36	3.4	
	Galicia	113	6.2	45	6	68	6.3	
	Madrid	258	14.1	115	15.3	143	13.3	
	Murcia	55	3	22	2.9	33	3.1	
	La Rioja	10	0.5	3	0.4	7	0.7	
	Navarra	21	1.2	11	1.5	10	0.9	
	Basque Country	83	4.5	33	4.4	50	4.7	
Educational level	No eduction	19	1	6	0.8	13	1.2	0,202[b]
	Primary education	134	7.3	47	6.2	87	8.1	
	Secondary education	401	22	185	24.6	216	20.1	
	Vocational Training	535	29.3	219	29.1	316	29.5	
	University education	730	40	294	39	436	40.7	
	No response	6	0.3	2	0.3	4	0.4	
Employment status	Currently in work	921	50.5	426	56.6	495	46.2	<0.001[b]
	I am unemployed	198	10.8	74	9.8	124	11.6	
	I am retired	429	23.5	192	25.5	237	22.1	
	Absolute permanent validity	107	5.9	43	5.7	64	6	
	I am studying	52	2.8	9	1.2	43	4	
	Unpaid housework	118	6.5	9	1.2	109	10.2	
Sick leave (Only those currently working answer)	Yes	428	46.5	194	45.5	234	47.3	0,599[b]
	No	493	53.5	232	54.5	261	52.7	

SD Standard deviation, *IR* Interquartile range

[a]Mann-Whitney U

[b]Chi-squared

Factors associated to mental component summary of the SF-12

The multivariate analysis of the variables associated with the physical component (PCS-12) showed several similarities between sex/gender. The older people (women B= -0.196; men B=-0.151), and those with a higher intensity of pain (women B= -1.557; men B= -1.435), a higher level of depression (women B= -0.404; men B= -0.322), and those who needed to ask for sick leave due to their pain (women B= -3.816; men= -3.439) obtained lower score in the physical component of SF-12 (PCS-12). Regarding the employment status, similarities were also found. Those reporting disability (women B= -10.541 men B= -7,544) and being retired (women B=-2.454; men B= -1.937) scored lower on the PCS-12. Additionally, the women who were unemployed (B= -3.394) obtained lower score on the PCS-12 than those working (Table 3).

Focusing on the differences in the PCS-12 by sex/gender, the women with a diagnosis of fibromyalgia (B= -4.787) scored lower. Men diagnosed with arthrosis (B=

Table 2 Clinical characteristics of people with chronic pain and differences by sex

