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# Examination of factors affecting pain-related self-efficacy in patients with chronic neck pain

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## ABSTRACT

**Objective:** Chronic neck pain (CNP) is a musculoskeletal disorder and has psychosocial characteristics. Our study aimed to identify demographic and clinical descriptives for pain-related self-efficacy in patients with CNP.

**Material and Methods:** Two hundred patients (100 women, 100 men) with CNP included to the study were divided into 2 groups according to gender. Of the groups, pain-related self-efficacy, pain severity, balance skills, and physical activity level were evaluated with the Pain Self-Efficacy Questionnaire (PSEQ), the Visual Analogue Scale (VAS), the Berg Balance Scale (BBS), the Timed Up and Go Test (TUG), and the International Physical Activity Questionnaire-Long Form (IPAQ-LF). Multiple linear regression analysis was used to determine whether the models created with the variables that were determined as a result of Spearman's correlation analysis were descriptive of pain-related self-efficacy.

**Results:** As a result of the correlation analysis, the model, created to determine the contribution of age, BMI, BBS, TUG and total IPAQ-LF scores, which were found to be associated with the pain-related self-efficacy levels, explained 62% of the total variance in women with CNP (F= 22.276; p=0.001; R2= 0.629). In men with CNP, it was revealed that the model created with the scores of VAS, BBS and TUG, which were found to be associated with the level of pain-related self-efficacy, explained 73% of the variance (F= 70.138, p<0.001, R2= 0.736). While the main variables affecting the PSEQ results in women were VAS (p=0.000) and total IPEQ-LF scores (p=0.003), only VAS scores significantly contributed to PSEQ results in men.

**Conclusion:** Primarily, reducing the severity of CNP contributes to increasing pain-related self-efficacy, regardless of gender. Moreover, increasing the level of physical activity in women may increase their belief in pain-related self-efficacy.

**Key words:** Neck Pain, Gender, Self Efficacy, Balance, Physical Activity

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## INTRODUCTION

Neck pain ranks fourth among the pathologies that result in disability (1). Neck pain exhibits different characteristics depending on the time of onset. Neck pain experienced by approximately 60% of patients for the first time becomes chronic after 3 months, and symptomatic control becomes more difficult (2). Although success in managing chronic neck pain (CNP) varies from patient to patient, the prevalence of CNP in the adult population has been reported as 5.92-38.7% (3).

Especially non-ergonomic working conditions and maintaining a non-physiological cervical position for a long time are among the main causes of CNP, which is a multifactorial symptom (4). Variables such as female gender, aging, inadequate physical activity, and increased daily computer use are also important risk factors in the development of CNP (5). However, CNP is not only a complaint of biological origin but also has psychosocial characteristics. Chronic pain is a sensory and emotional experience that causes behavioral changes depending on the person's psychological state and the meaning they attribute to the pain (2). Fear of recurrence and exacerbation of pain in the cervical region, which is closely related to balance and functional abilities, can lead to negative gains such as avoiding physical and daily activities (4).

Pain-related self-efficacy belief based on Bandura's theory of self-efficacy is defined as 'the attitudes and beliefs that people with chronic pain have to carry out certain daily activities even when they have pain' (6). The emphasis on the importance of high pain-related self-efficacy in coping with problems and stresses resulting from chronic pain by many researchers has made it necessary to determine the factors affecting pain-related self-efficacy (6,7,8). Belief in high pain-related self-efficacy has been reported to be an independent indicator for lower pain severity, higher quality of life, higher treatment effectiveness, and recovery from CNP 6 months after the initial consultation (7,9). Accordingly, it is characterized as a protective psychological support and tolerance factor for increasing pain-related self-efficacy, successful management of pain, and intensification of participation in activities (10).

Pain-related self-efficacy may vary depending on numerous factors, such as demographic factors, physical performance, and balance skills of people with chronic pain (11). Especially gender, which is one of the demographic factors that can lead to differences in the pain experience and management of people with chronic pain (12). High estrogen levels, which allowhe sensation of pain to pass quickly through the peripheral nerves and the posterior arm of the medulla spinalis and reach the parietal lobe in a shorter time, may cause women to perceive pain more severely (13,14). Since hormonal factors are among the leading clinical reasons behind the gender-related differences in the perception of pain, the gender-related change in the pain-related self-efficacy belief should be addressed specifically.

