



# Factors Affecting COVID-19-Related Fear and Burnout in Surgical Nurses

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## Abstract

**Background** Surgical nurses face the risk of psychological problems while trying to cope with the challenges arising from the COVID-19 pandemic.

**Aim** This study aimed to determine levels of COVID-19-related fear and burnout and affecting factors in surgical nurses.

**Design** The study has a descriptive, cross-sectional design.

**Methods** The study sample included 321 nurses working in surgical units and operation rooms in Turkey. Data were gathered with a sociodemographic and occupational characteristics form, the Fear of COVID-19 Scale and the COVID-19 Burnout Scale through a Google form between 1 August and 15 October in 2021. Obtained data were analyzed with independent groups t-test, One-Way ANOVA and simple and multiple linear regression analyses.

**Results** The nurses had moderate levels of fear ( $20.00 \pm 6.77$ ; Min–Max: 7–35) and burnout ( $29.52 \pm 10.03$ ; Min–Max: 10–50) due to COVID-19. The female gender and belief in health staff shortage were predictive of fear and burnout related to COVID-19. Age was not predictive of COVID-19 fear and receiving education about COVID-19, exposure to violence, having adequate supplies of goggles/face shields and having a limited number of aprons/work wear were not predictive of COVID-19-related burnout. Fear of COVID-19 was predictive of COVID-19 burnout.

**Conclusions** Female nurses and nurses believing in health staff shortage had higher levels of fear and burnout due to COVID-19. As COVID-19 fear increased, so did COVID-19 burnout. Nurses working in surgical units should be provided with education about coping strategies taking account of the factors affecting COVID-19-related fear and burnout.

**Keywords** Burnout · COVID-19 · Fear · Psychological impact · Surgical nursing

## Introduction

Coronavirus disease (COVID-19) affecting the world since 31 December 2019 infected 17,004,677 people and caused 101,419 deaths worldwide until February 2023 [1]. COVID-19 has affected lives of health professionals in several ways. Meta-analysis about the issue has shown that being a nurse is a risk factor of COVID-19 [2].

As COVID-19 cases have increased, so has the likelihood of disease spread in patients undergoing surgery. If patients present to hospital for surgery during the incubation of the virus, the infection risk in staff in surgical units can

increase [3]. Therefore, nurses in surgical units might have been exposed to many physical injuries and psychological stress during COVID-19 pandemic [4].

While surgical nurses try to cope with difficulties resulting from the pandemic, they face the risk of psychological problems [4–7]. There have been studies on psychological status of surgical nurses [4–10].

In the studies conducted, it was determined that surgical nurses had problems such as psychological problems such as anxiety, depression, stress, communication difficulties within the team, workload, inadequacy of material and moral support systems, as well as physical and social problems during the pandemic. [4, 6, 8, 9]. Fereidouni et al. [7] reported a significant relation between job satisfaction and adherence to preventive guides during COVID-19 pandemic in operating room nurses [7]. To our knowledge, there have been two studies to determine COVID-19 fear levels in surgical nurses [5, 10]. Çelik and Dağlı [10] found out that surgical staff and nurses had moderate level of COVID-19 fear, which had a positive relation with anxiety

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and stress [10]. Ünver and Yenigün [5] also determined moderate level of COVID-19 fear in surgical nurses [5]. In the same study, also noted that nurses receiving no education about COVID-19, losing patients due to COVID-19, having longer work experience and having advanced ages had higher levels of COVID-19 fear [5]. It has been shown in the literature that nurses have experienced psychological problems like anxiety, depression, burnout, fear and stress during the pandemic [2, 11–13]. Some studies from China, Turkey, Jordan, Brazil, Spain and Italy revealed high levels of COVID-19 fear in health professionals [13–16]. One study from Turkey [17] and one from Saudi Arabia [18] showed moderate level of COVID-19 fear in nurses.

Several studies have focused on burnout in nurses and other health professionals up to now [14, 16, 19–24]. Algunmeeyn et al. [20] reported that the primary factor of burnout is work stress [20]. Yörük and Gürler [22] stated that emotional overload was the main factor of burnout during COVID-19 pandemic in nurses in Turkey [22]. Another study showed high levels of burnout in nurses [23]. Few studies have aimed to examine the relation between fear and burnout in health professionals [14, 16, 25]. Two studies have shown a positive relation between COVID-19 fear and burnout in health professionals [14, 16]. There have not been any studies on factors affecting COVID-19-related fear and burnout in surgical nurses. It is stated in the literature that psychological status of surgical nurses during the pandemic can affect perioperative care [9]. Therefore, the present study focused on COVID-19-related fear and burnout levels and affecting factors in surgical nurses. The study sought answers to the following questions:

1. What is the COVID-19 fear level of surgical nurses?
2. What are the factors predictive of the COVID-19 fear of surgical nurses?
3. What is the COVID-19 burnout level of surgical nurses?
4. What are the factors predictive of the COVID-19 burnout of surgical nurses?
5. Is the COVID-19 fear of surgical nurses predictive of their COVID-19 burnout?