Variables	Categories		Global (N=1825)		Men (N=753)		Women (N=1072)		p
			n	%	n	%	n	%	
HEALTH STATUS									
Quality of life (SF 12v.2) PCS	Mean (SD)		37.98 (10.5)		38.17 (10.09)		37.84 (10.78)		0.483[a]
	Median (IR)		38.71 (15.65)		39.12 (14.87)		38.2 (16.5)		
Quality of life (SF 12v.2) MCS	Mean (SD)		42.43 (11.62)		44.07 (11.53)		41.27 (11.56)		<0.001[a]
	Median (IR)		41.85 (16.5)		43.71 (15.92)		40.39 (16.43)		
HADS- Anxiety	Mean (SD)		8.03 (4.49)		7.43 (4.3)		8.45 (4.57)		<0.001[a]
	Median (IR)		8 (6)		7 (6)		8 (7)		
HADS- Anxiety	No case		857	47	395	52.5	462	43.1	<0.001[b]
	Doubtful case		464	25.4	195	25.9	269	25.1	
	Case		504	27.6	163	21.6	341	31.8	
HADS- Depression	Mean (SD)		7.21 (4.46)		7.07 (4.34)		7.31 (4.53)		0.226[a]
	Median (IR)		7 (6)		7 (5)		7 (6)		
HADS- Depression	No case		1005	55.1	431	57.2	574	53.5	0,030[b]
	Doubtful case		415	22.7	178	23.6	237	22.1	
	Case		405	22.2	144	19.1	261	24.3	
DUKE TOTAL	Mean (SD)		37.12 (11.55)		36.75 (11.16)		37.38 (11.82)		0.127[a]
	Median (IR)		38 (16)		37 (15)		38 (17)		
DUKE CATEGORICAL	Low		529	29	212	28.2	317	29.6	0,511[b]
	Normal		1296	71	541	71.8	755	70.4	
PAIN									
Duration of chronic pain in months	Mean (SD)		81.91 (100.91)		80.74 (103.66)		82.75 (98.95)		0.277[a]
	Median (IR)		48 (96)		38 (96)		48 (96)		
Diagnosed cause of CP*(Possible more than one)*	Arthrosis	Yes	603	33	221	29.3	382	35.6	0,005[b]
		No	1222	67	532	70.7	690	64.4	
	Osteoporosis	Yes	600	32.9	219	29.1	381	35.5	0,004[b]
		No	1225	67.1	534	70.9	691	64.5	
	Neck pain	Yes	843	46.2	318	42.2	525	49	0,004[b]
		No	982	53.8	435	57.8	547	51	
	Lumbar pain	Yes	1061	58.1	445	59.1	616	57.5	0,486[b]
		No	764	41.9	308	40.9	456	42.5	
	Trauma	Yes	264	14.5	122	16.2	142	13.2	0,077[b]
		No	1561	85.5	631	83.8	930	86.8	
	Migraine or other chronic headaches	Yes	574	31.5	173	23	401	37.4	<0.001[b]
		No	1251	68.5	580	77	671	62.6	
	Pain related to surgery	Yes	275	15.1	133	17.7	142	13.2	0,009[b]
		No	1550	84.9	620	82.3	930	86.8	
	Rheumatoid arthritis	Yes	330	18.1	137	18.2	193	18	0,917[b]
		No	1495	81.9	616	81.8	879	82	
	Sciatica	Yes	468	25.6	197	26.2	271	25.3	0,671[b]
		No	1357	74.4	556	73.8	801	74.7	
	Muscles contractures	Yes	923	50.6	353	46.9	570	53.2	0,008[b]
		No	902	49.4	400	53.1	502	46.8	
	Cancer	Yes	66	3.6	21	2.8	45	4.2	0,112[b]
		No	1759	96.4	732	97.2	1027	95.8	
	Shoulder	Yes	533	29.2	215	28.6	318	29.7	0,607[b]
		No	1292	70.8	538	71.4	754	70.3	
	Fibromyalgia	Yes	190	10.4	38	5	152	14.2	<0.001[b]
		No	1635	89.6	715	95	920	85.8	
	Diabetic neuropathy or other neuropathy	Yes	140	7.7	61	8.1	79	7.4	0,563[b]
		No	1685	92.3	692	91.9	993	92.6	
	Carpal tunnel syndrome	Yes	223	12.2	81	10.8	142	13.2	0,110[b]
		No	1602	87.8	672	89.2	930	86.8	
	Crohn's disease or ulcerative colitis	Yes	74	4.1	28	3.7	46	4.3	0,542[b]
		No	1751	95.9	725	96.3	1026	95.7	
	Herniated disc	Yes	21	1.2	9	1.2	12	1.1	0,881[b]
		No	1804	98.8	744	98.8	1060	98.9	

Table 2 (continued)