Reduced cervical range of motion, inadequate extensor muscle function, decreased joint position sensation, and impaired postural stability can be observed in patients with CNP secondary to increased pain severity (15). These negativities, which further increase pain severity in people with CNP and lead to impairment in their balance and functional capacity, may lead to a decrease in the level of pain-related self-efficacy by reducing the ability to cope with pain (4,10). Determining the sensory, physical, and behavioral factors that affect CNP-related self-efficacy can make a significant contribution to developing rehabilitative strategies and/or protective/inhibitory interventions for treating patients and acquiring permanent behavioral changes.

The aim of our study was to identify demographic and clinical descriptives for pain-related self-efficacy in patients with CNP.

## MATERIAL and METHODs

### Study design

This cross-sectional study was conducted at Suleyman Demirel University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation. All participants were informed before participating in the study, and written consent was obtained from the individuals who agreed to participate. Each stage of the study was carried out in accordance with the Declaration of Helsinki.

### Participants

A total of 288 patients with CNP were invited to the study, and the patients who agreed to participate in the study were assessed in terms of eligibility for the study. Two hundred patients (100 women - 100 men) who had a pain severity of 3 and above according to the Visual Analogue Scale (VAS), whose pain continued for at least 12 weeks, were between the ages of 30-65, and agreed to participate in the study were included in the study. Patients between the ages of 30-65 were included in the study due to the high tolerance of painful stimuli in the young and the more exaggerated interpretation of pain in the elderly population. Patients with a history of vertebral injury, patients with spinal tumors and infections, patients who had undergone any musculoskeletal surgery, patients with neurological involvement, and patients with poor cognitive status were excluded from the study. While 40 patients with CNP did not agree to participate in the study, 48 patients were excluded from the study since they did not meet the inclusion criteria. Figure 1 shows the schema for patient screening and including participants in the study.

### Assessment Methods

After the demographic information of the patients included in the study [age, gender, body weight and height, body mass index (BMI), marital status, and educational status] were recorded, an experienced physiotherapist used the Pain Self-Efficacy Questionnaire (PSEQ) to assess the pain-related self-efficacy. The VAS, Berg Balance Scale (BBS), Timed Up and Go Test (TUG), and International Physical Activity Questionnaire-Long Form (IPAQ-Long Form) evaluated the pain severity, dynamic balance, static balance, and physical activity levels of the patients to determine their clinical status.

### Pain Self-Efficacy Questionnaire (PSEQ)

The ten-item PSEQ is used to measure how safe patients feel while performing various activities of daily living despite the presence of pain. Patients are requested to score their confidence in performing the activity defined in each item between "0: not at all confident" - "6: completely confident". The total score of the questionnaire varies between 0 and 60, and high scores indicate high pain-related self-efficacy (16). Kaynarcı et al. performed the Turkish validity and reliability study of this questionnaire (17).

### Visual Analogue Scale (VAS)

The VAS developed by Price et al. was used to evaluate the pain severity. In the assessment, patients are asked to mark a point corresponding to pain severity on a 10 cm line placed on the vertical line (0: no pain, 10: intolerable, severe pain). The distance between the point marked and the line's starting point (0 value) is measured, and the obtained value is recorded in centimeters. The recorded value shows the pain severity of patients (18). The CNP severity of patients was individually questioned using the VAS during rest (VASrest) and activity (VASactivity).

### Berg Balance Scale (BBS)

In the BBS, which is used to assess the static balance skills of patients, there are 14 different items that assess functions such as standing up, sitting without support, standing without support, sitting down, standing with eyes closed, transfers, standing with legs together, taking an item from the ground, extending forward while standing, looking backward, rotating 360 degrees, standing on a stool using the healthy side, standing one foot in front, and standing on one foot. Each

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activity is scored between 0-4. The total score is calculated by summing the scores obtained from each section. While low scores indicate an increased risk of falling during static activities, scores close to 56 indicate improved balance performance (0-20: high risk of falling, 21-40: moderate risk of falling, 41-56: low risk of falling). Şahin et al. performed the Turkish validity and reliability study of the BBS (19).