## Materials and methods

### The study design

The study has a descriptive and cross-sectional design.

### Setting and participants

The study population comprised of 1720 nurses as members of Turkish Surgical and Operating Room Nurses Association

(TSORNA). Convenience sampling was used in this study. The study sample included 321 nurses working in surgical units (general surgery, orthopedics and neurosurgery etc.) and operating rooms between 1 August and 15 October in 2021 and meeting inclusion criteria for the study.

Inclusion criteria were:

- Volunteering to participate in the study
- Aged 18 years or older

Exclusion criteria were:

- Incomplete data in data collection tools
- Have not psychiatric illness or treatment

### Data collection

Data collection was performed through a Google form due to COVID-19 pandemic between 1 August and 15 October in 2021. The nurses were informed about the study and the fact that obtained data would be kept confidential on the first page of the form. Those who accepted to participate in the study marked the option “I agree to participate in the study” and then continued to fill in the data collection tools. Completing data collection forms is average 15 minutes takes.

### Measurements

Data were gathered with a sociodemographic and occupational characteristics form, a COVID-19-related characteristics form, the Fear of COVID-19 Scale (FCV-19S) and the COVID-19 Burnout Scale (COVID-19-BS).

### Sociodemographic and occupational characteristics form

The sociodemographic and occupational characteristics form was prepared by the researchers in light of the literature [5, 12, 21]. The form was composed of 12 questions about sociodemographic characteristics -age, gender, marital status, having children and education- and occupational characteristics – the unit where the nurses worked, weekly working hours and duration of work experience and surgical nursing experience.

### COVID-19-related characteristics form

The COVID-19-related characteristics form is composed of 13 questions about COVID-19 like pregnancy during the pandemic, giving care to patients diagnosed as COVID-19, exposure to violence during the pandemic and opinions about adequacy of equipment protective against COVID-19.

## The fear of COVID-19 scale

The FCV-19S was developed by Ahorsu et al. in 2020 to determine the level of fear due to COVID-19 [26]. The internal consistency coefficient, test-retest reliability coefficient and Cronbach's alpha for the original scale were 0.82, 0.72 and 0.82 respectively. The factor loads of the scale items ranged from 0.66 to 0.74 and item total correlation coefficients ranged from 0.47 to 0.56. The scale had seven items and a one-factor structure. It is a five-point Likert scale (1= completely disagree and 5=completely agree). The lowest and highest scores for the scale can be 7 and 35 respectively. As the score on the scale rises, so does the level of COVID-19 fear. The FCV-19S was found to have a positive relation with perceived vulnerability, hospital anxiety and depression [26].

The validity and reliability of the FCV-19S for the Turkish population were tested by Satici et al. by using linguistic validity, content validity and factor analyses [27]. The factor loads of the scale were found to be between 0.48 and 0.72 and the scale was reported to be valid and reliable based on Cronbach's alpha of 0.84. In the present study, Cronbach's alpha for the scale was found to be 0.90.

## The COVID-19 burnout scale

The COVID-19-BS was adapted from the short version of the Burnout Measure [28]. The internal consistency coefficient, test-retest reliability coefficient and Cronbach's alpha for the COVID-19-BS were reported to be 0.82, 0.72 and 0.82 respectively. Factor loads of the items in the scale ranged from 0.66 to 0.74 and item-total correlations ranged from 0.47 to 0.56.

The COVID-19-BS was adapted into Turkish by Yildirim and Solmaz in 2020. It is a 10-item, five-point Likert scale (one=never and five=always) and has a one-factor structure [29]. The lowest and highest scores for the scale are 10 and 50 respectively. High scores show increased burnout. The validity of the COVID-19-BS was tested by using linguistic validity and construct validity. Factor loads of the items in the scale were reported to range from 0.58 to 0.88. Kaiser-Meyer-Olkin (KMO) and Bartlett's Sphericity tests showed that obtained data were suitable for factor analysis (KMO = 0.93; Bartlett's Sphericity,  $\chi^2$  [df = 45] = 1283.29;  $p < 0.001$ ). Cronbach's alpha for the scale was reported to be 0.92. In the present study, Cronbach's alpha for the scale was found to be 0.95.

