ORIGINAL RESEARCH: EMPIRICAL
RESEARCH - QUANTITATIVE

Profiles of adult people in a Spanish sample with chronic pain: Cluster analysis

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Abstract

Aim: To establish groups of people with chronic non-cancer pain according to the impairment caused by pain and to identify factors associated with the group with a higher level of impairment.

Background: Knowing the profiles of people who suffer from chronic non-cancer pain could make it possible to direct their treatment and to detect associated risks.

Design: A cross-sectional study.

Methods: A sample of 395 people with chronic non-cancer pain was collected in Pain Units and Primary Healthcare Centres in southern Spain (January to March 2020). A cluster analysis was performed to divide the population into groups and a binary logistic regression model was established to determine factors associated with the group with a higher level of impairment.

Results: Two groups were identified: lower level of impairment due to pain, characterized by being 45–65 years old, not medicated with opioids or anxiolytics, employed and with a mild level of impact on daily life; and higher level of impairment characterized by being older than 65 years old, medicated with opioids and anxiolytics, retired or on medical leave and with a severe impact on daily life. In addition, among women, being widowed, single or a smoker are risk factors for belonging to the group with a higher level of impairment; being smokers or consuming alcohol three or less times a week would be risk factors in men.

Conclusions: Age, chronic non-cancer pain impact on daily life, work situation and the consumption of opioid drugs and/or anxiolytics are factors that appear to influence the level of impairment due to chronic pain.

Impact: These findings could help detect impairment due to pain in its early stages, determining the specific needs of each person.

KEYWORDS
ageing, analgesics, opioids, anti-anxiety agents, chronic pain, cluster analysis, cross-sectional studies, impairment, logistics models, nursing

1 | INTRODUCTION

Chronic pain is defined as an unpleasant sensory and emotional experience that persists or recurs for more than 3 months (Raja et al., 2020; Treede et al., 2019). Chronic pain can be a symptom of a disease, or be considered as a disease in itself, a process recently referred to by the International Classification of Diseases (ICD-11) as 'Chronic primary pain' (International Classification Disease-11 (ICD), 2022; Nicholas et al., 2019). When chronic pain is not associated with an oncological process, it is denominated as chronic non-cancer pain (CNCP) (Bennett et al., 2019).

CNCP is a public health problem throughout the world, with significant economic and social repercussions (Torralba et al., 2014) and clinical consequences, such as higher levels of disability (Paterniani et al., 2020), sleep disturbances or higher rates of anxiety and depression, among others (Cáceres-Matos et al., 2020).

CNCP is estimated to affect around 1 in 5 people worldwide (Dahlhamer et al., 2018; El-Metwally et al., 2019), which recent studies have estimated to be in a range between 12% and 42% (Pain Alliance Europe, 2021). In Spain, this figure is 17% in population older than 18 years (Cabrera-León et al., 2017).

The annual cost associated with CNCP exceeds 300 billion euros, which is around 1.5–3% of the Gross Domestic Product in Europe (Smith & Hillner, 2019) and 16 billion euros in Spain (Torralba et al., 2014).

2 | BACKGROUND

In Spain, it is estimated that by 2029 the percentage of the population over 65 years old will increase from 18.2% to 24.9% (National Institute of Statistics, 2014) which is accompanied by a growing incidence of CNCP and impairment (Halonen et al., 2019).

In addition, employment status is another predictor of impairment due to pain. Grant et al. (2019) suggested that CNCP is one of the main causes that impair the ability to continue to perform work correctly (Grant et al., 2019).

Another aspect to consider is that CNCP's impact on daily life is one of the main indicators in predicting the deterioration it causes (Paterniani et al., 2020), although there is no exact definition of it. The United States' National Pain Strategy suggested the definition of chronic pain impact as a limitation in life activities on most days during the last 6 months due to chronic pain (Dahlhamer et al., 2018).

Another important aspect related to CNCP is the consumption of medicines, such as opioids or anxiolytics. It is known its benefits when is prescribed for acute pain; however, its advantages when are prescribed for CNCP are questionable (Busse et al., 2017; Volkow & McLellan, 2016). It is also especially relevant when opioids are prescribed together with anxiolytic drugs, a symptom that is present in between 30% and 40% of people who suffer from CNCP (Rayner et al., 2016).