**Timed Up and Go Test (TUG)**

The TUG, which is used to assess dynamic balance and gait, is one of the most preferred tests in the clinic due to the need for a small number of equipment support and ease of application. In the assessment, patients are asked to stand up from a chair without an armrest (46 cm height) with the command "start" and to walk to the cone placed 3 meters forward, come back, and sit again. The time until patients stand up from the chair and sit again is recorded with the help of a stopwatch. The test is repeated three times, and the averages of the obtained times are taken and recorded in seconds. Prolonging the average time in the TUG is associated with a high risk of falling in patients and indicates impaired balance and gait function (20).

**International Physical Activity Questionnaire-Long Form (IPAQ-LF)**

A 27-question long form of the International Physical Activity Questionnaire was used to identify the level of physical activity. The IPAQ-LF comprises work-related physical activity, transportation, household chores and care activities, rest, sports and recreation, and sitting sub-components. The questionnaire defined severe, moderate, and gait activities for all sub-components except sitting. The IPAQ-LF provides information about the time spent in the last week for severe, moderate, gait, and sitting activities. The time spent is calculated in minutes/week. The score calculation is based on 8 MET, 4 MET, and 3.3 MET values for severe physical activity, moderate physical activity, and gait activity, respectively. Each sub-section score is calculated as MET-min/week by multiplying the MET value defined for each activity by the obtained min/week value. Each activity must be performed for at least 10 minutes at a time to assess the activities. The patients' total physical activity level scoreconsist of the sum of severe activity, moderate activity, and gait scores (21).

**Statistical Analysis**

Statistical analyses of the study were conducted using SPSS version 22 software (SPSS Inc., Chicago, IL, USA). The normality of the variables' distribution was checked with visual (histogram and probability graphs) and analytical methods (Shapiro-Wilk tests). Since the continuous variables did not conform to the normal distribution, they were presented in median and interquartile range (interquartile range 25-75 percentile), and the categorical variables were presented in numbers and percentages. In order to determine the demographic and clinical factors related to pain related self-efficacy without the effect of the gender factor, whose effect on pain related self-efficacy has been clearly demonstrated, patients were divided into two groups as women and men. The groups' demographic and clinical characteristics results were compared via the Mann-Whitney U test and the Chi-squared test. The relationship between age, BMI, pain severity, static balance, dynamic balance, and physical activity level, which were thought to be associated with pain-related self-efficacy in both groups, was assessed using Spearman's correlation analysis. The relationship level was expressed using rho coefficients, indicating "a weak correlation between 0 and 0.25, a moderate correlation between 0.25 and 0.50, a strong correlation between 0.50 and 0.75, and a very strong correlation at 0.75 and above" (22). As a result of the correlation analysis, a model was created to determine the level of effect of the variables found to have a significant correlation with pain-related self-efficacy in intra-group analyses on pain-related self-efficacy. While age, BMI, VASrest, VASactivity, BBS, TUG, and IPAQ-LF scores were included in the model created for women, pain severity, BBS, and TUG scores during rest and activity were included for men. The effect of the models created on pain-related self-efficacy in both groups was identified via the multiple linear regression analysis method. The probability of error was taken as p< 0.05.

# RESULTs

One hundred women (mean age: 43.08 ± 10.17 years, mean BMI: 25.66 ± 4.95 kg/m2) and 100 men (mean age: 42.75 ± 11.32, mean BMI: 25.79 ± 3.78 kg/m2) with CNP were included in our study. When the groups were reviewed in terms of categorical characteristics, the number of married women was significantly higher than the number of married men, whereas the educational levels of women were significantly lower (p< 0.05). The demographic and clinical characteristics of the participants are presented in **Table 1**.

When the differences of the groups according to gender were compared, women's PSEQ scores, severe and moderate physical activity sub-scores, and total scores of the IPAQ-LF were significantly lower than those of men, but their VASrest, VASactivity, TUG scores, and gait sub-scores of the IPAQ-LF were significantly higher (p< 0.05). The BBS scores were similar in both groups (p> 0.05) (**Table 2**). Due to the significant difference between the groups in terms of many variables along with the PSEQ scores, it was difficult to estimate the gender-specific factors affecting pain-related self-efficacy. This required further analysis. Intragroup correlation analyses were conducted to determine the factors with which pain-related self-efficacy correlated in each group.