Variables	Categories		Global (N=1825)		Men (N=753)		Women (N=1072)		p
			n	%	n	%	n	%	
	Cause of pain unknown	Yes	495	27.1	191	25.4	304	28.4	0,157[b]
		No	1330	72.9	562	74.6	768	71.6	
Where is the worst pain located	It is widespread pain		240	13.2	67	8.9	173	16.2	<0.001[b]
	Head		165	9.1	61	8.1	104	9.7	
	Neck (cervical)		193	10.6	82	10.9	111	10.4	
	Back		511	28	251	33.4	260	24.3	
	Limbs and/or joints		603	33.1	248	3	355	33.1	
	Chest		18	1	10	1.3	8	0.7	
	Abdomen		73	4	25	3.3	48	4.5	
	Other		20	1.1	8	1.1	12	1.1	
Sleep disorder due to CP	Yes		1182	64.8	467	62	715	66.7	0,039[b]
	No		643	35.2	286	38	357	33.3	
Pain intensity	Mean (SD)		6.78 (1.72)		6.6 (1.71)		6.9 (1.71)		<0.001[a]
	Median (IR)		7 (2)		7 (2)		7 (2)		
Pain intensity	Slight or very slight (0-3)		85	4.7	43	5.7	42	3.9	0,009[b]
	Moderate (4-6)		608	33.3	275	36.5	333	31.1	
	Severe (7-9)		1051	57.6	408	54.2	643	60	
	Unbearable (10)		81	4.4	27	3.6	54	5	
CONSEQUENCES CP									
Limitations in daily activities due to CPFeeding oneself	Yes, many		113	6.2	34	4.5	79	7.4	<0.001[b]
	Yes, some		363	19.9	126	16.7	237	22.1	
	No limitations		1349	73.9	593	78.8	756	70.5	
Limitations in daily activities due to CPSitting down	Yes, many		215	11.8	86	11.4	129	12	0,484[b]
	Yes, some		710	38.9	283	37.6	427	39.8	
	No limitations		900	49.3	384	51	516	48.1	
Limitations in daily activities due to CPGetting up from chair or bed	Yes, many		322	17.6	121	16.1	201	18.8	0,243[b]
	Yes, some		810	44.4	333	44.2	477	44.5	
	No limitations		693	38	299	39.7	394	36.8	
Limitations in daily activities due to CPLying down	Yes, many		234	12.8	95	12.6	139	13	0,052[b]
	Yes, some		666	36.5	252	33.5	414	38.6	
	No limitations		925	50.7	406	53.9	519	48.4	
Limitations in daily activities due to CPDressing and undressing	Yes, many		171	9.4	67	8.9	104	9.7	0,034[b]
	Yes, some		699	38.3	315	41.8	384	35.8	
	No limitations		955	52.3	371	49.3	584	54.5	
Limitations in daily activities due to CPGoing to the toilet	Yes, many		138	7.6	57	7.6	81	7.6	>0.999[b]
	Yes, some		395	21.6	163	21.6	232	21.6	
	No limitations		1292	70.8	533	70.8	759	70.8	
Limitations in daily activities due to CPShowering or bathing	Yes, many		163	8.9	66	8.8	97	9	0,956[b]
	Yes, some		491	26.9	201	26.7	290	27.1	
	No limitations		1171	64.2	486	64.5	685	63.9	
Sick leave due to pain in the last year	Yes		474	28.6	213	30.7	261	27	0,096[b]
	No		1186	71.4	480	69.3	706	73	
Time on sick leave in last year (days)	Mean (SD)		136.74 (130.37)		146.09 (131.34)		129.14 (129.33)		0.056[a]
	Median (IR)		90 (180)		90 (210)		90 (180)		
Stopped or changed work duties due to CP(Only those answering "yes" to previous question answer)	Yes, I had to stop		153	32.3	72	33.8	81	31	0,249[b]
	Yes, I changed duties		82	17.3	42	19.7	40	15.3	
	No		239	50.4	99	46.5	140	53.6	
USE OF HEALTHCARE SYSTEM DUE TO CP									
Received healthcare in the last four weeks	Yes		769	42.1	337	44.8	432	40.3	0,058[b]
	No		1056	57.9	416	55.2	640	59.7	
Frequency attending Primary Care(Only those answering "yes" to previous question answer)	Never		102	13.3	48	14.2	54	12.5	0,458[b]
	Once		408	53.1	179	53.1	229	53	
	Twice		168	21.8	66	19.6	102	23.6	
	3 or more times		91	11.8	44	13.1	47	10.9	
Frequency attending Specialist Care(Only those answering "yes" to healthcare question answer)	Never		235	30.6	112	33.2	123	28.5	0,813[b]
	Once		312	40.6	130	38.6	182	42.1	
	Twice		112	14.6	48	14.2	64	14.8	
	3 or more times		110	14.3	47	13.9	63	14.6	

Table 2 (continued)