## Sample size

The sample size was calculated by using G\* Power 3.1.9.7. [30]. The study required a minimum sample size of 298

participants and was calculated with a t test based on a probability of  $\alpha = 0.05$ , effect size of 0.326, and a power level of  $1 - \beta = 0.8$  [5]. This study finally included 321 nurses, which met the required sample size.

## Data analysis

Data were analyzed with the Statistical Package Program for Social Sciences 21.0. General characteristics of the nurses were analyzed and expressed in numbers and percentages. Normality of the data was tested with Kurtosis and Skewness. Before the analysis, missing data, extreme value, autocorrelation and multicollinearity between independent variables were examined for data editing. As a result, there were no missing data and extreme values, and the correlation between the independent variables varied between 0 and 0.68. Since the data had a normal distribution, statistical analyses were made with parametric tests [31]. Independent groups t-test was used to compare the mean scores on the scales between two groups and One-way ANOVA was used to compare the mean scores between more than two groups. The effect of the COVID-19 fear on COVID-9 burnout was evaluated with simple linear regression analysis. The variables affecting COVID-19 fear and COVID-19 burnout were evaluated with multiple linear regression analysis.  $p < 0.05$  was considered significant for all the statistical tests [31].

## Results

The mean age of the nurses was  $35.00 \pm 9.06$  years (min-max: 21-60 years). The mean duration of work experience was  $14.20 \pm 9.221$  years (min-max: 1-36 years). The mean duration of surgical nursing experience was  $10.30 \pm 7.842$  years (min-max: 1-36 years). Of all the nurses participating in the study, 88.5% ( $n = 284$ ) were female, 38.3% ( $n = 123$ ) were aged 21-30 years and 59.2% ( $n = 190$ ) were living with their spouses and/or children. Besides, 57.3% ( $n = 184$ ) were married and 54.8% ( $n = 176$ ) had children. Regarding educational status, 64.5% ( $n = 207$ ) had a bachelor of nursing. Concerning work-related features, 53.6% ( $n = 172$ ) were working in state hospitals, 46.4% ( $n = 149$ ) were working in operating rooms, 71% ( $n = 228$ ) were working in both day and night shifts and 55.8% ( $n = 179$ ) were working for 40-48 h a week (Table 1).

During the pandemic, 2.5% of the nurses ( $n = 8$ ) were pregnant and 26.8% of the nurses ( $n = 86$ ) lived away from their family. With respect to COVID-19-related features of the nurses, 83.5% ( $n = 268$ ) had education about COVID-19, 58.60% of the nurses ( $n = 188$ ) provided intermittently care to patients with COVID-19, 12.1% ( $n = 39$ ) provided continuously care to patients with COVID-19, 47.4% ( $n = 152$ ) had patients dying from COVID-19, 31.5% ( $n = 101$ ) were

**Table 1** Sociodemographic and Occupational Features of the Nurses (n = 321)

	$\bar{X} \pm SD$ (Min–Max)
Age (years)	35.00 ± 9.06 (21–60)
Duration of nursing experience	14.20 ± 9.221 (1–36 years)
Duration of surgical nursing experience	10.30 ± 7.842 (1–36 years)
	<b>n (%)</b>
<b>Age groups</b>	
21–30 years	123 (38.30)
31–40 years	87 (27.10)
41 years and older	111 (34.60)
<b>Gender</b>	
Female	284 (88.50)
Male	37 (11.50)
<b>Marital status</b>	
Married	184 (57.30)
Not Married	137 (42.70)
<b>Educational level</b>	
Associate Degree	52 (16.20)
Bachelor's Degree	207 (64.50)
Postgraduate	62 (19.30)
<b>Having children</b>	
Yes	176 (54.80)
No	145 (45.20)
<b>People living with</b>	
Partner and/or children	190 (59.20)
Extended family	68 (21.20)
Friends	63 (19.60)
<b>Institution</b>	
Private Hospital	43 (13.40)
State Hospital	172 (53.60)
University Hospital	106 (33.00)
<b>Work Unit</b>	
Surgery Outpatient Clinic	11 (3.40)
Surgery Clinic	125 (38.90)
Surgical Intensive Care	36 (11.20)
Operating Room	149 (46.40)
<b>Work Shift</b>	
Night Shift	12 (3.70)
Day Shift	81 (25.20)
Night and Day Shift (both)	228 (71.00)
<b>Weekly working time</b>	
40- 48 Hours	179 (55.80)
More than 48 Hours	142 (44.20)
Total	321 (100)

$\bar{X} \pm SD$  = Mean ± Standard Deviation

diagnosed as COVID-19, 38% (n = 122) had a family member who experienced COVID-19 and 45,8% (n = 147) were exposed to violence during the pandemic. Of all the nurses,

3.1% (n = 10), 3.4% (n = 11), 5.6% (n = 18) and 4.4% (n = 14) reported inadequate supplies of masks, gloves, goggles/face shields and aprons/work wear respectively. Besides, 18.7% of the nurses (n = 60) reported healthcare staff shortages (Table 2).

