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Original Research

The Relationship Between Cognitive Intrusion of Pain, Fear of Surgery, and Comfort

Hülya Saray KILIÇ, PhD, RN*,[1], Neşe Mercan, PhD, RN†

* Faculty of Health Sciences, Department of Nursing, Bilecik Seyh Edebali University, Bilecik, Turkey
† Faculty of Health Sciences, Department of Child Development, Bilecik Seyh Edebali University, Bilecik, Turkey

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ABSTRACT

Aim: The aim of this study was to examine the relationship between cognitive intrusion of pain, fear of surgery, and comfort in the perioperative period.
Design: This was a descriptive study conducted with 180 patients hospitalized for surgery in a training and research hospital.
Methods: A sociodemographic questionnaire, Surgical Fear Questionnaire, General Comfort Questionnaire, and Experience of Cognitive Intrusion of Pain Scale were administered to the participants prior to surgery, while General Comfort Questionnaire and Experience of Cognitive Intrusion of Pain Scale were administered after surgery.
Results: Of the participants with a mean age of 49.94 ± 17.26 years, 62.2% were male and 31.1% had at least one chronic disease. The mean preoperative and postoperative pain scores were 2.65 and 3.47, respectively. There was a statistically significant negative correlation between perioperative experience of cognitive intrusion of pain and perioperative comfort and a positive correlation between perioperative experience of cognitive intrusion of pain and preoperative fear of surgery ($p < .05$).
Conclusions: Cognitive intrusion of pain does not change in the perioperative period. As the cognitive intrusion of pain increases, patient comfort decreases and surgical fear increases. Our study contributes to the literature since it is the first study evaluating the cognitive intrusion of pain in the perioperative period.

Key Practice Points

Patients may experience pain in the preoperative and postoperative periods. It is attempted to relieve the pain of patients with pharmacological and nonpharmacological methods. However, cognitive intrusion of pain, which is effective in the perception of pain, prevents the management of pain. So, it should be aimed to reduce or prevent the cognitive intrusion of pain.

Pain is a subjective phenomenon that affects individuals biologically, psychologically, and socially (Shoqirat et al., 2019). Individuals may preoperatively experience pain in relation to the disease leading to surgery. After the surgery, pain is initiated by surgical trauma as an acute condition, and its duration and severity change in relation to the site and extent of the incision (Çavdar & Akyüz, 2017). Postoperative pain, which is considered a universal problem, is seen in 80% of patients (Gürkan et al., 2020). For many patients, postoperative pain is not managed adequately (Wooldridge & Branney, 2020); therefore, there is a need for more efforts in the prevention of pain (Gürkan et al., 2020; Shoqirat et al., 2019).

Cognition is defined as acquiring, processing, and managing knowledge, perceiving experiences, and creating and managing similar mental processes (Harvey, 2019). It consists of critical elements such as attention, perception, memory, motor skills, thinking, executive function, and verbal and language skills (Khera & Rangasamy, 2021). The complex and bidirectional relationship between pain and cognition occurs as a result of the stimulation of the same region in the brain (Kragel et al., 2018). Shoqirat et al., in their 2019 study, stated what patients think about pain and how they feel affect their response to pain management strategies (Shoqirat et al., 2019). At the same time, pain and cognition overlap with anatomical and biochemical factors of the brain (Khera & Rangasamy, 2021; Kragel et al., 2018). Cognitive intrusion in pain comprises stages where there is an interruption of mental activity due to pain (attention), the involuntary recurrence of

[1] Address correspondence to Hülya Saray Kiliç, RN, PhD, Faculty of Health Sciences, Department of Nursing, Bilecik Seyh Edebali University, Bilecik, 11210, Turkey.
E-mail address: h.saraykilic@gmail.com (H. Saray KILIÇ).

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pain-related thoughts (rumination) and the catastrophizing of pain (Talaei-Khoei et al., 2017). The combination of these three concepts is defined as the cognitive intrusion of pain (Mercan et al., 2022). **C**ognitive processes concerning what is thought about pain, how pain is perceived, and where attention is directed affect pain management (Shoqirat et al., 2019). Pain management is achieved by reducing the cognitive capacity possessed to feel pain and the removal of attention from the sources that cause pain (Yılmaz Koçak & Kaya, 2021). Rumination, which refers to the persistent and repetitive experience of negative thoughts, poses an obstacle to coping with pain (Kokonyei et al., 2019). Catastrophizing, known as exaggeration by focusing on pain, adversely affects healing and causes a feeling of more pain after surgery (Coronado et al., 2021; Van Der List et al., 2023). Cognitive processes are individual, and methods addressing behaviors, thoughts, and emotions in the management of pain should not be ignored (Hajihasani et al., 2019; Khera et al., 2021). The emotions of individuals are a crucial influence in the emergence of thoughts and behaviors (Erden & Eminoğlu, 2020).