It was revealed that there was a moderate negative correlation between women's PSEQ scores and ages (rho: -0.463, p: 0.001) and BMIs (rho: -0.349, p: 0.001), a strong negative correlation between their PSEQ scores and VASrest (rho: -0.586, p: 0.001), VASactivity (rho: -0.647, p: 0.001) and TUG (rho: -0.522, p: 0.001) scores, and a strong positive correlation between their PSEQ scores and BBS scores (rho: 0.510, p: 0.001), and a weak positive correlation between their PSEQ scores and total IPAQ-LF scores (rho: 0.170, p: 0.001) (**Table 3**). Moreover, there was a strong negative correlation between men's PSEQ scores and VASrest (rho: -0.689, p: 0.001) and VASactivity (rho: -0.814, p: 0.001) scores, a moderate positive correlation between their PSEQ scores and BBS scores (rho: 0.431, p: 0.001), and a weak negative correlation between their PSEQ scores and TUG scores (rho: -0.289, p: 0.001) (**Table 3**).

As a result of the correlation analysis, when the model was created to determine the contribution of age, BMI, VASrest, VASactivity, BBS, TUG, and total IPAQ-LF scores, which were found to be associated with the pain-related self-efficacy levels of women with CNP, to the level of pain-related self-efficacy were examined with multiple regression analysis, the model explained 62% of the total variance (F= 22.276; p=0.001; $R^2$= 0.629). According to the results of the regression model, it was observed that pain-related self-efficacy was mainly influenced by the results of VASrest (β= -0.312, p = 0.000), VASactivity (β= -0.425, p = 0.000), and IPAQ-LF (β= 0.208, p= 0.003), and the other variables in the model did not significantly contribute to pain-related self-efficacy (p> 0.05) (**Table 4**).

In men with CNP, it was revealed that the model created with the scores of VASrest, VASactivity, BBS and TUG, which were found to be associated with the level of pain-related self-efficacy, explained 73% of the variance (F= 70.138, p< 0.001, R2= 0.736). Similar to women with CNP, the primary variables contributing to pain-related self-efficacy was found to be VASrest (β= -0.355, p= 0.000) and VASactivity (β= -0.610, p= 0.000) parameters (**Table 4**).

**Table 1**. **Demographic characteristics of the participants**

| | Women, n:100 Median (IQR 25-75) | Men, n:100 Median (IQR 25-75) | | p |
|---|---|---|---|---|
| **Age (years)** | 40 (33-53) | 39 (33-53) | -0.385$^z$ | 0.700 |
| **Height (cm)** | 162 (159-165) | 178 (175-182) | -11.062$^z$ | 0.001** |
| **Weight (kg)** | 65 (58.5-77) | 85 (75-91) | -7.040$^z$ | 0.001** |
| **BMI (kg/m$^2$)** | 24.59 (22.05-29.09) | 25.59 (23.09-29.04) | -0.826$^z$ | 0.409 |
| **Education status [n (%)]** | | | | |
| **Primary education** | 55 (55) | 13 (13) | | |
| **High school** | 14 (14) | 21 (21) | | |
| **University** | 18 (18) | 49 (49) | 42.343$^{\chi 2}$ | 0.001** |
| **Master's degree** | 13 (13) | 17 (17) | | |

IQR 25-75: Interquartile Range 25-75 percentil, BMI: Body mass index, $^z$: Mann-Whitney U Test, $^{\chi 2}$: Chi-Square Test, *p<0.05, **p<0.001.

