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# A Comparison of Disability, Emotional Status, and Physical Activity Level According to the Pain Activity Pattern in Chronic Low Back and Neck Pain: A Cross-Sectional Study

## Kronik Bel ve Boyun Ağrısında Ağrı Aktivite Paternine Göre Engellilik, Duygu Durum ve Fiziksel Aktivite Seviyesinin Karşılaştırılması: Kesitsel Çalışma

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**ABSTRACT Objective:** The study's purpose was to compare disability, emotional status, and physical activity level based on pain activity pattern (PAP) (avoiding, overdoing, and pacing) in chronic low back pain (CLBP) and chronic neck pain (CNP). **Material and Methods:** 103 patients with CLBP and 66 with CNP were involved in the study. PAPs, emotional status, physical activity level, and disability were evaluated with the Patterns of Activity Measure-Pain (POAM-P), Hospital Anxiety and Depression Scale (HADS), International Physical Activity Questionnaire (IPAQ), and Oswestry Disability Index (ODI) and Neck Disability Index (NDI); respectively. Patients were divided into avoidance, overdoing, and pacing groups based on POAM-P subscale dominance. **Results:** The prominent PAP in CLBP was avoidance, whereas the dominant PAP was overdoing in CNP. The pacing was the least reported pattern in both. The ODI ( $p=0.229$ ), HADS-A (anxiety), and HADS-D (depression) ( $p=0.619$ ,  $p=0.580$ ), and IPAQ scores ( $p=0.972$ ) were similar between avoiding, overdoing, and pacing groups in patients with CLBP. The scores of NDI ( $p=0.294$ ), HADS-A ( $p=0.801$ ), HADS-D ( $p=0.817$ ), and IPAQ ( $p=0.726$ ) were similar among avoiding, overdoing, and pacing groups in CNP. **Conclusion:** Disability, emotional status, and physical activity level were similar among patients with avoiding, overdoing, and pacing PAPs in CLBP and CNP. Therefore, PAPs may not directly affect disability, emotional status, or physical activity level. In clinical practice, the treatment strategies to improve disability, emotional disorders, and physical inactivity in CLBP and CNP may be considered independently of PAPs.

**Keywords:** Anxiety; depression; low back pain; neck pain; pain perception

**ÖZET Amaç:** Çalışmanın amacı, kronik bel ağrısı [chronic low back pain (CLBP)] ve kronik boyun ağrısında [chronic neck pain (CNP)] ağrı aktivite paternine (AAP) göre (kaçınma, aşırıya kaçma ve düzene sokma) engellilik, duygu durum ve fiziksel aktivite seviyelerini karşılaştırmaktır. **Gereç ve Yöntemler:** Çalışmaya, 103 CLBP'li ve 66 CNP'li hasta dâhil edildi. AAP Ağrı-Aktivite Paternleri Ölçeği (AAPÖ) ile duygu durum Hastane Anksiyete ve Depresyon Ölçeği (HADÖ) ile fiziksel aktivite seviyeleri Uluslararası Fiziksel Aktivite Anketi (UFAA) ile engellilik Oswestry Özürlülük İndeksi (OÖİ) ve Boyun Özürlülük İndeksi (BÖİ) ile değerlendirildi. Hastalar, AAPÖ alt başlıklarına göre kaçınma, aşırıya kaçma ve düzene sokma gruplarına ayrıldı. **Bulgular:** CLBP'de baskın AAP kaçınma iken, CNP'de aşırıya kaçmaydı. Her iki grupta da en az bildirilen patern düzene sokmaydı. Kaçınma, aşırıya kaçma ve düzene sokma paternlerine sahip CLBP'li arasında OÖİ ( $p=0.229$ ), HADÖ-A (anksiyete) ve HADÖ-D (depresyon) ( $p=0.619$ ,  $p=0.580$ ), ve UFAA ( $p=0.972$ ) skorları benzerdi. CNP'de kaçınma, aşırıya kaçma ve düzene sokma grupları arasında BÖİ ( $p=0.294$ ), HADÖ-A ( $p=0.801$ ), HADÖ-D ( $p=0.817$ ), ve UFAA ( $p=0.726$ ) skorları benzerdi. **Sonuç:** CLBP ve CNP'de kaçınma, aşırıya kaçma ve düzene sokma ağrı paternine sahip hastaların engellilik, duygu durum ve fiziksel aktivite seviyeleri benzerdi. Bu nedenle, AAP engelliliği, duygu durumu veya fiziksel aktiviteyi doğrudan etkilemeyebilir. Klinik pratikte, CLBP ve CNP'de engelliliği, duygu durum bozuklukları ve fiziksel hareketsizliği iyileştirmeye yönelik tedavi stratejileri, AAP'den bağımsız olarak ele alınabilir.

