

# An Investigation of the Relationship Between Psychosocial Characteristics of the Individuals with Severe Non-Specific Chronic Neck Pain and Their Neck Awareness, Body Awareness, Neck Disability Status, and Life Quality

Makbule ÖZEL<sup>1\*</sup>, İpek GÜRBÜZ<sup>2</sup>, Öznur TUNCA<sup>2</sup>

<sup>1</sup> Hacettepe University, Faculty of Medicine, Ankara, Türkiye.

<sup>2</sup> Hacettepe University, Faculty of Physical Therapy and Rehabilitation, Ankara, Türkiye.

\*Corresponding author e-mail: makbuleozel95@gmail.com

## ABSTRACT

**Purpose:** Only a small number of studies provide a comprehensive assessment of the factors involved in severe non-specific neck pain. The purpose of the present study was to investigate the relationship between the psychosocial characteristics of individuals with severe non-specific neck pain and their neck awareness, body awareness, neck disability status and life quality.

**Method:** Thirty individuals (mean age = 40.47±7.16) with severe non-specific neck pain participated in the study. The severity of pain, psychosocial characteristics, kinesiophobia, neck and body awareness, neck disability and quality of life were measured by Numeric Rating Scale (NRS), Hospital Anxiety and Depression Scale (HADS), Tampa Scale for Kinesiophobia (TSK), Fremantle Neck Awareness Questionnaire (FreNAQ), Cervical Joint Position Error (CJPE) test, Body Awareness Questionnaire (BAQ), Neck Disability Index (NDI), and Nottingham Health Profile (NHP), respectively.

**Results:** Significant correlations were detected between anxiety and depression levels and NHP and emotional reaction ( $p<0.05$ ). In addition, significant correlations were found between the fear of movement and pain severity, neck awareness, overall NHP score, NHP-emotional reaction, and NHP-social isolation ( $p<0.05$ ).

**Conclusion:** In individuals with severe non-specific chronic neck pain, a high fear of movement negatively affected neck awareness, quality of life, social participation, and emotional state.

**Key Words:** Chronic neck pain, Kinesiophobia, Neck awareness, Quality of life

## INTRODUCTION

Neck pain is considered a public health problem that is highly prevalent worldwide and significantly associated with disability. Neck pain is pain that is perceived between the superior nuchal line and the spinous process of the first thoracic vertebra. The pain may originate from any of the muscles, facet joints, ligaments, intervertebral discs, dura, and radicles, which are the constituents of the neck. There are many potential causes of neck pain, including tumors, traumas, infections, inflammatory disorders, and congenital disorders. However, in most cases, there may not be any systemic diseases cause of the complaints. This group is made

up of patients with major mechanical disorders including degenerative changes which are defined as non-specific neck pain (1).

Physiologically, prolonged pain can be attributed to higher sensitivity in the central nervous system and lower pain threshold in the peripheral nervous system. According to the biopsychosocial model, pain experience is addressed from physiological, cognitive, emotional and behavioral aspects. It also argues that thoughts, feelings and behaviors play a role in the experience of pain. (2). Individuals with neck pain demonstrate psychosocial symptoms such as anxiety,

depression, and fear of movement. These symptoms are considered potential risk factors for chronicity and poor prognosis (3). A broad distribution of pain is associated with anxiety and depression. It is a physiological condition that has cognitive, somatic, emotional, and behavioral components that cause anxiety, fear, and distress. Neck pain is correlated with anxiety and depression (4). Fear of movement limits the freedom of movement to avoid pain, giving rise to behavioral changes in the individuals suffering from pain. The effects of the fear of movement on pain and pain-related factors including disability and quality of life were investigated. Individuals with chronic musculoskeletal pain were found to demonstrate a correlation between a high fear of movement and a high severity of pain (2, 5).