Fear is an emotion that arises in the face of an identifiable threat accompanied by physiological, cognitive, and behavioral reactions (Martinez-Calderon et al., 2023). Individuals may experience fear for different reasons in the preop, intra op and postop areas (Aust et al., 2018). Indeed, while the fear arising from the same object of fear can be low in some patients, it can be quite high in others (Eberhart et al., 2020). In cases where fear is not addressed, healing is delayed, and the desired quality of life cannot be achieved after surgery (Coronado et al., 2021). Determination of preoperative fear and appropriate interventions facilitate compliance with the surgical process (Akutay & Ceyhan, 2023). Because of these reasons, it is important to determine the fear that may cause pain and to include it in the pain evaluation process. However, there is not enough evidence to explain the relationship between preoperative fear and postoperative pain and decreased functionality (Van Bogaert et al., 2022). For these reasons, preoperative fear should be carefully addressed.

Pain adversely affects physical comfort. Kolcaba (2003) states that cognitive, emotional, and spiritual elements affect psychospiritual comfort. Relief and relaxation should be provided in the model of basic human needs (Yelkin & Çınar Yücel, 2021). In cases where pain is not effectively managed and the cognitive process is not functional, comfort is adversely affected (Ilgen et al., 2019). It has been reported that methods positively affecting the cognitive process such as therapeutic touch increase comfort by reducing pain (Yelkin & Çınar Yücel, 2021). In order to increase the comfort of the patients in the perioperative period, the cognitive process should also be addressed in pain management.

The fact that the cognitive intrusion of pain in the perioperative period has not been evaluated together with surgical fear and comfort is an important deficiency in providing adequate pain management. It is predicted that a high quality of care will be provided by integrating the results of this study into pain management. The aim of this study was to examine the relationship between cognitive intrusion of pain, fear of surgery, and comfort in the perioperative period.

Methods

Study Design and Participants

This was a descriptive study conducted with 180 patients hospitalized for surgery in a training and research hospital. Patients admitted to general surgery, orthopedics, trauma, otolaryngology, and neurosurgery clinics for surgery in 2022 were included in the study. The sample of the study was calculated at a confidence interval of 95% with the Raosoft sample calculation software, considering the number of surgeries performed in 2021 (N:310). According to this calculation, the sample size was determined as 172 patients. The study was completed with 180 participants before surgery and 154 participants after surgery. The surgery of 10 patients whose data were collected before the surgery was canceled due to COVID-19, the surgery of 5 patients was canceled due to the operating room processes, and 11 patients could not be reached due to early postoperative discharge.

Inclusion criteria for the study were as follows: 1) admitted for surgery to a training and research hospital, 2) 18 years of age and older, 3) no comorbidities with a history of pain, 4) voluntary participation, and 5) able to participate in the study, both psychologically and physically, at least 24 hours postoperatively. Exclusion criteria were a history of mental illness as confirmed by a review of the patient's medical history and the inability to read or write Turkish.

Ethical Approval

The approval for this study was obtained from the ethics committee of Bilecik Şeyh Edebali University Non-Interventional Clinical Research Ethics Committee (approval number: 5/2, dated 24.09.2021) and from the hospital where the study was conducted. Written consent was obtained from the participants. The participants were informed about their right to withdraw from the study at any stage. The study was conducted in accordance with the Declaration of Helsinki.

Data Collection and Instruments

The data were collected in patients' room with face-to-face interviews with patients. Sociodemographic questionnaire form, Surgical Fear Questionnaire, General Comfort Questionnaire, and Experience of Cognitive Intrusion of Pain Scale were completed with the participants before surgery, while General Comfort Questionnaire and Experience of Cognitive Intrusion of Pain Scale were completed after surgery. The collection of data took 25 minutes before and after surgery.

Sociodemographic Questionnaire Form: It was created by researchers by reviewing the literature. This form contains questions about the patient's age, gender, chronic disease, etc. In addition, the perioperative pain levels of patients were evaluated with Visual Analog Scale (VAS).