**Anahtar Kelimeler:** Anksiyete; depresyon; bel ağrısı; boyun ağrısı; ağrı algısı

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Chronic pain, which lasts more than 3 months, is a substantial public health problem that exerts an enormous personal and economic burden.<sup>1,2</sup> It can stem from various sources, including cancer, post-surgical or post-traumatic complications, as well as disorders affecting the musculoskeletal system like chronic low back pain (CLBP) and chronic neck pain (CNP).<sup>2</sup> Among musculoskeletal disorders, they are the leading cause of disability with their high prevalence.<sup>3</sup> Chronic pain can cause various medical problems and significantly change a patient's daily activities. Individuals may show different behavioral patterns in response to chronic pain.<sup>4,5</sup> Traditionally, avoidance, overdoing, and pacing are the most observed pain-activity patterns in response to ongoing pain.<sup>6</sup> Avoidance refers to the act of trying to avoid or escape from activities that are unpleasant or expected to cause pain. This behavior is often associated with the fear-avoidance pattern. It suggests that avoidance arises from catastrophic thoughts about pain and thereby fear of movement. Overdoing is characterized by insisting on conducting an activity until it's completed, despite experiencing significantly increased pain. People who engage in overdoing tend to engage in extra activity on days when they have reduced symptoms.<sup>6,7</sup> Pacing is a combined form of avoidance of overdoing. In other words, it is the way to keep activity and rest in balance.<sup>6</sup>

It is theorized that patterns of pain activity may influence the physical and emotional behaviors of individuals suffering from chronic pain. Avoiding activities associated with pain can lead to lower levels of overall activity, resulting in increased disability. Additionally, persisting in activities despite experiencing pain can lead to elevated or fluctuating activity levels, which may negatively impact disability due to the potential for overuse.<sup>4,6,8</sup> Both avoidance and persistence in activity may also affect emotional well-being by heightening feelings of fear or stress.<sup>5,6,9</sup> Therefore, the daily activity pattern of chronic pain sufferers may be considered a central determinant of their overall physical, social, and emotional functioning.<sup>8,10</sup> However, although this theoretical background, the findings of studies investigating the disability, emotional status, and physical activity regarding PAP in chronic pain sufferers were contradictory.<sup>6,11-15</sup>

Increased disability, emotional disorders, and physical inactivity are significant issues related to CLBP and CNP that need to be addressed.<sup>3,16,17</sup> Understanding the theoretical relationship between pain activity patterns (PAPs) and these issues is crucial. Research into how PAPs may either exacerbate or alleviate these conditions is important for developing effective management strategies. However, studies focused on these issues in CLBP and CNP are quite scarce; and their findings were contradictory.<sup>11,12,15</sup> We believed it was essential to investigate this issue, which is significant in CLBP and CNP, and creates complexity in scientific knowledge. So, we targeted to find an answer to how different PAPs (avoiding, overdoing, or pacing) impact the disability, emotional status, and physical activity level (PAL) of patients with CLBP and CNP. Therefore, we aimed to compare the levels of disability, emotional status, and PAL between different PAPs in CLBP and CNP.

## MATERIAL AND METHODS

### STUDY DESIGN AND PARTICIPANT

The cross-sectional design study was conducted according to the principles of the Declaration of Helsinki. The ethical permission was taken from the Ankara Yıldırım Beyazıt University Ethics Committee (date: September 22, 2021; no: 20). Before the study, patients were informed, and their informed consent was obtained.

Patients with CLBP (pain localized below the shoulder blade and above the gluteal line, lasting at least 12 weeks) and CNP (pain lasting at least 12 weeks and localized in the posterior region of the cervical spine, from the upper neck line to the first thoracic spinous process), diagnosed by the researcher specialized in physical medicine and rehabilitation (B.Y.) in the outpatient clinic of Gazi Mustafa Kemal State Hospital, were screened for eligibility.<sup>18,19</sup> The medical examination, including clinical history, physical examination, and radiographic findings, was carried out by the physician. After the medical examination, patients with CLBP and CNP were listed to be invited to the study if they had no exclusion criteria detected by the physician. Eligible participants were contacted to ask if they would volunteer for the

study. If they agreed to participate, an online assessment form was sent to them. The data collection was carried out from October 2021-September 2023 via an online form created on the Google Forms (Google LLC: Alphabet Inc., California, USA) application.