**Table 2.** Comparison of pain-related self-efficacy, pain severity, balance and physical activity level

| | Women, n:100 Median (IQR 25-75) | Men, n:100 Median (IQR 25-75) | z | p | Overall, n:200 Median (IQR 25-75) |
|---|---|---|---|---|---|
| **PSEQ** | 27.5 (19.50-38) | 35 (22-43) | -2327 | 0.020* | 29 (21-42) |
| **$VAS_{rest}$** | 5 (4-6) | 4(3-5) | -3.237 | 0.001** | 7 (4-8) |
| **$VAS_{activity}$** | 8 (5-8) | 6 (4-7) | -2.350 | 0.019* | 5 (3-6) |
| **BBS** | 56 (53-56) | 56 (54-56) | -1.847 | 0.065 | 56 (53-56) |
| **TUG** | 9.30 (7.90-10.72) | 7.34 (6.64-8.48) | -6.594 | 0.001** | 8.33 ( 7.16 – 10.07) |
| **IPAQ-LF-Severe physical activity Score** | 0 (0-1201) | 990 (259-2574) | -2.123 | 0.001** | 495 (0-2250) |
| **IPAQ-LF-Moderate physical activity Score** | 368.5 (152.5-897) | 774 (8446-1386) | -1.803 | 0.001** | 579 (266-1198) |
| **IPAQ-LF-Gait score** | 720 (427-1395) | 0 (0-270) | -2.108 | 0.001** | 360 (0-1080) |
| **IPAQ-LF-Total physical activity score** | 2875 (1909.5-5001) | 3515 (2454-6000) | -2.308 | 0.021* | 3223 (2048-5585) |

IQR 25-75: Interquartile Range 25-75 percentile, PSEQ: Pain Self-Efficacy Questionnaire, VAS: Visual Analogue Scale, BBS: Berg Balance Scale, TUG: Timed Up and Go Test, IPAQ-LF: International Physical Activity Questionnaire-Long Form, z: Mann-Whitney U Test, *p<0.05, **p<0.001

**Table 3.** Relation of pain-related self-efficacy with demographic characteristics, pain severity, balance and physical activity level (Correlation coefficient 'r' values are given in the table)

| | Age | BMI | $VAS_{rest}$ | $VAS_{activity}$ | BBS | TUG | IPAQ-LF(T) |
|---|---|---|---|---|---|---|---|
| **Women** | | | | | | | |
| **PSEQ** | -0.463** | -0.349** | -0.586** | -0.647** | 0.510** | -0.522** | 0.170** |
| **Men** | | | | | | | |
| **PSEQ** | -0.034 | -0.065 | -0.689** | -0.814** | 0.431** | -0.289** | 0.003 |

PSEQ: Pain Self-Efficacy Questionnaire, BMI: Body mass index, VAS: Visual Analogue Scale, BBS: Berg Balance Scale, TUG: Timed Up and Go Test, IPAQ-LF(T): Total Score of International Physical Activity Questionnaire-Long Form, r: Spearman Correlation Test, *p<0.05, **p<0.001

**Table 4.** Main models predicting pain-related self-efficacy

| Women, n:100 | Unstandardised Coedfficients B | Unstandardised Coedfficients SE | Standardised Coefficients (β) | t | p | F | Adjusted $R^2$ |
|---|---|---|---|---|---|---|---|
| **Constant** | 71.788 | 19.053 | | 3.768 | 0.001** | | |
| **Age** | -0.61 | 0.108 | -0.047 | -0.566 | 0.573 | | |
| **BMI** | -0.247 | 0.203 | -0.093 | -1.216 | 0.237 | | |
| **$VAS_{rest}$** | -2.440 | 0.609 | -0.312 | -4.007 | 0.000** | 22.276 | 0.629 |
| **$VAS_{activity}$** | -2.607 | 0.466 | -0.425 | -5.598 | 0.000** | | |
| **BBS** | 0.023 | 0.263 | 0.008 | 0.088 | 0.930 | | |
| **TUG** | -0.960 | 0.601 | -0.149 | -1.599 | 0.113 | | |
| **IPAQ-LF (T)** | 0.001 | 0.000 | 0.208 | 3.062 | 0.003* | | |
| **Men, n:100** | **Unstandardised Coedfficients B** | **Unstandardised Coedfficients SE** | **Standardised Coefficients (β)** | **t** | **p** | **F** | **Adjusted $R^2$** |
| **Constant** | 83.231 | 19.693 | | 4.226 | 0.000** | | |
| **$VAS_{rest}$** | -3.004 | 0.560 | -0.355 | -5.361 | 0.000** | | |
| **$VAS_{activity}$** | -3.744 | 0.402 | -0.610 | -9.306 | 0.000** | 70.138 | 0.736 |
| **BBS** | -0.167 | 0.318 | -0.032 | -0.525 | 0.601 | | |
| **TUG** | -0.720 | 0.567 | -0.069 | -1.270 | 0.207 | | |