Another notable factor in individuals with neck pain is the relationship between persistent pain and how the body is perceived and experienced (6). Chronic pain is associated with a deteriorated perceived image of the painful parts of the body. Individuals with chronic pain and a deteriorated neck image report a higher intensity and/or a longer duration of pain. Since the impaired function of the neck muscles and sensory receptors in addition to pain jeopardizes the accuracy of the information that contributes to the self-awareness of the body, it gives rise to an impaired neck image (7).

It was found that the neck disability status of individuals with chronic neck pain is affected by the psychosocial and physical factors (3, 8, 9). The severity of neck disability is a factor that plays a role in the severity and chronicity of pain in individuals with neck pain. Severity and chronicity of pain are higher in the individuals with a severe neck disability than those with mild to moderate neck disability (10). It was also shown in different studies that neck pain negatively affects quality of life (10, 11).

A literature review shows that psychosocial characteristics, neck awareness, body awareness, neck disability level and life quality of the individuals with mild to moderate pain severity originating from different pathological causes were examined (3, 4, 7, 11). Only a limited number of publications examine the interplay between the aforementioned factors in individuals with chronic neck pain and provide a comprehensive assessment of the factors that play a role in severe pain (9). Therefore, our study was planned to

investigate the correlations between the psychosocial traits of the individuals with severe non-specific chronic neck pain and their neck awareness, body awareness, neck disability status and life quality.

## METHODS

### Study Design

This study was conducted in a centrally located state hospital in Istanbul, a cosmopolitan city. Individuals who applied with the complaint of neck pain and were diagnosed with non-specific chronic neck pain by a specialist were invited to the study. The study was conducted between November 2020 and May 2021. Participants were informed about the study procedure as prescribed in the Declaration of Helsinki. The participants voluntarily participated in the study by signing a consent form. A copy of the consent form was handed to the participant.

The ethical compliance of the study was approved by the Hacettepe University Faculty Committee of Non-Interventional Clinical Research Ethics at the meeting held on October 6, 2020, with the project number GO 20/911 and the decision number 2020/16-39.

In the study, age (year), body mass index ( $\text{kg}/\text{m}^2$ ), neck pain duration (months), gender, level of education, occupation, comorbidity, and drug use of the subjects were recorded in a form, and then the following assessments were made.

### Patients

The study was conducted with individuals with non-specific chronic neck pain, and the G\*Power software version 3.1.9.7 was used to calculate the sample size required for the study. When test was run with a power of 80%, an error margin of 5%, and an effect size of 0.50 (large), the sample size was found to be 29 individuals with chronic neck pain, 40 individuals were invited to the study, 5 individuals were excluded for failing to fulfill the inclusion criteria and 5 individuals were excluded at their request, and the study was conducted with 30 individuals.

The inclusion criteria were a) being diagnosed with a non-specific neck pain, b) having neck pain for at least three months, c) having a resting pain rating of 7 or above according to the Numeric Rating Scale (NRS) d) scoring five

or above in the Neck Disability Index (NDI) (12) and d) being 18 to 65 years of age. The exclusion criteria were a) having a history of spine surgery, b) being diagnosed with an additional musculoskeletal disease (thoracic outlet and scoliosis) that may affect the cervical region, c) having a history of physiotherapy and/or other treatment within the last 6 months due to neck pain (13) d) being diagnosed with a psychiatric condition (14) and f) being illiterate.

## Assessments

NRS was used to assess the pain. There were points corresponding to scores between 0 and 10 on a horizontal plane. The individuals were asked to pick a number that best defined the severity of their pain between "0: no pain" and "10 very severe pain". Pain severity was classified as 0: no pain, 1-3: mild pain, 4-6: moderate pain, and 7-10: severe pain (15).