The exclusion criteria of the study were low back or neck pain lasting less than 3 months, CLBP or CNP attributable to a recognizable, known specific pathology (severe degenerative arthritis, cervical/lumbar stenosis, osteoporosis, infection, cervical/lumbar fracture, tumor, and cauda equina syndrome, etc.), and having neck or low back pain due to a neurological disease or an inflammatory rheumatic disease. Chronic pain conditions due to any other disease (orthopedic disorders, fibromyalgia syndrome etc.), being obese, and having any diagnosed psychiatric or antidepressant used regularly. The potential participants diagnosed with CLBP and CNP who did not have listed exclusion criteria detected during medical examination were directed to other researchers for assessments. Participants were also asked to provide demographic, physical, and clinical specifications in the assessment form. Participants were also excluded from the study if they reported neck or low-back pain shorter than 3 months, being obese, any other condition hindering the assessments (spine surgery, neurologic, inflammatory rheumatic disease etc.), or having missing values according to their assessment form. Eligible patients based on their PAP were classified as avoidance, over-doing, and pacing groups.

### Assessments

The physical, demographic, lifestyle, and medical (pain duration and pain severity) characteristics of patients were recorded. Pain severity was assessed with the Visual Analog Scale. It is a straight line that measures 10 cm in length. The starting point of the line represents “0”, indicating “no pain at all”, while the endpoint signifies “10”, representing “unbearable pain”.<sup>20</sup> The PAP, disability, emotional status, and level of physical activity were evaluated.

### Pain Activity Patterns

The Turkish version of Patterns of Activity Measure-Pain (POAM-P) was used for evaluating the PAPs of participants. This self-administered scale consists of

30 questions with each of them having 5-point Likert-type items (0=never, to 4=always). It included 3 main pain subscales: avoidance, pacing, and overdoing, each containing ten items. The score of each subgroup ranges from 0-40 points and is summed up separately. The subgroup with the highest score is considered the dominant PAP. Based on the POAM-P subscale dominance, patients were grouped as avoidance, overdoing, or pacing. The reliability and validity of Turkish version of POAM-P was performed by Suygun et al.<sup>12</sup>

### Disability

The disability of patients with CNP was assessed with the Turkish version of the Neck Disability Index (NDI). The Turkish version of NDI performed by Aslan et al. was found reliable and valid. It consists of 10 items designed to evaluate the effects of neck pain on daily living activities. There are 6 possible answers for each item (0=no pain and no functional disability; 5=worst pain and maximum disability). The sum of all items gives the total score of NDI. The higher score indicates a higher disability.<sup>21</sup>

The Turkish version of the Oswestry Disability Index (ODI) was used for assessing disability for CLBP. The Turkish version of ODI performed by Yakut et al. was found reliable and valid. It was designed to determine how much low back pain and problems affect daily life. It consists of a total of 10 6-point Likert-type items. The total score is calculated by summing up all items, and it changes between 0-50. Higher disability is represented by a higher score.<sup>22</sup>

### Emotional Status

The emotional status of patients was evaluated with the Turkish version of the Hospital Anxiety and Depression Scale (HADS). The cultural adaptation of HADS was performed by Aydemir. The Turkish version of it was found reliable and valid. It questions how patients have felt for the past few days. It consists of 14 items, half of them (odd numbers) examine the level of anxiety (HADS-A) and half of them (even numbers) examine the level of depression (HADS-D). Each item scores 0-3 points, and the total score for depression and anxiety changes between 0-21. The risk of depression and anxiety increases when the score increases.<sup>23</sup>

### Physical Activity Level

The PAL of participants was assessed using the Turkish version of the International Physical Activity Questionnaire-Short Form (IPAQ). The Turkish version of IPAQ performed by Sağlam et al. was found reliable and valid. It's a self-report form that asks the respondent to indicate the amount of time they spent physically active in the past week. The questionnaire consists of four parts according to physical activity intensity from least to highest: sitting, walking, moderate, and heavy physical activities. The physical activity score is determined by adding up the scores for vigorous physical activity, moderate physical activity, and walking. These scores are calculated by multiplying the duration, frequency, and standard metabolic equivalent (MET) values for each activity. The standard MET values for physical activity for 8=heavy, 4=moderate, and 3.3=walking. A higher score indicates a higher level of physical activity.<sup>24</sup>

### STATISTICAL ANALYSIS

The required sample size was determined by using statistical power analysis software.<sup>25</sup> Based on the disability, ODI score for CLBP, and NDI score for CNP, the sample size was calculated. Randomly selected 5 data from each group were used for calculations. After calculations, we found that a sample of 87 patients (29 per group) would be needed to obtain 80% power with 0.344 effect size,  $\alpha=0.05$  type I error, and  $\beta=0.20$  Type II error for the CLBP group. Similarly, to achieve 80% power with 0.442 effect size,  $\alpha=0.05$  Type I error, and  $\beta=0.20$  Type II error for the CNP group, a sample of 54 patients (18 per group) was needed.