Nurses play a main role in prevention, but also in monitoring and managing CNCP. In this sense, they have the potential to change the behaviour of people with CNCP, providing specialized care to the individuals and, by extension, their families (Royal College of Nursing, 2018). Knowing the profiles of people who suffer from CNCP could make it possible to direct their treatment and the approach is taken to detect associated risks at earlier stages or in groups in need of specific interventions, as well as to reduce associated healthcare costs.

The most frequently used technique of analysis for these purposes is cluster analysis. In recent years, it has been widely used in the area of health sciences to classify and characterize people with different pathologies on the basis of symptoms or common characteristics (Bayman et al., 2021).

Previous studies have managed to classify the profiles of people with CNCP on clinical variables such as the number of pain sites, pain duration, control over pain or depression/anxiety symptoms (Dueñas et al., 2015; Giesecke et al., 2003). Our study intends to detect groups of people with CNCP, according to the level of impairment due to pain based on variables widely recognized such as age, employment status, CNCP impact in daily life and the consumption of opioids and anxiolytics, comparing the results among women and men (Rivera et al., 2020).

3 | THE STUDY

3.1 | Aims

The objectives of this study were (1) to establish groups of people with CNCP according to the impairment caused by pain and (2) to identify factors associated with the group with a high level of impairment due to pain.

3.2 | Design

The study was a cross-sectional study designed to establish groups using cluster analysis and determine factors associated with the group with a higher level of impairment due to pain based on logistic regression models.

3.3 | Sample and data collection

The sample size of the purposive sample was 395 people, based on a CNCP prevalence of 17% (Cabrera-León et al., 2017), the Andalusian population (8.5 million inhabitants) (National Institute of Statistics, 2020), a confidence level of 95% and a sampling error of 5 percentage points. The final samples obtained for men and women were 143 and 243, respectively. Those sample sizes, based on the CNCP prevalence of 23.9% for women and 9.9% for men (Cabrera-León et al., 2017) and the previous Andalusian population and confidence level, determined sampling errors of 5.2 and 4.8 percentage points, for the women and men study groups, respectively.

3.4 | Participant characteristics and data collection

Participants were recruited from four Pain Units and several Primary Healthcare Centres that are part of the Spanish Public Health System in the province of Seville in southern Spain. The data were collected by trained healthcare professionals (nurses and physicians) from January to March 2020.

The inclusion criteria were individuals over 18 years old and diagnosed with any CNCP condition. Furthermore, the exclusion criteria were suffering from cancer pain, cognitive impairment or difficulties with oral communication in the Spanish language.

Individuals that met the inclusion criteria were invited to participate. The information on the pharmacological treatment prescribed to the participants was collected from the hospital's medical records.

3.5 | Measurements and variables

Data about sociodemographic variables such as age or employment status and clinical variables (number of pain sites, duration of the evolution of the pain, medication prescription, among others) were collected. Table 1 shows the characteristics of the variables listed in the study.

The PAIN_Integral Scale$^©$ for assessing the impact that CNCP has on a person's daily life and the Visual Analogue Scale (VAS) for evaluating the subjective intensity of pain were used.

The PAIN_Integral Scale$^©$ is an instrument composed of 36 items, with a Type-Likert scale from one to five points. The results of its validation study showed adequate reliability ($\alpha = 0.72$) and a structure of nine dimensions that explained 68.22% of the variance. The nine dimensions are self-care, mobility, sleep, treatment compliance, proactivity, resilience, support network, hopelessness due to pain and pain catastrophizing. Scores on the scale range from 36–180 points that are divided into three intervals (36–130: Severe impact;131–135: Moderate impact; 136–180: Mild impact) (Cáceres-Matos et al., 2021). Therefore, the variable 'impact of CNCP on daily life' was a categorical variable composed of the instrument's three categories.

The VAS is a 10 cm line with anchor statements on the left (no pain) and on the right (extreme pain). The person is asked to mark their current pain level on the line (Scott & Huskisson, 1979).

3.6 | Data analysis

The analyses were carried out separately for women and men with the intention of identifying possible differences between both sexes. All the analyses were performed using SPSS version 26 and R version 3.6.3 as statistical software. Descriptive statistics were provided for the participant's characteristics with categorical variables reported as frequencies and percentage values. To define the associations between the variables, a chi-square test was performed for categorical variables and *p*-values ≤.05 were considered significant.

TABLE 1 Variables included in the study

Variables included in cluster analysis

Age: 16–44 years; 45–64 years; +65 years.