Variables	Categories		Global (N=1825)		Men (N=753)		Women (N=1072)		p
			n	%	n	%	n	%	
Frequency attending Hospital Care(Only those answering "yes" to healthcare question answer)	Never		587	76.3	242	71.8	345	79.9	0,054[b]
	Once		90	11.7	44	13.1	46	10.6	
	Twice		37	4.8	21	6.2	16	3.7	
	3 or more times		55	7.2	30	8.9	25	5.8	
Frequency attending Emergency Dept.(Only those answering "yes" to healthcare question answer)	Never		423	55	185	54.9	238	55.1	0,054[b]
	Once		215	28	96	28.5	119	27.5	
	Twice		65	8.5	20	5.9	45	10.4	
	3 or more times		66	8.6	36	10.7	30	6.9	
Unit/speciality you were attended in. (Only those answering "yes" to previous question answer)	Unit of Pain	Yes	185	24.1	84	24.9	101	23.4	0,619[b]
		No	584	75.9	253	75.1	331	76.6	
	Rehabilitation	Yes	212	27.6	101	30	111	25.7	0,188[b]
		No	557	72.4	236	70	321	74.3	
	Traumatology	Yes	367	47.7	172	51	195	45.1	0,104[b]
		No	402	52.3	165	49	237	54.9	
	Rheumatology	Yes	173	22.5	70	20.8	103	23.8	0,312[b]
		No	596	77.5	267	79.2	329	76.2	
	Neurology	Yes	175	22.8	74	22	101	23.4	0,641[b]
		No	594	77.2	263	78	331	76.6	
	Internal medicine	Yes	240	31.2	102	30.3	138	31.9	0,618[b]
		No	529	68.8	235	69.7	294	68.1	
	Oncology	Yes	41	5.3	21	6.2	20	4.6	0,327[b]
		No	728	94.7	316	93.8	412	95.4	
	Neurosurgery	Yes	91	11.8	50	14.8	41	9.5	0,023[b]
		No	678	88.2	287	85.2	391	90.5	
	Physiotherapy	Yes	282	36.7	134	39.8	148	34.3	0,116[b]
		No	487	63.3	203	60.2	284	65.7	
Time waiting for first appointment Unit of Pain (days)	Mean (SD)		313.95 (291.5)		342.22 (294.75)		291.46 (288.49)		0.207[a]
	Median (IR)		365 (305)		365 (275)		365 (320)		

SD Standard deviation; IR: Interquartile range

[a]Mann-Whitney U

[b]Chi-squared

-2.521), neuropathy (B= -3.871) and low back pain (B= -2.199) obtained lower score. On the other hand, the men with university studies obtained higher scores on the PCS-12 (B = 2.079) compared to those with no studies (Table 3).

Factors associated with the mental component summary of SF-12

The multivariate analysis of the variables associated with the MCS-12 showed also resemblances between sex/gender. Younger people (women B = 0.111; men B = 0.058), those with higher levels of anxiety (women B= -1.067; men B= -0.101) and higher levels of depression (women B= -0.817; men B= -1.004) scored lower on the MCS-12.

Regarding women's mental-related quality of life, those with a diagnosis of herniated discs (B= -5324) and those with dysmenorrhea/endometriosis (B= -3.975) scored lower on the MCS-12. However, those with secondary studies (B = 1.699) obtained a higher score on the MCS-12 compared to those without formal studies (Table 4).

The men whose pain was located in the neck (B = 3.785), back (B = 3.108) and joints (B = 4.375) scored higher on the MCS-12 compared to those with widespread pain. Additionally, men who perceived having social support also scored higher on the MCS-12 (B = 0.073). On the contrary, men who had a diagnosis of neck pain (B= -1.142) had a lower score on the MCS-12 (Table 4).

Discussion

Based on a survey of the Spanish general population, this study analyses the differences in the characteristics and consequences of pain between women and men with CP and the factors associated with their HRQL.

The main findings obtained reveal that age, intensity of pain, being on a sick leave due to pain, and having depression were factors that affect the physical quality of life in both sexes/genders. These results are consistent with previous research [31] that shows that aging is a significant factor in the development of chronic pain, as a result of the progressive aging of the global population, CP is becoming increasingly prevalent [32]. The associations and relationships among intensity of pain, depression and being on a sick leave with physical health in CP have been widely discussed. Depression is a common comorbidity