BMI: Body mass index, VAS: Visual Analogue Scale, BBS: Berg Balance Scale, TUG: Timed Up and Go Test, IPAQ-LF (T): Total Score of International Physical Activity Questionnaire-Long Form, Multiple Linear Regression Analysis, B: Unstandardized coefficient, SE; Standard Error, β: Standardized coefficient, *p<0.05, **p<0.001

# DISCUSSION

This study, which included men and women with CNP, provided an opportunity to make comparisons between genders and gender-specific analyses. This comparison clearly indicated the demographic and clinical determinants of pain-related self-efficacy. While the collected data showed that women had lower pain-related self-efficacy compared to men, their pain severity during both rest and activity, which were thought to affect self-efficacy possibly, was higher, and their dynamic balance skills and physical activity levels were lower. Significant differences in pain-related self-efficacy between genders aroused interest in which parameters this difference was associated with for the female and male genders and which parameters were the main determinants of gender-specific pain-related self-efficacy. While pain-related self-efficacy was associated with all parameters, including demographic characteristics related to age and BMI, in women with CNP, pain severity during rest and activity was associated with static and dynamic balance skills in men. The regression models created defined pain-related self-efficacy at considerable rates, at 62% in women and 73% in men. Whereas the main determinants of pain-related self-efficacy were pain severity and physical activity level in the female group, pain severity alone was a more dominant determinant of pain-related self-efficacy in the male group.

The prevalence of CNP was reported as 7% in women and 5% in men (23). The higher prevalence of CNP and other chronic pain syndromes in women in general makes women more susceptible to chronic pain and its associated psychosocial effects. Larsson et al. (24) also stated in their systematic review report that gender was an important risk factor in the development and management of CNP. According to our results, the fact that CNP causes greater decrease in performance levels, including both balance and physical activity levels, in women and that women feel pain much more may result from women's higher tendency to report pain and their exhibiting more negative behaviors to cope with pain (25).

Researchers are greatly interested in the idea that having high pain-related self-efficacy is necessary to enhance an individual's ability to cope with pain and enable them to carry out their daily activities despite experiencing pain. Although the importance of high self-efficacy, which is reported as a prerequisite for pain management, is stressed, it is not known how gender-specific differences will affect this management. Our findings revealed that women had lower levels of self-efficacy and higher pain severity due to CNP experience. Hormonal and psychosocial differences between men and women with chronic pain cause people to react to pain at varying levels and exhibit different behaviors to cope with pain. This may explain why women feel more pain than men and thus have low self-efficacy in daily life (26). It is known that men use active coping strategies for problem-solving and getting away from the sensation of pain in pain management, whereas women prefer passive coping strategies such as emotional orientation, pain orientation, and worrying (27). Men resorting to active coping strategies more often can increase their pain tolerance by allowing them to turn their attention away from pain. Preferring active coping strategies can indirectly increase the pain-related self-efficacy of patients. The higher educational levels in the male group may also have made the management of CNP more successful. On the other hand, the researchers who report no significant correlation between pain-related self-efficacy and gender make it difficult to explain why women have lower self-efficacy than men (8,27). The results of the study, in which we examined gender-specific pain-related self-efficacy, emphasized the association of the increase in the severity of CNP during rest and activity with the decrease in self-efficacy level, regardless of gender. Unfortunately, the lack of any gender-specific self-efficacy studies in the literature led to a discussion of the relationship between pain severity and self-efficacy in the general population. Similar to our results, Touche et al. (28) reported that the pain-related self-efficacy ochronic spinal pain moderately correlated with pain severity.