Chronic non-Cancer Pain impact: The variable CNCP was collected using the instrument PAIN_Integral Scale$^©$ which ranges between 36–130 points. The scores were divided into three intervals: 36–130: severe impact; 131–136: moderate impact; 137–180: mild impact (Cáceres-Matos et al., 2021).

Employment status: employed; unemployed; retired; medical leave; housemaker.

Number of pain sites: 1 site; 2–3 sites; more than 3 sites.

Duration of evolution of the pain: last 12 months; from 1 to 4 years; more than 4 years.

Pain intensity: The subjective intensity of pain score was collected with the Visual Analogue Scale which is a 10 cm line with anchor statements on the left (no pain) and on the right (extreme pain). The person is asked to mark their current pain level on the line (Scott & Huskisson, 1979). When a person suffered from pain in more than one location, their response referred to the site at which the pain was most intense at the time of the interview. The scores were categorized into three intervals: 0–4: mild intensity of pain; 5–7: moderate intensity of pain; 8–10: severe intensity of pain (Ministry of Health, 2021).

Antidepressant consumption: consumed; not consumed.

Anxiolytics consumption: consumed; not consumed.

Hypnotics consumption: consumed; not consumed.

Non-opioid analgesics consumption: consumed; not consumed.

Opioid analgesics consumption: consumed; not consumed.

Variables included in logistic regression analysis

Alcohol consumption: frequent consumer (more than 4 days a week), occasional consumer (3 days a week or less), not a consumer (National Drug Plan, 2020).

Income level: up to €999; from €1000 to €1999; more than €2000.

Level of education: primary school; secondary school; higher education (National Institute of Statistics, 2014).

Marital status: married; single; separated/divorced; widowed.

Tobacco consumption: smoker, ex-smoker, non-smoker (National Drug Plan, 2020).

Type of area: rural; urban (Eurostat, 2018).

Have you witnessed a regular use of pain medication in your family since childhood? yes or no.

Are you in charge of anyone who depends on your care? yes or no.

To group the study population, firstly, the independence between the variables included in the cluster analysis was verified: age, CNCP impact, employment status, number of pain sites, duration of evolution of CNCP, pain intensity and the consumption of five types of drugs (antidepressants, anxiolytics, hypnotics, non-opioid analgesics and opioid analgesics). We performed a hierarchical cluster analysis using log-likelihood as a measure of distance to classify the study population into groups according to those variables. The

Akaike Information Criterion (AIC) was also calculated to assess the degree of adjustment of the groups.

The second stage was to assign cases to clusters using a K-means iterative partitioning procedure. Following the formation of clusters, a chi-square test was used to confirm that variables used in the analysis were differentiated by the cluster solution.

The third stage was developed to check the validity of the two groups formed, performing a discriminant analysis, again separately for women and men. Eigenvalues, Wilks' Lambda (λ), the percentage of cases correctly classified, and the Canonical Discriminant Function Coefficients were calculated.

Finally, two multinomial logistic regression models (in women and men separately) were used to determine the factors associated with the group with a high level of impairment due to pain in comparison to the group with a lower level of impairment due to pain.

A model was initially adjusted using a manual procedure. The dependent variable was the different clusters, and the independent variables included in the models were alcohol consumption, income level, level of education, marital status, tobacco consumption, type of area, 'have you witnessed a regular use of pain medication in your family since childhood?' and 'are you in charge of anyone who depends on your care?'. Those furthest from significance (at 5%) were successively excluded, verifying at each step that the exclusion did not change the value of the other parameters by>30% of their previous value to control possible confusion effects. The statistical power of these multivariate models was 93.2% for the group of women and 82.1% for the group of men, considering a significance level of 5%, a sample of 249 women and 146 men, 5 independent variables finally selected from the initial 8, and two coefficients of determination obtained in the final models of 0.265 and 0.295, respectively. On the other hand, the OR detectable as statistically significant with the above parameters was 2.3 and 2.4 for women and men, respectively.

3.7 | Ethical considerations

Participants were informed about the study and only those who provided written or verbal informed consent were included in the study. The Research Ethics Committee of the Virgen Macarena-Virgen del Rocío University Hospitals approved the study (1373-N-20).

4 | RESULTS

4.1 | Sample

The study subjects represented a sample of 395 people including 249 women (63%) and 146 men (37%). The response rate was 76.4% of participants who met the inclusion criteria. Table 2 shows data on age, data collection centres, level of education, employment status, marital status and type of area, among others.