The mean score on the FCV-19S was  $20.00 \pm 6.77$  (Min–Max: 7–35) and the mean score on the COVID-19-BS was  $29.52 \pm 10.03$  (Min–Max:10–50). There was a significant moderate positive relation between them ( $r_p = 0.585$ ,  $p < 0.001$ ).

The mean scores on the FCV-19S significantly differed in terms of gender ( $t = 2.264$ ,  $p = 0.024$ ), age ( $F = 3.186$ ;  $p = 0.043$ ) and adequacy of the number of healthcare workers ( $F = 3.231$ ;  $p = 0.023$ ). (Fig. 1). The mean scores on the FCV-19S were not significantly different with respect to marital status, having children, educational level, people living with, institution, working unit, work shift, weekly working time, duration of nursing experience, duration of surgical nursing experience, being pregnant in the COVID pandemic, living apart from people who normally live together in the COVID pandemic, caring for a patient with COVID-19, COVID-19 education receiving status, lost patient because of COVID-19, diagnosed with COVID-19, had a relative diagnosed with COVID-19, exposure to violence, adequacy of masks, adequacy of gloves, adequacy of goggles or face shields, adequacy of aprons/work wear ( $p > 0.05$ ). Besides, the mean scores on the COVID-19-BS were significantly different with respect to gender, COVID-19 education receiving status, exposure to violence, adequacy of the supplies of goggles/face shields and aprons/work wear and adequacy of the number of healthcare workers ( $p < 0.05$ ) (Fig. 1). The mean scores on the COVID-19-BS were not significantly different with respect to age, marital status, having children, educational level, people living with, institution, working unit, work shift, weekly working time, duration of nursing experience, duration of surgical nursing experience, being pregnant in the COVID pandemic, living apart from people who normally live together in the COVID pandemic, caring for a patient with COVID-19, lost patient because of COVID-19, diagnosed with COVID-19, had a relative diagnosed with COVID-19, adequacy of masks, adequacy of gloves ( $p < 0.05$ ).

Multiple linear regression analysis was performed to determine whether age, gender and adequacy of the number of healthcare workers were predictive of COVID-19 fear. The regression model was found to be significant [ $F(6,314) = 3.286$ ,  $p = 0.007$ ] and gender and the adequacy of the number of healthcare workers significantly predicted of COVID-19 fear ( $p < 0.05$ ). Age, gender and adequacy of the number of healthcare workers explained 6.6% of the variance in the score of the FCV-19S ( $R^2 = 0.066$ ). The mean COVID-19 fear score was 2.208 points higher in the female nurses

**Table 2** COVID-19-Related Characteristics of the Nurses (n= 321)

	n (%)
<b>Being pregnant in the COVID pandemic</b>	
Yes	8 (2.50)
No	313 (97.50)
<b>Living apart from people who normally live together in the COVID pandemic</b>	
Yes	86 (26.80)
No	235 (73.20)
<b>Caring for a patient with COVID-19</b>	
Continuously	39 (12.10)
Intermittently	188 (58.60)
No	94 (29.3)
<b>COVID-19 education receiving status</b>	
Yes	268 (83.50)
No	53 (16.50)
<b>Lost patient because of COVID-19</b>	
Yes	152 (47.40)
No	169 (52.60)
<b>Diagnosed with COVID-19</b>	
Yes	101 (31.50)
No	220 (68.50)
<b>Had a relative diagnosed with COVID-19</b>	
Yes	122 (38.00)
No	199 (62.00)
<b>Exposure to violence</b>	
Yes	147 (45.80)
No	174 (54.20)
<b>Number of masks</b>	
Very Inadequate	10 (3.10)
Inadequate	37 (11.50)
Moderate	115 (35.80)
Sufficient	159 (49.50)
<b>Number of gloves</b>	
Very Inadequate	11 (3.40)
Inadequate	30 (9.30)
Moderate	76 (23.70)
Sufficient	204 (63.60)
<b>Number of goggles/face shields</b>	
Very Inadequate	18 (5.60)
Inadequate	62 (19.30)
Moderate	98 (30.50)
Sufficient	144 (44.50)
<b>Number of aprons/work wear</b>	
Very Inadequate	14 (4.40)
Inadequate	49 (15.30)
Moderate	90 (28.00)
Sufficient	168(52.30)
<b>Number of healthcare workers</b>	
Very Inadequate	60 (18.70)
Inadequate	116 (36.10)
Moderate	96 (29.90)