Experience of Cognitive Intrusion of Pain Scale (ECIPS): ECIPS was developed by Attridge et al. (2015) to measure the cognitive intrusion of pain by identifying cognitive responses related to the experience of pain. The Turkish validity and reliability study of the scale was performed by Mercan et al. (2022). It is a 7-point Likert-type scale with 10 items. The items are scored from 0 (totally disagree) to 6 (totally agree). The lowest score that can be obtained from the scale is 0, while the highest score is 60 points. High scores indicate that individuals have a greater instance of cognitive intrusion of pain. The Cronbach's alpha coefficient of ECIPS in this study was 0.972 for both preoperative and postoperative scores.

Surgical Fear Questionnaire (SFQ): SFQ was developed by Theunissen et al. (2014) to determine the degree of fear in patients undergoing elective surgery, and the Turkish validity and reliability study of the questionnaire was performed by Bağdigen and Karaman Özlü (2018). It is an 11-point Likert-type scale with 8 items scored from 0 to 10 (0: not afraid at all, 10 points: very afraid). The scale score ranges from 0 to 80 points. As the score obtained

Table 1
The Sociodemographic Characteristics of the Participants (N = 180)

	Mean ± Standard Deviation	Minimum-Maximum
Age (n = 177)	49.94 ± 17.26	20-89
	n	%
Gender		
Female	68	37.8
Male	112	62.2
Educational status		
Illiterate	9	5.0
Primary school	105	58.3
High school	36	20.0
University and above	30	16.7
Marital status		
Married	138	76.7
Single	42	23.3
Status of living alone		
Lives alone	18	10.0
Does not live alone	162	90.0
Employment status		
Working	73	40.6
Not working	107	59.4
Presence of chronic disease		
Yes	56	31.1
No	124	68.9

from the scale increases, the level of fear increases. The Cronbach's alpha coefficient of SFQ in this study was 0.934.

General Comfort Questionnaire (GCQ): GCQ was developed by Kolcaba (1992) and was adapted into Turkish by Kuğuoğlu and Karabacak (2008). The scale consists of 48 items scored on a 4-point Likert scale. The mean score is used to evaluate the comfort status of patients (ranging from 1 to 4). A higher score indicates high patient comfort. The Cronbach's alpha coefficient of GCQ in this study was 0.821 for preoperative scores and 0.831 for postoperative scores.

Data Analysis

SPSS Statistics for Windows version 21.0 software package was used in the analysis of the data. As descriptive statistics, numbers and percentages were used for numerical data, while mean and standard deviation were used for continuous variables. The Pearson correlation test was used to analyze the relationship between scales. In order to determine whether the data were distributed normally, Kolmogorov-Smirnow test was used. In the analysis of differences between groups, the Student *t*-test and the one-way ANOVA test were used for normally distributed values, while Mann-Whitney U and Kruskal-Wallis tests were used for non-normally distributed values. For all analyses, a *p*-value less than .05 was considered statistically significant.

Results

The relationship between cognitive intrusion of pain, fear of surgery and comfort in the perioperative period is reviewed in the study results. Examples of surgeries included in this study were inguinal hernia, cholecystectomy, total knee replacement, total hip replacement, fracture reduction, septorhinoplasty and lumbar disc herniation. Of the participants with a mean age of 49.94 ± 17.26 years, 62.2% were male, 58.3% were primary school graduates, and 76.7% were married, 10.0% of the participants were living alone, 40.6% were employed, and 31.1% had at least one chronic disease (Table 1).

Of the participants, 45% stated that they had never undergone surgery and 95.6% stated that they did not receive any education about coping with pain. The mean preoperative and postoperative pain scores were 2.65 ± 3.13 and 3.47 ± 2.90, respectively. The anesthesia type of 50% of the participants was general anesthesia (Table 2).

The mean preoperative and postoperative ECIPS scores of the participants were 18.84 ± 18.10 and 19.38 ± 17.26, respectively. The mean preoperative GCQ score was 2.96 ± 0.33, while the mean postoperative GCQ score was 3.01 ± 0.32. The mean preoperative SFQ score was 22.76 ± 20.25.

There was a statistically significant positive relationship between preoperative and postoperative ECIPS scores, SFQ, and perioperative VAS scores ($p < .05$). There was a statistically significant negative relationship between perioperative ECIPS scores and perioperative GCQ scores ($p < .05$) (Table 3).