TABLE 2 Descriptive analysis. Characteristics of the sample[a]

Variables (n = 395)	Women (n = 249) n (%)	Men (n = 146) n (%)	p-value
Age			
16–44 years	27 (10.7)	26 (17.9)	.001[b]
45–64 years	110 (44.3)	65 (44.8)	
Over 65 years	112 (45)	55 (37.3)	
PAIN_Integral Scale scores			
Mild	62 (24.9)	48 (33.1)	.891[b]
Moderate	33 (13.3)	19 (12.5)	
Severe	154 (61.8)	79 (54.4)	
Time of evolution of Chronic non-cancer pain			
More than 4 years	151 (65.4)	79 (59.4)	.485[b]
From 1 to 4 years	63 (27.3)	41 (30.8)	
Last 12 months	17 (7.4)	13 (9.8)	
Centres			
Virgen del Rocio University Hospital	215 (86.5)	114 (78.3)	.123[b]
San Juan de Dios Aljarafe Hospital	7 (2.7)	3 (2.2)	
Virgen Macarena University Hospital	18 (7.2)	17 (11.5)	
Valme University Hospital	9 (3.6)	12 (8.0)	
Level of education[a]			
Primary school	174 (70.0)	86 (58.8)	.022[b]
Middle school	43 (17.0)	43 (29.4)	
Higher education	32 (13.0)	17 (11.8)	
Employment status			
Employed	40 (15.9)	37 (25.3)	<.001[b]
Unemployed	14 (5.8)	11 (7.5)	
Retired	73 (29.3)	36 (24.6)	
Medical leave	76 (30.5)	61 (41.6)	
Homemaker	46 (18.5)	1 (1)	
Marital status			
Married	144 (57.7)	115 (78.8)	<.001[b]
Single	31 (12.6)	18 (12.4)	
Separated/divorced	25 (9.9)	12 (8.0)	
Widowed	49 (19.8)	1 (0.8)	
Type of area			
Rural	34(13.5)	27(18.8)	
Urban	215(86.5)	119(81.2)	.169[b]
Visual Analogue Scale (VAS)	X̄ (SD) 7.44(2.14)	X̄ (SD) 6.88(2.38)	<.001[c]

[a]Missing data in all the boxes <0.8%.
[b]Chi-square tests.
[c]t-student test.

4.2 | Main chronic non-cancer pain groups

Characteristics related to CNCP were analysed to identify groups of people. For both sexes, the hierarchical cluster analysis suggested the exclusion of the following variables from the analysis due to not being classification variables: hypnotics consumption, non-opioid analgesics consumption, number of pain sites, duration of the evolution of the pain and pain intensity (AIC for women:800.172; AIC for men:693.68). Finally, the results suggested a two-cluster solution for each sex. For women and men, group 1 referred people with a low level of impairment due to pain and group 2 was associated with people with a high level of impairment due to CNCP (Table 3). In women, the data of two participants were excluded in the formation of the groups for being outliers while in men only one of the cases was excluded.

Similar results were found for both the women and men's populations. In both cases, group 1 (women:21.5%; men: $n = 33.1\%$) was primarily characterized by being between 45 and 64 years old, a mild level of CNCP impact on daily life, being employed and not consuming opioids or anxiolytics. Group 2 (women:78.5%; men: $n = 66.9\%$) consisted of people aged over 65 years old with a severe level of CNCP impact on daily life, retired or on medical leave and who were consumers of opioids or anxiolytics. The name of the two groups of people with CNCP found were based on the impairment caused by this health condition as follows: 'group 1-people with a lower level of impairment' and 'group 2-people with a higher level of impairment'.

Table 3 summarizes the degree of success in classifying the participants into the two groups based on discriminant analysis. The results show that 100% of the cases were correctly classified for both women and men. This supports the results obtained in the previous cluster analysis.

4.3 | Factors associated with the group of people with higher impairment due to pain

When identifying factors associated with pain groups in the analysis, the first stages suggested the elimination of some of the variables (income level, 'have you witnessed a regular use of pain medication in your family since childhood?' and 'are you in charge of anyone who depends on your care?'). Finally, we built two logistic regression models (Table 4), one for women and another made up of the following variables: level of education, marital status, type of area of residence, consumption of tobacco and consumption of alcohol.