A statistical analysis software (IBM Corp. Released in 2012, IBM SPSS Statistics for Windows, Version 22.0, USA) was used for data analysis and calculations. Skewness and Kurtosis coefficients, histogram, detrended normal Q-Q graph, and Shapiro-Wilks test were employed to decide if data were normally distributed, or not. Mean and standard deviation for normally distributed continuous values, median, and the 25<sup>th</sup> percentile (Q1) and the 75<sup>th</sup> percentile (Q3) for not normally distributed continuous values, and frequency (n) and percentage (%) for ordinal variables were used to represent the descriptive

analysis. For the analysis of ordinal variables, the chi-square or Fisher exact test was performed. Comparison of continuous variables of groups when assuming normal distribution and homogenous variances was carried out with the one-way analysis of variance (ANOVA) test. The Welch ANOVA test was used when the assumption of normal distribution was provided; however, the variances were not homogeneous. The Kruskal-Wallis test was used when the assumption of normal distribution was not held. Pairwise comparisons were not performed in the absence of statistically significant results.

## RESULTS

Initially, 107 patients with CLBP and 75 with CNP were assessed who responded to the study call and agreed to participate after medical examination. 4 patients in the CLBP group due to reporting acute/subacute low back (n=2) and being obese (n=2), and nine patients in the CNP group due to reporting acute/subacute neck pain (n=3), having missing data in the assessment form (n=5) and being obese (n=1) were excluded. Finally, 169 patients, 103 in the CLBP group and 66 in the CNP group, were involved. [Figure 1](#) demonstrates the participants' recruitment process for the study.

### DESCRIPTIVE VALUES OF OUTCOMES OF PATIENTS WITH CLBP AND CNP

Of the 103 patients with CLBP, 62 (60.7%) were female and 41 (39.81%) were male. Patients with CLBP's mean age was  $42.50 \pm 11.60$  years and pain severity was  $6.05 \pm 2.27$  out of 10 (moderate). Their pain duration was 24.0 (10.0-60.0) months. The values of ODI, HAD-A, HAD-D, and IPAQ scores of patients with CLBP were 22.0 (16.0-34.0), 8.00 (7.0-11.0),  $8.94 \pm 3.50$ , and 1,744.0 (786.0-4,490.5), respectively.

Of the 66 patients with CNP, 57 (86.36%) were female and 9 (13.64%) were male. Patients with CNP's mean age was  $39.94 \pm 11.97$  years, and pain severity was  $6.0 \pm 2.21$  out of 10 (moderate). Their pain duration was 36.0 (24.0-96.0) months. The values of NDI, HAD-A, HAD-D, and IPAQ scores of patients with CNP were  $29.97 \pm 11.98$ ,  $6.47 \pm 3.75$ ,  $8.68 \pm 4.34$ , and 2331.0 (924.0-5,685.0), respectively.