Anxiety, depression and kinesiophobia were assessed as part of the psychosocial characteristics of the subjects. The Hospital Anxiety and Depression Scale (HADS) was used to measure anxiety and depression levels. 7 questions in the scale measure anxiety, and 7 questions measure depression. Those who score 10 or above in the anxiety subscale are considered under the risk of anxiety, and those who score 7 or above in the depression subscale are considered under the risk of depression. Higher scores from each subscale indicate higher levels or risks of severe anxiety or depression (16, 17). The Tampa Scale for Kinesiophobia (TSK), which is valid for individuals with lower back and neck problems, was used to measure the fear of movement. The purpose of this scale is to make a distinction between the individuals who didn't have a fear of movement and those who had a high level of fear of movement. The minimum score on the scale is 17 and the maximum score is 68. Higher scores indicate a higher fear of movement (18). According to Günay Uçurum and Demirbüken et al., a TSK score greater than 37 indicates a high fear of movement, and a TSK score less than 37 indicates a low fear of movement (19, 20). We used the same cut-off point in our study.

The Fremantle Neck Awareness Questionnaire (FreNAQ) and the Cervical Joint Position Error (CJPE) test were used to measure neck awareness. FreNAQ is a questionnaire that is

applicable to individuals with chronic neck pain. FreNAQ assesses attention, proprioceptive senses, shape/size perception of the neck, and neglect. The score range of the questionnaire is between 0 and 36 points. A higher score in FreNAQ indicates a poorer neck awareness (14, 21).

The CJPE test is a method developed by Revel et al. and suitable for clinical use. It measures an individual's ability to reposition the head after actively moving it in different planes of motion from a neutral position. It involves the use of a laser pointer in head, and a board with circles drawn 1 cm apart from each other. The patient sat on a chair positioned 90 cm away from the board. The cervical joint movements that the patient was asked to do before starting the test were demonstrated by the physiotherapist in a manner that the patient could understand. The laser pointer was adjusted to the initial point, then the patient was asked to keep that point in mind and return to the initial point after actively flexing the head with their eyes closed. The distance from the end point of laser reflection to the initial point after active cervical joint movement was measured as horizontal error, vertical error, and global error in centimeters (cm). Each cervical movement was repeated 10 times, and the average horizontal, vertical and global error values were recorded. Following the flexion movement, measurements were made for the extension and the right and left rotation movements, respectively, and the error values were recorded. An error value above 3-4° (4-5 cm) indicates a cervical joint position sense disorder (22, 23). The Body Awareness Questionnaire (BAQ), which is applicable to the individuals with chronic pain, was used to assess body awareness. BAQ is a questionnaire with psychometric properties, which fully evaluates the concept of body awareness. It consists of 18 items, and the score range of the questionnaire is between 18 and 126 points. A higher score in the questionnaire indicates a better body awareness (24, 25).

NDI was used when assessing the neck disability status. NDI allows individuals with neck pain to self-assess their disability status. It has six subsections. A total score of 0-14 is considered no disability, 5-14 is considered mild disability, 14-24 is considered moderate disability, 25-34 is considered severe disability, and 35 and above is considered complete disability (26).

The Nottingham Health Profile (NHP) was used to assess quality of life. NHP is designed to assess the emotional, social, and physical health issues perceived by an individual. It is a questionnaire that consists of 6 subsections and the overall score ranges from 0 to 600 points. A higher score indicates a poorer quality of life (27, 28).

### Statistical Analysis

The SPSS 23 (The Statistical Package for The Social Sciences) software was used in the analysis of this study. Mean, standard deviation, and minimum-maximum values for quantitative variables, and the number of observations (n) and relative frequencies (percentages) for qualitative variables are provided. The Shapiro-Wilks test was used to see whether the data showed normal distribution or not. Since the data did not distribute normally, the correlation among the scales was measured with Spearman's rho coefficient (r). A correlation coefficient of  $\geq 0.90$  indicates a very strong relationship, 0.70-0.89 indicates a strong relationship, 0.40-0.69 indicates a medium relationship, 0.20-0.39 indicates a weak relationship, and  $< 0.20$  indicates a very weak relationship (30).

## RESULTS

The mean age, body mass index and neck pain duration of the 30 subjects of the study with severe non-specific chronic neck pain are shown in Table 1. 80% of the subjects were female, 50% were secondary school graduates and 40% worked at a desk job. 70% of the subjects did not have an accompanying disease such as diabetes or hypertension, and 80% were not on a regular medication treatment for any such disease.