For women, the results show that among the factors analysed, being widowed (OR:9.69; 95%CI:1.24–18.14) and being single (OR:18.01; 95%CI:2.07–36.81) would increase the risk of belonging to the group with higher impairment due to pain, 9 to 18 times, respectively. Another factor that has shown that it would double the risk of belonging to this group is to be a woman who smokes (OR:2.36; 95%CI:1.01–5.52). The latter factor, being a man who smokes (OR:2.71; 95%CI:1.04–7.04) and occasional alcohol consumption (OR:2.43; 95%CI:1.01–5.85) would also double the risk of being in group 2 for men.

5 | DISCUSSION

The two objectives of this study were: (1) to establish groups of people CNCP according to the impairment caused by pain and (2) to identify factors associated with the group with a high level of impairment due to pain.

The results of this study could be compared with those obtained by other studies performed in a population with similar characteristics by Dueñas et al. (2015) and Wilson et al. (2005). In both studies, the participants were classified into groups according to clinical characteristics of CNCP such as pain duration, number of pain sites and pain location in the first study; and pain intensity, pain interference and depression diagnosis in the second one. Another study by Giesecke et al. (2003) classified people with CNCP based on psychological characteristics such as anxiety, depression, catastrophizing and control over pain. Our study has identified two groups, but classifying people based on other characteristics, widely regarded in the literature as factors related to the suffering of CNCP (Rivera et al., 2020), including age, opioid consumption, anxiolytic consumption, employment status and impact of CNCP on daily life (Cáceres-Matos et al., 2020). Although some of the variables mentioned in the above studies were included (pain intensity, number of pain sites and duration of evolution of the pain), these were excluded from the hierarchical cluster analysis.

This has made it possible to establish two groups of people based on the impairment caused by this health condition from a different perspective, taking into account sociodemographic factors that the literature recognizes as necessary to understand CNCP (Mills et al., 2019). The groups were named 'people with a lower level of impairment' and 'people with a higher level of impairment'. The results found were similar for women and men, where the group that suffered the higher level of impairment was characterized by being older than 65 years of age, being retired or on medical leave, medicated with opioids or anxiolytics and with a severe CNCP impact on daily life measured by the PAIN_Integral Scale© (Cáceres-Matos et al., 2021).

Firstly, it has been acknowledged that the prevalence of CNCP increases with age (Schwan et al., 2019; Zelaya et al., 2020) and that it may be explained by the greater multi-morbidity in older people (Mills et al., 2019). In several studies, it was found that the prevalence of pain increased in the age range between 40 and 50 years, with further stabilization until reaching the group of people over 65 again (Fayaz et al., 2016; Zelaya et al., 2020). This would suppose the existence of two spikes, one at middle age and the other at an older age, findings that are in line with the results obtained in this study.

About the labour sphere, it has been detected that the group with a higher level of impairment due to CNCP was characterized by being retired or on medical leave. The condition of retirement could be explained by the high percentage of people over 65 who