The perioperative ECIPS scores were higher in female participants. The postoperative ECIPS scores were higher in unemployed participants and those with chronic diseases. The total SFQ score was higher in female participants and those with chronic diseases. The postoperative GCQ scores were lower in unemployed participants (Table 4).

Discussion

This study investigated the cognitive intrusion of pain, comfort and preoperative fear of surgery and their relationship with each other.

In our study, the mean preoperative pain score was 2.65 ± 3.13. The mean pain score of the patients before knee prosthesis surgery was found to be 7.1 ± 1.9 (Şen & Kurtoğlu, 2022). A meta-analysis reported that one of the determinants of postoperative pain was the preoperative pain of patients (Andreoletti et al., 2022). Patients with different types of surgery in our study may have caused these differences.

In our study, the mean postoperative pain score was 3.47 ± 2.90. Demir and Yilmaz (2022) found a mean postoperative pain score of 7.21 ± 1.28. In other studies, postoperative pain score was

Table 2
The Information About the Surgery and Pain of the Participants (N = 180)

	Mean ± Standard Deviation	Minimum-Maximum
Pain (VAS) (0-10)		
Preoperative (n = 180)	2.65 ± 3.13	0-10
Postoperative (n = 154)	3.47 ± 2.90	0-10
	n	%
Anesthesia type (n = 154)		
General anesthesia	77	50.0
Spinal anesthesia	77	50.0
Previous surgery (n = 180)		
No	81	45.0
Yes	99	55.0
Receiving any education about coping with pain (n = 180)		
No	172	95.6
Yes	8	4.4

Table 3
The Relationship Between ECIPS, GCQ, SFQ, and VAS Results

		ECIPS-preoperative	ECIPS-postoperative	GCQ-preoperative	GCQ-postoperative	SFQ	VAS-preoperative	VAS-postoperative
ECIPS-preoperative	r[a]	1						
	p							
ECIPS-postoperative	r[a]	0.462	1					
	p	<.001						
GCQ-preoperative	r[a]	−0.202	−0.246	1				
	p	.006	.002					
GCQ-postoperative	r[a]	−0.165	−0.437	0.512	1			
	p	.041	<.001	<.001				
SFQ	r[a]	0.428	0.372	−0.415	−0.196	1		
	p	<.001	<.001	<.001	.015			
VAS-preoperative	r[a]	0.422	0.209	−0.138	−0.101	0.221	1	
	p	<.001	.009	.064	.212	.003		
VAS-postoperative	r[a]	0.170	0.466	−0.204	−0.387	0.305	0.228	1
	p	.035	<.001	.011	<.001	<.001	<.001	

[a] Pearson correlation.

determined as 3.61 ± 1.86 by İbrahimoglu et al. (2023), 3.37 ± 2.05 by Disceken and Kose (2021), 3.68 ± 1.37 by Tosun et al. (2022), 3.7 ± 2.3 by Şen and Kurtoğlu (2022), and 4.01 ± 1.75 by Yurddas and Seyhan Ak (2022). Considering these studies, our results are similar to those reported for postoperative pain levels.

According to the participants' VAS results, it is observed that they experienced pain both before and after the surgery; however, it is important to identify cognitive intrusions in individuals experiencing pain. Further analysis revealed low-level intrusive thoughts related to pain preoperatively persisted after surgery in this study. The cognitive intrusion of pain appears to increase with perioperative pain; however, it appears there is a paucity of published evidence to support this statement (Sanchez-Gomez et al., 2021; Wong et al., 2019). Healthy people also have illness-related intrusive thoughts, although they are more common in people with anxiety disorder (Arnáez et al., 2021). Cognitive intrusion has been shown to be involved in different disease processes. Our study was the first to show that intrusion occurs in patients experiencing pain in the perioperative period. In our study, the mean preoperative SFQ score was 22.76 ± 20.25. In other studies, SFQ mean score was determined as 33.89 ± 24.04 by Mete and Avci Isik (2020), 37.7 ± 18.01 by Kapıkıran and Bulbuloglu (2024), 46.8 ± 23.4 by Demir and Yilmaz (2022), and 67.91 ± 8.95 by Tasdemir et al. (2022). Various studies have shown low to high levels of fear before surgery (Çınar & Bülbüloğlu, 2022; Soydaş et al., 2023). In the literature, it is observed that each study evaluates surgical fear in a different type of surgery. In our study, the assessment of surgical fear across multiple surgical types complicates direct comparisons. Nevertheless, despite the inclusion of various procedures in our study, a lower incidence of surgical fear was noted compared to other studies. With that being the case and our study demonstrating lesser fear of surgery, nurses should assess for fear of surgery, acknowledge those fears and identify alleviating factors to reduce the fear. The utilization of the nursing process with this element of the surgical experience may lead to further compliance postoperatively (Akutay & Ceyhan, 2023).