Table 3 Factors associated to Physical HRQL in women and men

Variables	MODEL 1: Women Physical HRQL (N = 967)			MODEL 2: Men Physical HRQL (N =692)		
	Beta (SE)	CI 95%	p-value	Beta (SE)	CI 95%	p-value
Constant	47.705	(42.473;52.936)	<0.001	37.010 (3.785)	(29.578;44.443)	<0.001
-Age	-0.196 (0.025)	(-0.246;-0.147)	<0.001	-0.151 (0.031)	(-0.212;-0.091)	<0.001
-Intensity of pain	-1.557 (0.177)	(-1.904;-1.210)	<0.001	-1.435 (0.201)	(-1.830;-1.040)	<0.001
¿Have you taken sick leave in the last year due to your pain?						
-Yes	-3.816 (0.655)	(-5.102;-2.530)	<0.001	-3.439 (0.742)	(-4.897;-1.981)	<0.001
-No *						
HADS Depression	-0.404 (0.063)	(-0.528;-0.279)	<0.001	-0.322 (0.078)	(-0.475;0.168)	<0.001
Employment status						
-Unemployed	-3.394 (0.866)	(-5.093;-1.696)	<0.001	-0.576 (1.085)	(-2.706;1.555)	0.596
-Retired	-2.454 (0.980)	(-4.378;-0.530)	0.012	-1.937 (1.015)	(-3.930;-0.055)	0.057
-Disability	-10.541 (1.195)	(-12.886;-8.196)	<0.001	-7.544 (1.431)	(-10.354;-4.733)	<0.001
-Studing			0.572	0.429 (2.910)		0.883
-Housewife/husband	-0.787 (1.392)	(-3.520;-1.945)	0.082	-2.732 (2.842)	(-5.285;6.142)	0.337
-Working*	-1.666 (0.957)	(-3.544;-0.212)			(-8.313;2.848)	
Fibromyalgia:						
-Yes	-4.787 (0.793)	(-6.344;-3.231)	<0.001			
-No *						
Arthrosis:						
-Yes				-2.521 (0.764)	(-4.022;-1.020)	<0.001
-No *						
Diabetic neuropathy and other neuropathies						
-Yes				-3.871 (1.209)	(-6.245 ;-1.497)	<0.001
-No *						
Low Back Pain						
-Yes				-2.199 (0.6663)	(-3.500;-0.898)	<0.001
-No *						
Educational level						
-Primary studies				0.214 (1.653)	(-3.031;3.460)	0.897
-Secondary studies				-0.030 (0.869)	(-1.735;1.676)	0.973
-University studies				2.079 (0.783)	(0.540;3.617)	0.008
-No studies*						

Dependent variable: The PCS-12 of SF-12v2; SE, Standard error; CI, Confidence interval; * Reference category

Model 1: Adjusted $R^2 = 0.376$

Model 2: Adjusted $R^2 = 0.320$

in pain conditions and comorbidity is one of the major factors influencing work disability [33]. The associations between pain and depression seem to be reciprocal, although there is stronger evidence that pain predisposes to depression than vice versa [34]. Likewise, the greater the intensity of pain, the less likelihood of remission of depression through anti-depressants, possibly increasing the suffering, prolonging sick leaves [35] and further undermining physical health.

The separate analyses for women and men showed different patterns of factors associated with physical quality of life. More specifically, the results showed that having fibromyalgia affects the physical quality of life of women in particular, which makes sense since women are diagnosed with fibromyalgia much more likely than men [36]. Some authors [37] demonstrated that patients with fibromyalgia tend to have worse health status and quality of life when compared to other patients with other chronic diseases. Due to the complexity of the illness, many women have difficulties in describing their symptoms. Health professionals do not always identify the patient's CP as being fibromyalgia-related or still do not believe in this condition reported by patients [37]. A large number of studies have reported that patients with fibromyalgia encounter stigmatization, including expressions of disbelief as to the validity of the diagnosis itself, being seen as the medicalization of psychosocial problems [38]. Thus, it is usually only diagnosed in the advanced stages, when it has already had an impact on their physical health.