TABLE 3 Chronic non-cancer pain group characteristics from the cluster analysis

Variables (n = 392)[a]	Women (n = 247)		Men (n = 145)		
	Group 1 Low impairment n (%) 53(21.5)	Group 2 High impairment n (%) 194(78.5)	Group 1 Low impairment n (%) 48(33.1)	Group 2 High impairment n (%) 97(66.9)	p-value
Classifying variables in the cluster analysis					
Chronic non-cancer pain impact (PAIN_Integral Scale©)	X̄ (SD) 125.6(13.0)	X̄ (SD) 120.3(16.1)	X̄ (SD) 126(12.1)	X̄ (SD) 122.1(15.0)	<.05
	n (%)	n (%)	n (%)	n (%)	
Mild impact	32(60.4)	29(14.9)	29(60.4)	19(19.6)	<.05
Moderate impact	5(9.4)	28(14.5)	8(16.7)	10(10.3)	
Severe impact	16(30.2)	137(70.6)	11(22.9)	68(70.1)	
Age					
18–44 years	14(26.4)	12(6.2)	17(35.4)	9(9.3)	<.05
45–64 years	35(66.1)	75(38.7)	30(62.5)	35(35.6)	
+65 years	4(7.5)	107(55.1)	1(2.1)	53(55.1)	
Employment status					
Employed	39(73.6)	0	37(77.6)	0	<.05
Unemployed	14(26.4)	0	11(22.4)	0	
Retired	0	73(37.6)	0	36(37.1)	
Medical leave	0	75(38.7)	0	60(61.9)	
Homemaker	0	46(23.7)	0	1(1.0)	
Opioid consumption					
Consumed	16(29.3)	118(60.6)	16(33.3)	63(65.0)	<.05
Not consumed	37(70.7)	76(39.49	32(66.7)	34(35.0)	
Anxiolytic consumption					
Consumed	18(28.3)	116(59.6)	10(20.5)	64(65.5)	<.05
Not consumed	38(71.7)	78(40.4)	36(79.5)	33(34.5)	
Summary of the rest of the variables primarily included in the cluster analysis that not classified the subgroups					
Hypnotics consumption					
Consumed	2(38.0)	43(22.2)	4(8.3)	14(14.4)	<.05
Not consumed	51(96.2)	151(77.8)	44(91.7)	83(85.6)	
Non-opioid analgesic consumption					
Consumed	41(77.4)	139(71.6)	23(47.9)	72(74.2)	<.05
Not consumed	22(22.6)	55(28.4)	25(52.1)	25(25.8)	
Number of pain sites					
1 site	17(32.1)	2(1.0)	0(0.0)	5(5.2)	<.05
2–3 sites	36(67.9)	95(49.0)	38(79.2)	58(59.8)	
More than 3 sites	17(32.1)	97(50.0)	10(20.8)	34(35.1)	
Duration of evolution of the pain					
Last 12 months	4(8.3)	13(7.2)	2(4.7)	11(12.4)	.38
From 1 to 4 years	16(33.3)	47(26.0)	14(32.6)	27(30.3)	
More than 4 years	28(58.3)	121(66.9)	27(62.8)	51(57.3)	

TABLE 3 (Continued)

Variables (n = 392)[a]	Women (n = 247)		Men (n = 145)		
	Group 1 Low impairment n (%) 53(21.5)	Group 2 High impairment n (%) 194(78.5)	Group 1 Low impairment n (%) 48(33.1)	Group 2 High impairment n (%) 97(66.9)	p-value
Pain intensity (Visual Analogue Scale VAS)					
Mild intensity	2(3.8)	8(4.1)	8(16.7)	5(5.2)	.24
Moderate intensity	27(50.9)	74(38.1)	24(50)	39(40.2)	
Severe intensity	24(45.3)	112(57.7)	16(33.3)	53(54.6)	
	X̄ (SD) 7.04(1.7)	X̄ (SD) 7.53(2.2)	X̄ (SD) 6.3(2.6)	X̄ (SD) 7.21(2.2)	<.05
Discriminant analysis					
Eigenvalues	3.72		11.23		
% of Variance	100%		100%		
Canonical correlation	0.89		0.96		
Wilks'Lambda (λ)	0.21		0.08		
Chi-Square (5 gl)	376.53		351.81		
p-value	<.01		<.01		
Canonical discriminant function coefficients					
Age	0.15		0.19		
Chronic non-cancer pain impact	−0.13		0.04		
Employment status	2.26		3.95		
Opioid consumption	0.23		−0.08		
Anxiolytic consumption	0.15		−0.33		
Constant	−6.55		−9.66		
% of cases correctly classified	100%		100%		

Note: Variables primarily included in the cluster analysis: age; anxiolytic consumption; chronic non-cancer pain impact; duration of evolution of the pain; employment status; hypnotics consumption; non-opioid analgesic consumption; Number of pain sites; opioid consumption; pain intensity.
[a]Missing data in all the boxes <0.8%.

participated in the study, whereas the high percentage of people on medical leave could be explained by the consequences that CNCP has on the ability to perform the job correctly. In this sense, in a study carried out by De Sola et al. (2016) it was found that 31.6% of the participants who suffered from CNCP stated that they had been on medical leave in the last year due to pain; and 13.5% of them lost or had to leave their job for this same reason. On the other hand, other authors such as Dany et al. (2016) or Yamada et al. (2016) stated that most people need to continue working despite pain, especially those groups with fewer economic resources, being likely to have up to 30% less productivity compared with the population without pain.

With regards to the consumption of opioids, the increase in long-term prescription have been accompanied by an increase in the negative consequences associated with its use such as hyperalgesia or constipation (Busse et al., 2018). However, this relationship is also bidirectional, since higher levels of pain and impairment are treated with more powerful opioid drugs instead of with other rehabilitative measures. The same occurs with anxiolytic prescriptions, although it

is known that consuming this group of drugs can increase the severity of pain by 68% (Kempton et al., 2018). In this case, anxiety symptoms are medicated instead of providing the person with skills to improve coping and management of CNCP and the consequences it causes (Gil-García et al., 2020). It would be necessary to promote the training of prescribers in this area, as well as to carry out exhaustive monitoring of the evolution of people who follow these treatments (Lyden & Binswanger, 2019).