**Table 1.** Identifying information (n=30).

Parameters	Minimum	Maximum	Mean $\pm$ SD
Age (year)	23.00	50.00	40.47 $\pm$ 7.16
Weight (kg)	57.00	99.00	75.80 $\pm$ 11.49
Height (m)	1.50	1.80	1.63 $\pm$ 0.07
BMI (kg/m <sup>2</sup> )	22.05	38.60	28.56 $\pm$ 3.76
Neck Pain Duration(month)	4.00	180.00	44.13 $\pm$ 53.24

The results of the psychosocial characteristics (anxiety, depression, fear of movement), resting pain severity, neck

awareness, body awareness, neck disability status, and life quality of the subjects are shown in Table 2.

The correlation between the subjects' psychosocial characteristics (anxiety, depression, and fear of movement) and pain severity, FreNAQ, BAQ, NDI, and NHP are shown in Table 3. Accordingly, it was found that there were moderate and weak strong correlations between anxiety ( $r=0.443$ ,  $p=0.017$ ) and depression ( $r=0.389$ ,  $p=0.034$ ) and emotional reaction, sub-parameter of NHP, respectively. In addition, a weakly significant correlation was found between fear of movement, and pain intensity ( $r=0.389$ ,  $p=0.034$ ) and neck awareness ( $r=0.372$ ,  $p=0.043$ ), and a moderately significant correlation was found among the overall NHP score ( $r=0.478$ ,  $p=0.008$ ), emotional reaction ( $r=0.537$ ,  $p=0.002$ ), which is a sub-parameter of the NHP, and social isolation ( $r=0.469$ ,  $p=0.009$ ), which is another sub-parameter of NHP. No statistically significant correlation was found between the psychosocial characteristics of individuals and the CJPE, another assessment parameter indicating neck awareness ( $p>0.05$ ).

## DISCUSSION

In our study, which was designed to analyze the relationship between the psychosocial characteristics and neck awareness, body awareness, neck disability status and quality of life of the individuals with severe non-specific chronic neck pain (7 out of 10 according to the NRS), individuals aged 40 years on average, overweight [according to the World Health Organization(30)] and mostly female were found have low levels of anxiety, borderline levels of depression, and high levels of fear of movement. Surprisingly, it was found that severe neck pain and moderate neck disability of the individuals only mildly affected their neck and body awareness. In line with their pain severity, the individuals were affected more seriously in the pain and energy parameters, which are sub-parameters of life quality. On the other hand, the level of effect in the other sub-parameters of life quality were milder, therefore their life quality was good. According to our study, psychosocial characteristics of individuals, including anxiety, depression, and fear of movement, affected their emotional reactions associated with the quality of life. It was found that the fear of movement was particularly associated with the severity of pain, neck

awareness and social isolation of individuals, and affected their general quality of life negatively. In addition, although we found disturbance in the sense of cervical joints (cervical flexion, extension, right and left rotation) and positioning (global error) in all directions supporting neck awareness, this was irrelevant with the psychosocial characteristics of the individuals.

Studies have shown the correlations between chronic neck pain and being female, older, overweight, and having a lower educational level (1, 31, 32). Despite their severe rest pain, the individuals in our study had low levels of anxiety and borderline levels of depression. In line with their severity of pain, they were found to have a high fear of movement.

**Table 2.** Findings of psychosocial characteristics, pain severity, neck awareness, body awareness, neck disability status and quality of life evaluations of individuals included in the study (n=30).