It is important to know the concepts associated with fear before planning interventions to reduce fear. Therefore, this study has focused on the relationship between fear and cognitive intrusion. Our study showed that preoperative cognitive intrusion of pain was positively correlated with fear of surgery. Rumination and catastrophizing, which are part of cognitive intrusion, are among the inappropriate cognitive emotion regulation strategies (Nolen-Hoeksema et al., 2008). It is also supported by our study that individuals who cannot regulate their fear can resort to cognitive intrusion. Lu et al. (2021) found that practices including cognitive belief training reduced movement phobia associated with fear. It can be stated that in addition to pain management strategies, efforts to reduce cognitive intrusion are effective in reducing the negative processes associated with the surgical procedure (Parrish et al., 2021; Talaei-Khoei et al., 2017).

Our study demonstrated a perioperative comfort level above the moderate level. A study by Tosun et al. (2022) found a comfort level of 2.84 ± 0.23, which is lower than the value found in our study. Another study reported a moderate level of comfort in patients (Kubat Bakır & Yurt, 2020). It is believed that the different comfort levels indicated in the studies are due to the varying

Table 4
Comparison of the Sociodemographic Characteristics and SFQ, ECIPS, and GCQ Scores

	ECIPS-Preoperative Mean ± SD	ECIPS-Postoperative Mean ± SD	GCQ-Preoperative Mean ± SD	GCQ-Postoperative Mean ± SD	SFQ Mean ± SD
Gender					
Female	24.64 ± 19.08	25.05 ± 18.31	2.93 ± 0.34	3.01 ± 0.31	31.02 ± 20.90
Male	15.32 ± 16.59	16.15 ± 15.83	2.97 ± 0.33	3.01 ± 0.33	17.75 ± 18.18
p	**.001***	**.003***	.756	.797	**<.001***
Z	**−3.478**	**−2.978**	0.311	0.257	**−4.436**
Educational status					
Illiterate	30.00 ± 26.38	17.85 ± 23.01	2.89 ± 0.44	3.09 ± 0.44	21.33 ± 22.56
Primary school	20.14 ± 18.66	21.24 ± 17.25	2.95 ± 0.30	2.99 ± 0.30	24.32 ± 20.02
High school	15.16 ± 13.41	15.56 ± 16.92	2.96 ± 0.39	3.02 ± 0.40	20.19 ± 21.12
University and above	15.36 ± 17.03	17.09 ± 15.79	2.99 ± 0.34	3.07 ± 0,28	20.83 ± 19.85
p	.385	.243	.881	.373	.516
KWX^2	3.041	4.176		3.121	2.280
F			0.222		
Marital status					
Married	19.26 ± 18.01	19.55 ± 17.29	2.96 ± 0.30	3.01 ± 0.31	23.50 ± 20.61
Single	17.45 ± 18.54	18.78 ± 17.38	2.94 ± 0.41	3.01 ± 0.37	20.33 ± 19.04
p	.473	.789	.972	.637	.433
Z	−0.717		−0.036	−0.390	−0.784
t		0.269			
Status of living alone					
Lives alone	17.83 ± 19.54	19.14 ± 14.31	3.05 ± 0.40	3.02 ± 0.34	19.83 ± 18.69
Does not live alone	18.95 ± 17.99	19.41 ± 17.57	2.95 ± 0.32	3.01 ± 0.32	23.09 ± 20.44
p	.744	.769	.244	.940	.611
Z	−0.326	−0.293		−0.075	−0.509
t			1.169		
Working status					
Working	19.06 ± 17.58	14.89 ± 13.49	3.01 ± 0.32	3.08 ± 0.32	19.72 ± 19.04
Not working	18.69 ± 18.53	22.10 ± 18.73	2.92 ± 0.33	2.97 ± 0.32	24.84 ± 20.86
p	.755	**.028***	.087	**.020***	.114
Z	−0.312	**−2.201**		**−2.326**	−1.580
t			1.723		
Presence of chronic disease					
Yes	21.51 ± 18.47	24.96 ± 17.77	2.91 ± 0.27	3.03 ± 0.31	27.50 ± 20.00
No	17.63 ± 17.87	16.71 ± 16.43	2.98 ± 0.35	3.00 ± 0.33	20.62 ± 20.07
p	.116	**.004***	.183	.653	**.015***
Z	−1.570	**−2.845**			**−2.444**
t			−1.217	0.451	
Previous surgery					
No	22.09 ± 19.38	20.34 ± 17.37	2.99 ± 0.33	2.97 ± 0.35	25.44 ± 21.99
Yes	16.18 ± 16.60	18.53 ± 17.21	2.93 ± 0.33	3.05 ± 0.30	20.57 ± 18.53
p	.057	.518	.204	.170	.174
Z	−1.902	−0.646			−1.361
t			1.274	−1.378	
Receiving any education about coping with pain					
No	18.75 ± 18.10	19.58 ± 17.10	2.95 ± 0.33	3.00 ± 0.32	23.12 ± 20.42
Yes	20.75 ± 19.17	15.28 ± 21.42	3.17 ± 0.32	3.19 ± 0.38	15.00 ± 15.19
p	.810	.296	.074	.143	.332
Z	−0.241	−1.045		−1.276	−0.970
t			−1.797		
Anesthesia type					
General anesthesia	19.25 ± 18.18	17.00 ± 16.29	2.98 ± 0.32	3.02 ± 0.30	24.89 ± 20.61
Spinal anesthesia	19.97 ± 18.62	21.77 ± 17.96	2.96 ± 0.33	3.00 ± 0.34	19.88 ± 19.65
p	.740	.073	.704	.563	.121
Z	−0.332	−1.795		−0.578	−1.553
t			0.381		