A study conducted on patients with whiplash injuries indicated that patients with low neck pain severity had higher levels of pain-related self-efficacy (29). While it is generally believed to be absolutely necessary to develop strategies to reduce pain severity for increasing pain-related self-efficacy in patients with CNP, our results caused us to interpret that reducing pain severity during rest and activity separately for both genders might increase confidence in performing daily activities. Regression analyses conducted to confirm this interpretation showed that the main descriptors and determinants of pain-related self-efficacy in both women and men were the severity of neck pain felt during rest and activity.

No studies have been conducted investigating the relationship between pain-related self-efficacy and balance skills of patients with CNP patients. Therefore, our findings, which draw attention to the fact that the decrease in pain-related self-efficacy is associated with deterioration in both static and dynamic balance in both genders, will be guiding for the determination of treatment programs, especially in patients with CNP, because maintaining balance in the treatment of patients with CNP is of major importance (30). In our study, the significant association of static and dynamic balance with pain-related self-efficacy in both genders did not mean that balance skill was among the main factors defining pain-related self-efficacy. Field et al. (31) reported that CNP caused a significant deterioration in balance skills. It is not surprising that there is a decrease in postural control in individuals with neck pain because, in cervical spine pathologies, the inputs from muscle and joint receptors will not be able to establish central and reflexive connections with vestibular, visual, and proprioceptive systems and will make it difficult to achieve postural control (32). Thus, the increase in the severity of CNP may impair the quality of balance, regardless of gender. The fact that the severity of CNP is also associated with pain-related self-efficacy suggests that the relationship between self-efficacy and balance is a secondary association resulting from pain severity.

Umeda et al. (33) showed that women with CNP had lower physical activity scores than men. The high physical activity levels in men led to the expectation that physical activity could contribute to pain-related self-efficacy. Although men had higher levels of both pain-related self-efficacy and physical activity, there was no significant correlation between the two variables in men, unlike women, which caused a contradiction. Furthermore, regression modelling showed that the level of physical activity was one of the main descriptors of pain-related self-efficacy in women. The main reasons for this situation can be the active coping strategies used by men and the more regular physical activity habits of women (34,35). It has been proven that individuals who are active and regularly engage in physical activity have lower sensitivity to experimental painful stimuli and more effective pain management compared to individuals who do not have a regular activity habit (35). However, in line with the findings of Umeda et al. (33), our results pointed out that self-efficacy, which is already lower in women, can be significantly increased even with a very low increase in physical activity level. Proving this situation, Lavin-Perez et al. reported that self-efficacy for walking and light physical activity is more relevant than self-efficacy for moderate and vigorous physical activity to achieve higher levels of physical activity in women (36).

In addition, while discussing the relationship between pain and self-efficacy, neuroanatomic connections and neurophysiological processes responsible for self-efficacy should not be skipped. This would help to better understand why pain-related self-efficacy decreases as pain intensity increases. Wang et al. stated that the structures of the right anterior cingulate cortex, the left posterior cingulate cortex/precuneus, and the bilateral parahippocampal cortex are related to self-efficacy (37). We know that these centers associated with self-efficacy are also responsible for the perception of pain. These centers, whose activity increases with the increase in pain severity, can also make a secondary contribution to the decrease in self-efficacy.

Considering the biopsychosocial differences between men and women, the study has some limitations, which investigated the factors affecting pain-related self-efficacy. Since the IPAQ-LF directed questions about the physical activities of the patients in the last week, questioning the physical activity habits of the patients could have made it easier to discuss our results. Secondly, since our study was planned in an isolated group, our results cannot be generalized to all age groups and situations related to CNP developing due to different reasons. There is a need for further studies to examine the factors affecting self-efficacy in the geriatric population and patients with trauma-induced CNP. However, the lack of similarity in terms of educational status was another limitation.

# CONCLUSION

In conclusion, this study showed that women with CNP had lower pain-related self-efficacy than men. Compared to men, pain-related self-efficacy had a close relationship with more variables, including demographic characteristics, pain characteristics, balance, and physical activity levels in women. Further analyses revealed that controlling the severity of pain was of major importance to increasing pain-related self-efficacy in managing CNP for both genders. Increasing the level of physical activity, especially in women, may increase the belief in pain-related self-efficacy. For successful CNP management, rehabilitation programs should be planned within the gender-specific biopsychosocial model.

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