	Minimum	Maximum	Mean $\pm$ SD
<b>Psychosocial Characteristics</b>			
HADS-A (0-21)	0.00	15.00	7.67 $\pm$ 3.81
HADS-D (0-21)	0.00	15.00	6.73 $\pm$ 3.77
TSK (17-68)	29.00	47.00	40.73 $\pm$ 4.03
<b>Pain Assessment</b>			
NRS (0-10)	7.00	10.00	7.63 $\pm$ 0.85
<b>Assessment of Neck Awareness</b>			
FreNAQ (0-36)	0.00	22.00	10.83 $\pm$ 6.02
<b>CJPE test (cm)</b>			
Cervical flexion HE	0.85	5.50	2.39 $\pm$ 1.09
Cervical flexion VE	1.10	7.05	3.88 $\pm$ 1.52
Cervical flexion GE	1.50	8.43	4.89 $\pm$ 1.75
Cervical extension HE	0.65	7.20	2.19 $\pm$ 1.26
Cervical extension VE	0.50	12.55	4.41 $\pm$ 2.34
Cervical extension GE	2.38	12.80	5.20 $\pm$ 2.40
Right rotation HE	2.15	5.60	3.67 $\pm$ 0.90
Right rotation VE	0.80	10.55	3.08 $\pm$ 2.15
Right rotation GE	2.40	11.60	5.23 $\pm$ 2.00
Left rotation HE	1.45	8.00	4.03 $\pm$ 1.50
Left rotation VE	0.60	6.90	2.73 $\pm$ 1.42
Left rotation GE	2.00	10.40	5.27 $\pm$ 1.94
<b>Assessment of Body Awareness</b>			
BAQ (18-126)	40.00	125.00	96.07 $\pm$ 19.52
<b>Assessment of Neck Disability Level</b>			
NDI (0-50)	7.00	33.00	15.90 $\pm$ 6.36
<b>Assessment of Life Quality (NHP)</b>			
NHP-Pain (0-100)	0.00	100.00	64.51 $\pm$ 27.69
NHP-Emotional reaction (0-100)	0.00	100.00	31.80 $\pm$ 27.76
NHP-Sleeping (0-100)	0.00	78.30	37.24 $\pm$ 25.86
NHP- Social isolation (0-100)	0.00	100.00	17.00 $\pm$ 26.54
NHP-Physical activity (0-100)	0.00	54.47	24.05 $\pm$ 17.31
NHP- Energy level (0-100)	0.00	100.00	64.53 $\pm$ 36.66
NHP-Total score (0-600)	32.75	469.99	241.23 $\pm$ 110.53

HADS-A: Hospital Anxiety and Depression Scale -Anxiety, HADS-D: Hospital Anxiety and Depression Scale -Depression, NRS: Numeric Rating Scale, TSK: Tampa Scale for Kinesiophobia, FreNAQ: Fremantle Neck Awareness Questionnaire, CJPE: Cervical Joint Position Error, HE: Horizontal Error, VE: Vertical Error, GE: Global Error, BAQ: Body Awareness Questionnaire, NDI: Neck Disability Index, NHP: Nottingham Health Profile.



**Table 3.** Findings on the relationship between psychosocial characteristics of individuals included in the study and pain severity, pain duration, neck awareness, body awareness and quality of life (n=30).

	HADS-A		HADS-D		TSK	
	r	p	r	p	r	p
<b>Pain Intensity (NRS)</b>	0.014	0.942	0.082	0.666	<b>0.389</b>	<b>0.034</b>
<b>FreNAQ</b>	0.232	0.217	0.229	0.223	<b>0.372</b>	<b>0.043</b>
<b>BAQ</b>	0.086	0.651	-0.089	0.639	-0.111	0.561
<b>NDI</b>	0.196	0.298	0.266	0.155	0.309	0.096
<b>NHP</b>						
<b>NHP-Pain</b>	0.018	0.925	0.080	0.676	0.318	0.087
<b>NHP-Emotional reaction</b>	<b>0.443</b>	<b>0.017</b>	<b>0.389</b>	<b>0.034</b>	<b>0.537</b>	<b>0.002</b>
<b>NHP-Sleeping</b>	-0.059	0.756	-0.172	0.364	0.029	0.879
<b>NHP-Social isolation</b>	0.105	0.580	0.331	0.074	<b>0.469</b>	<b>0.009</b>
<b>NHP-Physical activity</b>	-0.093	0.625	0.128	0.500	0.256	0.173
<b>NHP-Energy level</b>	0.065	0.734	-0.045	0.812	0.213	0.259
<b>NHP-Total score</b>	0.158	0.405	0.179	0.343	<b>0.478</b>	<b>0.008</b>