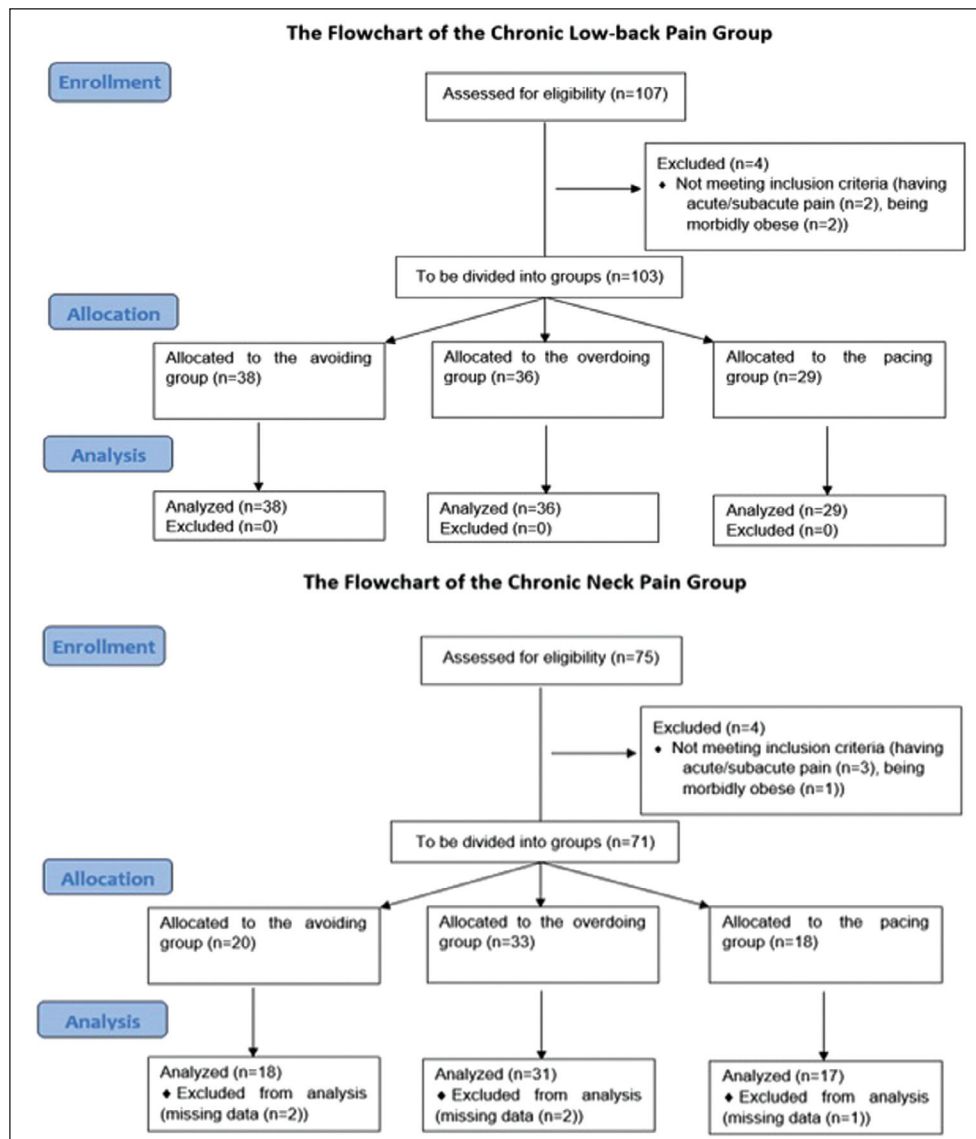


FIGURE 1: The flowchart of the study

### THE DISTRIBUTION OF PAPS OF CLBP AND CNP

Of the 103 patients with CLBP, 38 (36.9%) of them in the avoidance group, 36 (35.0%) of them in the overdoing group, and 29 (28.1%) of them in the pacing group. Of the 66 patients with CNP, 18 (27.3%) of them in the avoidance group, 31 (47.0%) of them in the overdoing group, and 17 (25.8%) of them in the pacing group. The prominent PAP in CLBP was avoidance, whereas it was overdoing in CNP. The least reported PAP was pacing for CLBP and CNP (Figure 2). There was no difference between CLBP

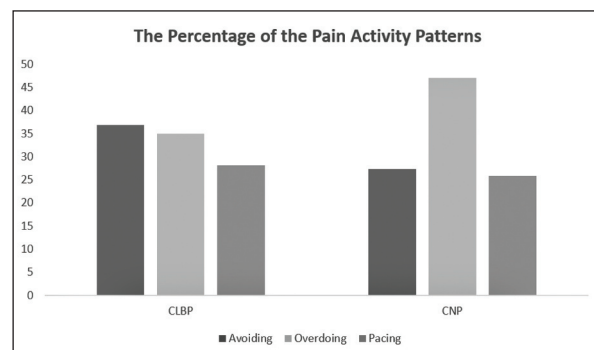


FIGURE 2: The percentage of pain activity patterns  
CLBP: Chronic low-back pain, CNP: Chronic neck pain

**TABLE 1:** Comparison of the distribution of pain activity patterns of chronic low-back pain and chronic neck pain

Pain Activity Pattern	CLBP group (n=103)	CNP group (n=66)	p value
Avoidance [n (%)]	38 (36.9)	18 (27.3)	0.263 <sup>a</sup>
Overdoing [n (%)]	36 (35.0)	31 (47.0)	
Pacing [n (%)]	29 (28.1)	17 (25.8)	

<sup>a</sup>chi-square test. CLBP: Chronic low-back pain; CNP: Chronic neck pain

and CNP groups according to their PAP distribution (p=0.263) (Table 1).

## COMPARISON OUTCOMES OF AVOIDING, OVERDOING, AND PACING (PAPS) GROUPS

The demographic, physical, lifestyle, and medical characteristics of PAP subgroups in CLBP (p>0.05) and CNP (p>0.05) were similar; separately (Table 2). The ODI score (p=0.229), HAD-A and HAD-D scores (p=0.619, p=0.580), and IPAQ scores (p=0.972) of avoiding, overdoing, and pacing groups were not different in patients with CLBP (Table 3). The scores of NDI (p=0.294), HAD-A (p=0.801), HAD-D (p=0.817), and IPAQ (p=0.726) were similar among avoiding, overdoing, and pacing groups in CNP (Table 3).