SD = standard deviation; Z = Mann-Whitney U test; *t* = Student *t* test; KWX^2 = Kruskal-Wallis chi-square test; F = one-way ANOVA test.
* In bold statistical significance <0.05.

types of surgeries. Our study showed that the patients had sufficient comfort and their comfort did not change after the surgery. Studies in the literature have shown that the postoperative comfort levels of patients are increased with some interventions (Demir & Saritas, 2020; Kızıl Toğaç & Yılmaz, 2021; Uyar Çavdar et al., 2020).

Our study showed that perioperative pain increased cognitive intrusion and decreased comfort. According to the comfort theory, a feeling of relief and relaxation occurs with the satisfaction of needs (Taşkın Duman et al., 2020). People with cognitive intrusion cannot experience a sense of relief and may experience restlessness and anger (Scott et al., 2018). There is no study examining the cognitive intrusion of pain and comfort in surgical patients. Therefore, the result of our study that perioperative cognitive intrusion will reduce patient comfort contributes to the literature.

Similar studies should be planned in which our study results can be compared.

Limitations

The limitation of this study is its single-center design. Therefore, the results of the study cannot be generalized to patients undergoing all surgical procedures. The presence of patients undergoing different types of surgeries in the studies discussed and the first-time evaluation of the cognitive intrusion of pain in surgical patients have led to limitations in discussing the findings of our study. Conducting studies that evaluate the perioperative impact of the cognitive intrusion of pain only in specific surgical and/or anesthesia types is recommended.

Conclusion

Patients experiencing pain pre- and postoperatively should be treated with both pharmacological and nonpharmacological means; however, the cognitive intrusion of pain needs to be assessed as well as pain levels. Therefore, the aim should be to reduce or prevent the cognitive intrusion of pain. In the literature, there is no study evaluating the perioperative cognitive intrusion of patients' pain. The result of our study is new in the literature. In our study, no significant difference was observed between the cognitive intrusion of pain before and after surgery. Moreover, an increase in cognitive intrusion of pain is associated with a decrease in patient comfort and an increase in surgical fear. This shows the importance of evaluating the pain not only as a numerical value. With the addition of cognitive methods to the standard management of pain, it is predicted that perioperative patient comfort will increase, and preoperative fear of individuals will decrease. Further studies are needed on the subject. In future studies, it is recommended to consider the effect of cognitive intrusion in the management of pain and the concepts associated with cognitive intrusion in the perioperative period.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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