HADS-A: Hospital Anxiety and Depression Scale -Anxiety, HADS-D: Hospital Anxiety and Depression Scale -Depression, TSK: Tampa Scale for Kinesiophobia, NRS: Numeric Rating Scale, FreNAQ: Fremantle Neck Awareness Questionnaire, BAQ: Body Awareness Questionnaire, NDI: Neck Disability Index, NHP: Nottingham Health Profile.

As suggested in the literature, it was found that the average age of our subjects with neck pain was in line with the age groups where the risk of neck pain increased, they were mostly women, their body mass index corresponded to overweight and most of them had a low level of education (1, 31, 32). A review of the literature shows that the studies investigating the correlation between psychosocial characteristics and pain severity in individuals with neck pain have contradictory conclusions (9, 32, 33). Contrary to our study, Dimitriadis et al. (8) reported that pain severity was not related to depression and fear of movement in study investigating correlation between anxiety and pain severity in individuals with non-specific neck pain. However, in coherence with our study, Luo et al. (30) and Mäntyselkä et al. (33) reported that anxiety and depression didn't affect pain severity in individuals with neck pain. Also, Myburgh et al. (35) stated that chronic, severe pain and anxiety were not always correlated, and that low levels of anxiety in individuals with pain may be an indicator of a strategy for coping with pain. Therefore, the low levels of anxiety and depression in our subjects who had chronic, severe neck pain in our study suggest that this may be a result of the

individuals' psychological confrontation with the experience of pain and the success of their coping strategies.

The body of literature on the correlation between the fear of movement and neck pain severity in the literature also yield contradictory results. Günay Uçurum (20) reported that the severity of pain didn't affect kinesiophobia in individuals with non-specific chronic neck pain, and it might be the fear of re-injury that caused kinesiophobia. Demirbüken et al. (19) reported that there was no correlation between the fear of movement and pain severity in individuals with neck pain, and that pain severity didn't have a direct effect on the fear of movement. Contrary to these studies, Asiri et al. (34) reported that there was a strong correlation between the fear of movement and pain severity in individuals with chronic neck pain, attributing this to an increase in the fear of movement due to a decrease in tolerance of pain as a result of aging. Coherent with Asiri et al. (34), our study found that pain severity and the fear of movement are correlated. However, even though the mean age of our subjects was not too high, since they avoided moving their necks because of losing some of their tolerance to pain due to the severe resting pain they had, they may have had a high fear of movement.

There is a limited body of literature investigating the factors affecting neck and body awareness of the individuals experiencing pain, and while the studies focus on such factors as pain severity, functional status, and muscle structure (35, 36), the studies on body awareness largely investigate how the pain severity, life quality and emotional state of the individuals experiencing pain change after the treatment (2, 37). To the best of our knowledge, our study is the first study to investigate correlation between psychosocial state and neck and body awareness in the individuals experiencing chronic non-specific severe neck pain. One of the problems that occur in individuals with neck pain is deterioration of the sense of cervical joint position, which may make the neck pain chronic (38, 39). In our study, the CJPE score that indicates neck awareness suggested that there was a global error in all directions, thus neck awareness was reduced, and despite high pain severities, this effect was found to be mild according to the results of the neck awareness questionnaire. In addition, despite high levels of pain severity, we found that the subjects did not have serious levels of anxiety and depression, therefore, there was no correlation between the levels of anxiety and depression, and neck awareness measured by the CJPE and FreNAQ. However, we found a significant correlation between the fear of movement and neck awareness measured by FreNAQ in individuals with neck pain, and that those individuals whose neck awareness was affected had a high fear of movement. This may be explained by the fact that the neck awareness questionnaire includes questions that assess attention, shape/size perception of the neck and neglect in addition to the cervical proprioceptive sense, and that the questions in the fear of movement questionnaire focus more on the perception of the individual. The strong correlation between pain severity and fear of movement has been shown in many studies in the literature (5, 34). Therefore, it is thought that the high levels of kinesiophobia in the subjects of our study is attributable to the severity of their pain, and that high levels of kinesiophobia restricts neck movements, affecting neck awareness of individuals negatively. In addition, the subjects whose body awareness was mildly affected according to the BAQ did not show any correlation between body awareness and any of their psychosocial characteristics examined.