**TABLE 2:** Comparison of the demographic, physical, lifestyle, and medical characteristics of participants

CLBP group	Avoidance group (n=38) X±SD, M (Q1-Q3)	Overdoing group (n=36) X±SD, M (Q1-Q3)	Pacing group (n=29) X±SD, M (Q1-Q3)	p value
Age (years)	43.95±12.03	40.67±10.58	42.86±12.52	0.476 <sup>a</sup>
BMI (kg/m <sup>2</sup> )	26.27±2.48	26.94±4.31	25.99±4.14	0.632 <sup>b</sup>
Education level (years)	14.47±1.88	14.33±2.41	13.79±2.77	0.280 <sup>b</sup>
Gender [n (%)]				0.146 <sup>d</sup>
Female	19 (50)	26 (72.2)	17 (58.6)	
Male	19 (50)	10 (27.8)	12 (41.4)	
Employee [n (%)]				0.210 <sup>d</sup>
Yes	18 (47.4)	22 (61.1)	11 (37.9)	
No	11 (28.9)	11 (30.6)	13 (44.8)	
Retired	9 (23.7)	3 (8.3)	5 (17.2)	
Exercise habit [n (%)]				0.886 <sup>d</sup>
Yes	12 (31.6)	13 (36.1)	9 (31.0)	
No	26 (68.4)	23 (63.9)	20 (69.0)	
Pain severity (VAS)	5.86±2.33	6.58±1.99	5.64±2.46	0.211 <sup>a</sup>
Pain duration (month)	24 (9.0-60.0)	24 (11.0-66.0)	24 (8.0-60.0)	0.618 <sup>c</sup>
CNP group	Avoidance group (n=18) X±SD, M (Q1-Q3)	Overdoing group (n=31) X±SD, M (Q1-Q3)	Pacing group (n=17) X±SD, M (Q1-Q3)	p value
Age (years)	36.50 (31.0-49.0)	42 (31.0-53.0)	38.0 (33.0-49.0)	0.471 <sup>c</sup>
BMI (kg/m <sup>2</sup> )	24.51 (23.3-27.9)	24.99 (21.5-29.2)	24.97 (21.71-29.67)	0.968 <sup>c</sup>
Education level (years)	16.0 (16.0-16.0)	16.0 (12.0-16.0)	16.0 (12.0-16.0)	0.590 <sup>c</sup>
Gender [n (%)]				0.385 <sup>d</sup>
Female	17 (94.4)	25 (80.6)	15 (88.2)	
Male	1 (5.6)	6 (19.4)	2 (11.8)	
Employee [n (%)]				0.102 <sup>d</sup>
Yes	9 (50.0)	20 (64.5)	4 (23.5)	
No	6 (33.3)	8 (25.8)	8 (47.8)	
Retired	3 (16.7)	3 (9.7)	5 (29.4)	
Exercise habit [n (%)]				0.995 <sup>d</sup>
Yes	4 (22.2)	7 (22.6)	4 (23.5)	
No	14 (77.8)	24 (77.4)	13 (76.5)	
Pain severity (VAS)	6.50 (5.0-8.0)	7.0 (4.0-8.0)	6.0 (5.0-7.0)	0.907 <sup>c</sup>
Pain duration (month)	66.0 (24.0-120.0)	48.0 (24.0-96.0)	24.0 (12.0-36.0)	0.059 <sup>c</sup>

<sup>a</sup>One-Way ANOVA, <sup>b</sup>Welch ANOVA, <sup>c</sup>Kruskal-Wallis test, <sup>d</sup>chi-square test. CLBP: Chronic low-back pain; SD: Standard deviation; M: Median, Q1-Q3 Percentile 25-75; BMI: Body mass index; VAS: Visual analog scale; CNP: Chronic neck pain