Having arthrosis, diabetic neuropathy and low back pain were the factors related to the worst physical quality of life of men. Previous studies have found a higher frequency of diabetic sensorimotor polyneuropathy in males, despite the evidence of the higher frequency and

Table 4 Factors associated to Mental HRQL in women and men

Variables	MODEL 1: Women Mental HRQL (N =1068)			MODEL 2: Men Mental HRQL (N =752)		
	Beta (SE)	CI 95%	p-valor	Beta (SE)	CI 95%	p-value
Constant	31.466 (5.740)	(20.204;42.729)	<0.001	47.388 (2.178)	(43.112;51.665)	<0.001
Age	0.111 (0.016)	(0.079;0.143)	<0.001	0.058 (0.020)	(0.019;0.098)	0.004
Anxiety (HADS)	-1.067 (0.082)	(-1.228;0.906)	<0.001	-0.877 (0.101)	(-1.075;-0.680)	<0.001
Depression (HADS)	-0.817 (0.080)	(-0.973;-0.660)	<0.001	-1.004 (0.101)	(-1.202;-0.806)	<0.001
Educational level						
-Primary studies	0.906 (0.958)	(-0.974;2.786)	0.345			
-Secondary studies	1.699 (0.675)	(0.376;3.023)	0.012			
-University studies	0.493 (0.562)	(-0.610;1.597)	0.381			
-No studies*						
Herniated discs						
-Yes	-5.324 (2.230)	(-9.700;-0.948)	0.017			
-No *						
Dysmenorrhea/Endometriosis						
-Yes	-3.975 (1.800)	(-7.508;-0.443)	0.027			
-No *						
Pain localization						
-Head				-1.055 (1.361)	(-3.726;1.616)	0.438
-Neck				3.785(1.252)	(1.327;6.244)	0.003
-Back				3.108 (1.046)	(1.055;5.160)	0.003
-Joints				4.375 (1.064)	(2.287;6.463)	<0.001
-Chest				1.634 (2.554)	(-3.380;6.648)	0.522
-Abdomen				0.245 (1.789)	(-3.268;3.758)	0.891
-Others				0.188 (2.858)	(-5.422;5.799)	0.948
Generalized *						
Neck pain						
-Yes				-1.142 (0.602)	(-2.324;-0.039)	0.058
-No *						
Social support (Duke-UNC-11)				0.073 (0.029)	0.016;0.129)	0.012

Dependent variable: The MCS-12 of SF-12v2; SE Standard error, *CI* Confidence interval

Model 1: Adjusted R2 = 0.561

Model 2: Adjusted R2 = 0.571

*Reference category

intensity of pain and other neuropathic symptoms in females. However, females have greater sensitivity to multiple sensory modalities, which might potentially facilitate early detection and treatment of diabetes, and therefore explain the relatively milder nerve injury in females with diabetes [39]. Low back pain is the most prevalent chronic pain (Table 2) and one of the most common reasons for visiting a physician. Facet arthrosis is a common radiographic finding and has been a suggested cause of low back pain, which has a greater prevalence in men at all lumbar levels [40]. Previous studies have shown that evidence of facet arthrosis can be linked to the amount of heavy work done before the age of 20 [41]. This could be related to another of our results that shows that men with university studies, who usually do not perform manual jobs, had better physical health compared to those with no studies.

Regarding mental quality of life, there were factors that affect both sexes/genders such as age, anxiety and depression. In this study, we found that age was associated with both physical and mental health in both sexes/genders. However, being older was worse for physical quality of life, while it was better for mental quality of life. There is an enormous variety in how the elderly attempt to adjust to the challenge of pain [42]. In this vein, it is noticeable that, as other studies show, elderly patients accept pain as part of their aging process [43], and depression is less commonly associated with pain in elderly individuals than in younger subjects. It can be argued that the duration of pain, which is generally longer in older people, allows them to get used to it and make adjustments over an extended time. Social comparison (comparisons between the self and others) is also important because concern about a symptom is less likely when that symptom is common [44].

The women without studies and those with dysmenorrhea/endometriosis and herniated discs were linked with worse mental quality of life. Regarding the level of

studies, lower health literacy has been shown [45, 46] to be associated with poorer self-management behaviour, such as worse adherence to medication, and with greater pain intensity and attention and memory problems, issues that have been acknowledged in CP and depression (the extra burden), which could explain the association in our results with mental health.