It has also been found that the impact of CNCP would be a predictor of impairment due to pain. In this study, the new instrument PAIN_Integral Scale© was used, which extensively evaluates the areas in which CNCP impacts (Cáceres-Matos et al., 2021). It is known that CNCP can also impact social relationships, quality of sleep and the ability to perform activities of daily life, among others (Cáceres-Matos et al., 2020), and this increases as the severity of the pain increases. However, the concept of the impact of pain on daily life is complex, there is no exact definition of it, and, at times, it is difficult to differentiate it from the quality-of-life construct. The United States' National Pain Strategy suggested the definition of chronic

TABLE 4 Factors associated with the subgroup with higher impairment due to chronic non-cancer pain from multinomial logistic regression models

Higher impairment vs. lower impairment		Women		Men	
Independent variables	**Categories**	**p-values**	**OR (95% CI)**	**p-values**	**OR (95% CI)**
Level of education	Primary school	.07	0.42(0.16–1.06)	.36	0.55(0.15–1.99)
	Secondary school	.62	1.30(0.46–3.72)	.73	1.28(0.32–5.04)
	Higher education[a]				
Marital status	Widowed	*.03*	*9 .69(1.24–18.14)*	.35	0.24(0.01–4.97)
	Single	*.009*	*18 .01(2.07–36.81)*	.42	1.72(0.45–6.53)
	Separated/divorced	.091	6.95(0.73–65.86)	.48	0.64(0.18–2.23)
	Married[a]				
Type of area	Rural	.28	0.55(0.19–1.62)	.97	1.02(0.40–2.64)
	Urban[a]				
Tobacco	Smoker	*.04*	*2 .36(1.01–5.52)*	*.04*	*2.71(1.04–7.04)*
	Ex-smoker	.185	1.77(0.76–4.11)	.74	1.19(0.43–3.27)
	Non-smoker[a]				
Alcohol	Frequent consumer	.32	0.32(0.04–3.01)	.54	1.45(0.44–4.81)
	Occasional consumer	.31	1.49(0.89–3.22)	*.04*	*2.43(1.01–5.85)*
	Not a consumer[a]				
Constant		$\beta = 4.22; p = .03;$		$\beta = 4.83; p < .001;$	
Coefficient of determination		$R^2 = 0.265$		$R^2 = 0.295$	

Note: *Higher impairment group*: older than 65 years, severe chronic non-cancer pain impact, retired/medical leave, consumers of opioids or anxiolytics. *Lower impairment group*: 45–64 years old, mild chronic non-cancer pain impact, employed and not consumers of opioids or anxiolytics. Bold and italic values are statistically significant data.

Abbreviations: CI, confidence interval; OR, odds ratio.

[a]Reference category.

pain impact as a limitation in life activities on most days during the last 6 months due to chronic pain (Dahlhamer et al., 2018), proposing the inclusion of the assessment areas of work, social network and self-care. Using the PAIN_Integral Scale© we have covered these areas and evaluated areas of interest not previously considered.

About the analysis of the sociodemographic factors associated with the group with a higher level of impairment due to pain, the results show that being widowed or single would be a risk factor that would increase the probability of belonging to this group by 9 and 18 times, respectively. The relationship between marital status and pain interference in women is unclear and there are conflicting conclusions in previous studies, as it appears to be influenced by perceived social support (Driscoll et al., 2015). However, these results should be treated with caution due to the fact that the group with a lower impact due to CNCP consisted of only 14 single women and one widow; while the group with a high level of impact due to the CNCP was composed of seven single women and 51 widowed women. This could point to the need to contrast these findings with a larger sample in future studies that allow for increasing the accuracy of the OR. Future studies that address this problem in-depth, but using a gender-based analysis, would be also recommended.