**TABLE 3:** Comparison of the disability, emotional status, and physical activity level of groups

CLBP group	Avoidance group (n=38) X±SD, M (Q1-Q3)	Overdoing group (n=36) X±SD, M (Q1-Q3)	Pacing group (n=29) X±SD, M (Q1-Q3)	p value
Disability				
ODI score	24.0 (18.0-34.0)	21.0 (16.0-31.0)	18.0 (12.0-32.0)	0.229 <sup>b</sup>
Emotional status				
HAD-A score	9.0 (6.0-11.0)	8.0 (7.0-11.0)	9.0 (8.0-13.0)	0.619 <sup>b</sup>
HAD-D score	7.55±2.53	7.39±5.0	8.07±2.52	0.580 <sup>a</sup>
Physical activity level				
IPAQ score	1,809.0 (1,039.5-3,090.0)	1,682.0 (664.5-6,280.5)	1,578.0 (792.0-4,638.0)	0.972 <sup>b</sup>
CNP group	Avoidance group (n=18) X±SD, M (Q1-Q3)	Overdoing group (n=31) X±SD, M (Q1-Q3)	Pacing group (n=17) X±SD, M (Q1-Q3)	p value
Disability				
ODI score	33.66±13.18	28.38±10.58	28.58±12.89	0.294 <sup>a</sup>
Emotional status				
HAD-A score	6.83±4.19	6.16±3.37	6.65±4.09	0.801 <sup>a</sup>
HAD-D score	8.39±4.42	9.06±4.30	8.29±4.55	0.817 <sup>a</sup>
Physical activity level				
IPAQ score	2,156.0 (813.0-5,412.0)	2,388.0 (921.0-5,346.0)	2,346.0 (1,219.5-8,532.0)	0.726 <sup>b</sup>

<sup>a</sup>One-Way ANOVA; <sup>b</sup>Kruskal-Wallis test. CLBP: Chronic low-back pain; SD: Standard deviation; M: Median, Q1-Q3 Percentile 25-75; ODI: Oswestry Disability Index; HAD-A: Hospital Anxiety and Depression Scale-Anxiety; HAD-D: Hospital Anxiety and Depression Scale-Depression; IPAQ: International Physical Activity Questionnaire; CNP: Chronic neck pain

## DISCUSSION

We demonstrated that there were no differences in the disability, emotional status, and PAL between patients with different PAPs in CLBP and CNP. The current study suggested new findings regarding the role of 3 distinct PAPs that do not directly predict disability, anxiety, depression, and PAL in patients with CLBP and CNP. From a clinical perspective, treatment strategies to be planned for disability, emotional disorders, and physical inactivity in CLBP and CNP can be considered independently of PAPs.

Chronic pain sufferers may organize their activity patterns to relieve their pain. Different pain activity models may arise even for the same condition, as patients react to pain differently.<sup>4-6</sup> Our findings indicated that the PAP in CLBP is higher to lower, consisting of avoiding, overdoing, and pacing. Similarly, a study conducted on CLBP reported that patients with avoiding patterns had a higher number than patients with overdoing patterns.<sup>15</sup> We found that individuals with CNP exhibited an overdoing

PAP dominantly. This finding is significant because, before our study, the data related to the percentage of PAPs in CNP did not exist. As mentioned earlier, it is generally reported that chronic pain sufferers tend to avoid PAPs. However, our findings may be related to the gender distribution of patients with CNP in our study. It has previously been stated that men with chronic pain tend to avoid activities, while women tend to overdo them.<sup>6</sup> In our study, the percentage of females (86.36%) compared to men (13.64%) in the CNP population was quietly high. The predominance of the overdoing pattern rather than the avoiding pattern in the CNP population may be related to the higher percentage of females. Hence, our study is the first to demonstrate the diversity of PAPs in individuals with CNP, we did not have enough data to discuss our findings with other studies. Therefore, to gain more data further studies should focus on investigating the profile of pain activity of patients with CNP.

Both CLBP and CNP are major chronic conditions that cause functional disability.<sup>3</sup> The close re-

lationship between avoidance and fear-avoidance models has gained more attention because of their role in the development and worsening of chronic pain and disability. Avoidance is often driven by catastrophic thoughts about pain, leading to fear of movement. Increased kinesiophobia can result in reduced functional activities, which may ultimately lead to disability.<sup>6,13,26</sup> Contrary to our expectations based on this theory, the studies investigating the relationship between disability and PAPs stated conflict results. López-Roig et al. reported that disability was related to activity avoidance and persistence (refers to overdoing), but not pain avoidance in women with fibromyalgia.<sup>27</sup> In another study including fibromyalgia, the authors informed that physical disability was associated with avoiding patterns, but not overdoing.<sup>28</sup> A study conducted on CLBP found that patients with avoiding and overdoing patterns had similar disability levels.<sup>15</sup> Although the disability score of the avoiding group was numerically higher than the overdoing and pacing, no significant difference was found between the groups in our study. One possible explanation for the lack of significant differences in disability between groups is that disability is influenced by multiple determinants, such as physical fitness and emotional resilience, therefore it is not completely related to pain.<sup>29</sup> Due to the multifactorial nature of disability, PAPs alone may not have revealed a certain effect.