Concerning endometriosis, it is a chronic health condition, yet it is still all too often considered taboo or not important due to its links with the menstrual cycle [47]. It is characterized by chronically painful menstruation and sex, and pelvic symptoms, pain stigma that contributes to endometriosis stigma and to poorer mental health. Additionally, infertility is a likely contributor to poorer mental health in people with endometriosis, as up to half of endometriosis patients experience it [48]. On the subject of herniated discs, epidemiological studies have determined that this is more common among women and that the incidence depends on the degree of the lumbar burden associated with tasks performed at the patient's workplace [49]. Additionally, patients with lumbar or cervical disc herniation had a higher prevalence of anxiety disorders [50], and this is more prevalent in females [51].

The men in the study who had a diagnosis of neck pain, or had widespread pain, and lacked social support had a worse mental quality of life. Our results are not surprising since individuals with widespread pain often experience long-lasting pain in multiple body regions, and this pain is associated with other physical symptoms such as fatigue, concentration problems and psychological distress. In addition, associations between widespread pain and social factors have been reported [52]. That is in line with another of our results: how social support serves as a protective factor, suggesting that it reduces psychological distress especially at times of heightened social isolation, which is common among individuals with chronic pain [53]. Research has demonstrated that many people with psychological problems are reluctant to seek help from mental health professionals or communicate with their social sphere. When it comes to help-seeking for a mental health problem, this process is ultimately determined by structural factors. Gender socialization and traditional male values are impediments to help seeking and inhibit propensities to communicate since men are not expected to express their emotions, which can perpetuate low mental health in this population [54].

Some strength and limitations of the present study must be taken into account. First, the sample, given the characteristics of the online survey, was selected from people that volunteered to be part of the register of a market research company, and would appear to be selective and biased. However, some authors [55] have argued that panel providers undertake to manage the demographic compositions of their respondent pools, and try to correct the biases so that panels are demographically similar to national populations. In addition, online panel surveys are widely used by social scientists. Second, while the sample (n = 1825) was robust for analysing the PCS, it was underpowered for the MCS. The observed power of 48% (below the 80% benchmark) increases the risk of Type II errors and limits the generalizability of the MCS related findings. These results should therefore be interpreted with caution. Nevertheless, this study was carried out using a large representative Spanish sample and a rigorous selection procedure. Furthermore, the use of validated scales to measure many dimensions ensures that, despite the aforementioned limitation, the information obtained remains highly valid and reliable. Finally, it is necessary to bear in mind that since this is a cross-sectional study, the relationships observed do not allow us to establish causal relationships.

Conclusions

CP has an impact on the HRQL of both sexes/genders. However, some issues have a different impact on the HRQL of each sex/gender such as fibromyalgia or endometriosis in women; or low back pain or social support in men. Identifying the sources of this difference in pain is a complex matter that requires a bio-psycho-social perspective. Yet this survey aims to contribute to future data collection efforts and ongoing and future applications centred on the care of both men and women suffering from chronic pain.

Abbreviations

CP	Chronic pain
CATI	Computer-assisted telephone interviewing
CAWI	Computer-assisted web interviewing
HADS	Hospital Anxiety and Depression Scale
HRQL	Health-related quality of life
IASP	International Association for the Study of Pain
MCS	Mental component
PCS	Physical component
SF-12	Short-Form Health Survey version 2
VIF	Variance inflation factor

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Authors' contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by HDS, MD, AS and IF. The first draft of the manuscript was written by HDS and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Data availability
The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
This study was conducted in accordance with the Declaration of Helsinki and complies with the Spanish Biomedical Research Act (Law 14/2007) [56] and Organic Law 3/2018 on Data Protection (LOPDGDD) [57]. In accordance with the 17th Additional Provision of Law 3/2018 [57], the use of pseudonymized data for health research is permitted without additional explicit consent when a strict functional separation between the data controllers and the research team is guaranteed. Consequently, formal approval by a Research Ethics Committee (REC) was deemed unnecessary as the project falls outside the scope of Royal Decree 1090/2015 [58]. The study is strictly observational, involves no clinical intervention, and the research team only had access to a dataset that was effectively anonymized at the source by the data collection agency. All participants provided explicit informed consent at the beginning of the questionnaire (via CATIor CAWI platforms). While the data collection agency managed personal identifiers for recruitment purposes, these were strictly decoupled from the responses. The final dataset delivered to the researchers was stripped of all personal identifiers, ensuring the confidentiality and privacy of participants in full compliance with current ethical and legal standards.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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