Similarly, Erden et al. reported that there was no correlation between depression and body awareness in healthy individuals with low levels of depression (40). According to these results, one can conclude that the individuals without serious psychosocial problems may perceive their body better.

Despite their severe resting pain, our subjects had moderate neck disability, and no correlation was found between their levels of neck disability and their psychosocial characteristics. However, a correlation was observed between pain severity and fear of movement, one of the psychosocial characteristics, rather than the level of neck disability. Luque-Suarez et al. (6) reported that individuals with chronic musculoskeletal pain who had a high fear of movement had a high level of pain in parallel with it. In our study, it was thought that a lower level of kinesiophobia may have caused a higher perception of pain severity. Therefore, even though the subjects reported high levels of resting pain, one can conclude that this was not actually caused by a severe neck disability but a change in pain perception due to a high fear of movement. Our findings are supported by studies in literature. Dimitriadis et al. (8) reported that there was no correlation between the fear of movement and the level of neck disability in individuals with non-specific neck pain who had mild neck pain and neck disability. Beltran-Alacreu et al. (9) reported in a study on groups with non-specific neck pain and different levels of neck disability that the fear of movement was not affected by the level of neck disability.

It is known that anxiety, depression and fear of movement have negative effects on the quality of life, and emotional, social and physical health, which is related to the quality of life, in individuals with chronic pain (9, 20). According to our study, psychosocial characteristics of individuals with severe non-specific chronic neck pain affected their emotional reactions associated with the quality of life. It was also found that a high fear of movement negatively affects the overall quality of life and social participation of individuals. Consistent with our findings, Günay Uçurum (20) reported that quality of life and overall health of the individuals with neck pain were adversely affected as their fear of movement increased. Our study results showed that among the

psychosocial characteristics of the individuals with severe non-specific chronic neck pain, the fear of movement had the highest potential to affect their emotional state and social participation, negatively affecting their overall quality of life; the levels of anxiety and depression negatively affected only the emotional reactions of individuals in daily life, but it did not have a significant effect on their overall quality of life. Therefore, one may conclude that it is important to assess the fear of movement caused by a high severity of pain among the psychosocial characteristics of individuals and consider the rehabilitation approaches to eliminate the fear of movement for a better life quality for the individuals with a severe chronic neck pain.

### Limitations

The small number of participants can be considered as a limitation of this study. However, the number of participants was limited since only those individuals with non-specific chronic neck pain who applied to a center could be contacted, and the number of individuals with severe level of pain was less than those with a mild/moderate level of pain. The access to the participants was further limited by the fact that the study had to be completed during the COVID-19 pandemic and the unique conditions of that period.

### CONCLUSION

In conclusion, we found that individuals with non-specific chronic neck pain had low levels of anxiety/depression despite severe pain, but a high fear of movement due to a high severity of pain. We also determined that a high fear of movement, one of the psychosocial characteristics of individuals with chronic neck pain, affected neck awareness, quality of life, social participation, and emotional state negatively. However, we found that psychosocial characteristics (anxiety, depression, and the fear of movement) of the individuals with severe non-specific chronic neck pain did not affect body awareness and neck disability status. We suggest that studies investigating the effects of the approaches for reducing the fear of movement and proprioceptive exercises on pain severity, neck awareness, fear of movement, and quality of life for individuals with non-specific chronic neck pain be designed.

In addition, we believe that studies investigating the factors that affect pain perception and body awareness of individuals with different levels of pain severity are needed.

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