In addition, tobacco use has been shown to be a risk factor that would double the risk of impairment due to pain in both women and men. Nevertheless, this relationship is also unclear and causes

controversy. While in some studies tobacco use has been linked to the occurrence and worsening of CNCP levels, with a greater sensitivity to painful stimuli (Ditre et al., 2017) and with higher number of painful locations and disabilities (Khan et al., 2019), another study carried out by Ditre et al. (2016) reported that nicotine could reduce the level of pain. Finally, in men, drinking alcohol three times a week or less would be a risk factor for impairment due to pain. This could be explained by alcohol consumption that happens less frequently, but in greater quantities, also known as binge drinking. Another explanation could be the changes in social habits due to the impairment caused by CNCP and it generates differences in consumption patterns (Law et al., 2015).

With respect to the clinical practice implications, pain assessment and management are fundamental nursing skills. Therefore, knowing the profiles of people with CNCP can help nurses to design and direct primary prevention strategies when the person has not yet developed pain; secondary prevention, when the person has not consulted the health professional about it; and tertiary, to avoid worsening or derived complications (Royal College of Nursing, 2018). On the one hand, the strategies highlight the motivational interview and change of habits and lifestyles, effective communication to promote the active involvement of the person or self-management, and monitoring of treatment, among others (Barbosa et al., 2017; National Institute for Health and Care

Excellence, 2020; Royal College of Nursing, 2018). In this sense, the role of nurses in the education of the person with CNCP requires special consideration. The American Nursing Association concluded that all nurses are pain management nurses and have the obligation to provide skills and knowledge to the patients with the intention of promoting optimal nursing care (American Nurses Association, 2018). All these considerations could translate into an improvement in the quality of care and, therefore, in better health outcomes, with the consequent savings in health spending that the CNCP entails for health care systems and for the people who use them.

As prospective lines of research in future studies, it would be appropriate to analyse the characteristics of pain medicine prescriptions for people in this population, identifying whether there is a relationship with the different types of CNCP. Furthermore, we believe that it would be necessary to evaluate the profiles of people with CNCP by considering the different domains that the PAIN_Integral Scale© assesses and comparing functional domains and behavioural domains, as other studies have previously done (Bair et al., 2016).

Finally, we must acknowledge the limitations of this study. One of these limitations is the risk of learning or memory bias characteristic of population health studies (Manterola & Otzen, 2015). Response bias is also necessary to be taken into account because participants could modify their responses about what they could consider as socially unacceptable or embarrassing behaviours such as alcohol consumption (Sudhinaraset et al., 2016).

Secondly, the PAIN_Integral Scale is a new instrument that has been preliminarily validated and more research is necessary for this area (Cáceres-Matos et al., 2021). Another limitation is that the study sample was not completely representative of Spanish people with CNCP which, in turn, is essentially a convenience sample, not a population-based sample, and does not necessarily represent the characteristics of the entire population. In addition, data on pharmacological therapy were included in the cluster analysis, however, dosage, treatment duration, treatment adherence and non-pharmacological interventions were not considered. This is a limitation that would need to be addressed in future studies. In addition, as mentioned above, it is desirable to have a larger sample size to increase the precision of some ORs, such as those obtained for marital status. Finally, these results should be handled with caution since it is a retrospective cross-sectional study and the relationships found cannot be considered causal relationships (Romain et al., 2021). Therefore, it would be convenient to delve into this hypothesis in later studies.

6 | CONCLUSIONS

This study has identified two groups of people, both men and women, with CNCP according to the level of impairment due to pain with clear differences between both: people with a lower level of impairment and people with a higher level of impairment. The latter was characterized by people over 65 years of age, retired or on medical

leave, medicated with opioids or anxiolytics and with a severe CNCP impact on daily life. These findings could help detect impairment due to pain in its early stages, serving to direct the approach taken specifically according to each specific situation and each person.

Furthermore, evidence has been found among women that being a widowed, single or a smoker increases the risk of belonging to this group by 9, 18 and 2 times, respectively, while, in men, the risk factors found would be being smokers and consuming alcohol three or less times a week and they would double the probability of belonging to the group with higher impairment due to pain. However, these results should be handled with caution because it is a cross-sectional study in which cause-effect relationships cannot be established. Therefore, these relationships would need more research in future studies.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS

RCM conceived, designed, analysed data and wrote the manuscript; EGG supervised the study and corrected and provided conceptual input on the manuscript; JMLM, AMN and IP corrected and provided conceptual input on the manuscript and designed and ACL supervised the study and corrected and provided conceptual and methodological input on the manuscript.

PEER REVIEW

The peer review history for this article is available at https://publons.com/publon/10.1111/jan.15201.

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