A strong relationship between emotional symptoms (anxiety and depression) and chronic pain has been reported. The percentage of disorders of anxiety and depression is nearly double in patients with chronic pain compared to healthy. So, emotional disorders are an important part of ongoing chronic pain.<sup>30</sup> Studies investigating the association between PAPs evaluated with POAM-P and emotional status evaluated with HAD indicate that PAPs may be associated with anxiety and depression. However, the results of these studies were conflicting. Suygun et al. found that anxiety and depression were negatively linked to the pacing and avoidance pattern but positively linked to the overdoing pattern.<sup>12</sup> Enamoto et al. found a positive relationship between the avoidance and overdoing pattern and anxiety but not pacing. Depression was associated with just avoidance

patterns.<sup>14</sup> In another study, anxiety and depression were positively linked to avoidance and negatively linked to overdoing, but no association was found between pacing and anxiety or depression.<sup>31</sup> The studies suggest that while certain patterns of pain activity may be linked to emotional symptoms, it is still unclear which patterns affect them and how. We found that patients with avoiding, overdoing, and pacing patterns had similar levels of anxiety and depression. This could be due to the complex nature of anxiety and depression, which are influenced by multiple factors such as personal traits, socioeconomic status, pain characteristics, and physical well-being.<sup>32-34</sup> It may be possible that PAPs on their own may not be sufficient to determine emotional status.

It was assumed that since it is possible that abatement in activity amount can reduce the severity of pain to some extent, the PAL of those who prefer avoidance pattern are lower than those who do not. Moreover, persisters refers to overdoing tend to continue physical activity despite pain.<sup>12,35</sup> Despite this, we found that PAL of avoiding, pacing, and overdoing groups were similar. The results of the studies of Huijnen et al. agree with our findings.<sup>11,15</sup> Their study involving seventy-nine patients with CLBP reported that the physical activity level assessed with an accelerometer did not differ between the avoiders and persisters.<sup>11</sup> Another study conducted in CLBP indicated that the PAL assessed with a questionnaire and accelerometer was similar for patients showing avoiding and overdoing PAPs.<sup>15</sup> Based on the results presented here it can be concluded that patients with CLBP and CNP having avoiding and overdoing patterns do not show any difference in the physical activity level. So, it is commented that the PAP of patients with CLBP and CNP did not alter the level of the PAL.

One limitation is that it is challenging to make causal inferences as the data and analyses are based on a cross-sectional design. Also, the study only relied on self-reported measures to examine PAPs, disability, emotional status, and physical activity. Therefore, the study was limited to patients' perceptions of these factors. Future studies should consider using alternative measurement methods such as qualitative interviews or activity monitors. One signifi-



cant limitation was the heterogeneity of the samples in both populations. The disease population lacked sphericity, had an uneven gender distribution, and encompassed a wide age range, which contributed to the overall variability. Future studies should consider these factors when selecting samples.

## CONCLUSION

The study was one of the first to explore disability, emotional status, and physical activity in patients with CLBP and CNP who exhibit different patterns of pain activity. So, it is important to clarify if PAP affects the disability, emotional status, and PAL in patients with CLBP patients and CNP. We found the disability, emotional status, and physical activity in patients with different PAPs in CLBP and CNP were similar. It can be concluded that patients with CLBP and CNP who exhibit avoiding, overdoing, or pacing activity patterns are not distinct in terms of disability, anxiety, depression, and physical activity. We suggest that treatment strategies to improve disability, emotional disorders, and physical inactivity in CLBP and CNP should be considered independently of PAPs in clinical practice.

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## Conflict of Interest

*No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

## Authorship Contributions

**Idea/Concept:** Oğuzhan Mete, Şeyda Toprak Celenay; **Design:** Oğuzhan Mete, Şeyda Toprak Celenay; **Control/Supervision:** Oğuzhan Mete, Şeyda Toprak Celenay, Berna Yıldız; **Data Collection and/or Processing:** Oğuzhan Mete, Berna Yıldız; **Analysis and/or Interpretation:** Oğuzhan Mete, Berna Yıldız, Şeyda Toprak Celenay; **Literature Review:** Oğuzhan Mete, Berna Yıldız, Şeyda Toprak Celenay; **Writing the Article:** Oğuzhan Mete, Berna Yıldız, Şeyda Toprak Celenay; **Critical Review:** Oğuzhan Mete, Berna Yıldız, Şeyda Toprak Celenay; **References and Findings:** Oğuzhan Mete, Berna Yıldız, Şeyda Toprak Celenay; **Materials:** Oğuzhan Mete, Berna Yıldız, Şeyda Toprak Celenay.

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