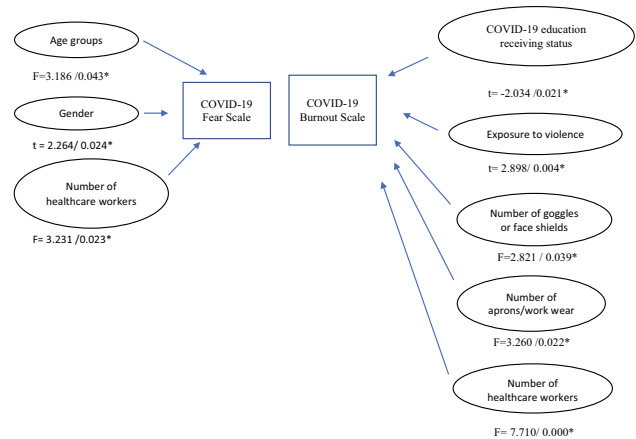
**Table 2** (continued)

	n (%)
Sufficient	49 (15.30)
<b>Total</b>	<b>321 (100)</b>

than in the male nurses and 2.890 points higher in the nurses considering the number of healthcare workers as inadequate than in those considering it adequate. However, age was not predictive of COVID-19 fear ( $p > 0.05$ ) (Table 3).

Multiple linear regression analysis was also utilized to determine whether gender, COVID-19 education receiving status, exposure to violence, adequacy of goggles/face shields supplies, adequacy of aprons/work wear and adequacy of the number of healthcare workers were predictive of COVID-19-related burnout. The regression model was found to be significant [ $F(12.308) = 3.422; p < 0.001$ ]. Gender and adequacy of the number of healthcare workers significantly predicted COVID-19-related burnout ( $p < 0.05$ ) and accounted for 11.8% of the variance in the score on the COVID-19-BS ( $R^2 = 0.118$ ). The mean score on COVID-19 burnout was 5.089 points higher in the female nurses and 4.271 points higher in the nurses considering the number of healthcare workers insufficient. However, COVID-19 education receiving status, exposure to violence, adequacy of the supplies of goggles/face shields and adequacy of the supplies of aprons/work wear were not predictive of COVID-19 burnout ( $p > 0.05$ ) (Table 4).

Simple linear regression analysis revealed that the COVID-19 fear was statistically significantly predictive of COVID-19 burnout [ $F(1,319) = 166.206; p < 0.001$ ]. The score on the FCV-19S was responsible for 34.3% of the variance in the score on the COVID-19-BS ( $R^2 = 0.343$ ).



**Fig. 1** Differences in the mean scores on the FCV-19S and the COVID-19-BS in Terms of sociodemographic and COVID-19-related characteristics \* $p < 0.05$ ,  $t$ =independent groups  $t$ -test,  $F$ =One-way variance analysis



**Table 3** Factors Affecting COVID-19 Fear

Independent variables	Unstandardized coefficients		Standardized coefficients $\beta$	t	p	95,0% CI	
	B	SE				Lower Bound	Upper Bound
<b>Constant</b>	16.050	1.439		11.156	p < 0,001	13.220	18.881
<b>Age (R = 21–30)</b>							
31–40	-1.207	0.949	-0.079	-1.272	0.204	-3.076	0.661
41 years old or older	1.326	0.896	0.093	1.479	0.140	-0.438	3.090
<b>Sex (R = Male)</b>							
Female	2.208	1.185	0.123	2.001	0.028*	0.276	4.940
<b>Number of health workers (R: Sufficient)</b>							
Very Inadequate	2.890	1.294	0.166	2.233	0.026*	0.343	5.437
Insufficient	2.443	1.138	0.173	2.147	0.033*	0.204	4.682
Moderate	0.315	1.166	0.021	0.270	0.787	-1.980	2.609

Dependent variable: COVID-19 Fear Scale Score

Durbin-Watson = 1.917; F = 3.723, p = 0,001; R = 0.258; R<sup>2</sup> = 0.066; Adjusted R<sup>2</sup> = 0.049; \* = p < 0.05

CI confidence interval, SE standard error,  $\beta$  standardized regression coefficient, B unstandardized coefficients

A one-point increase in the score on the FCV-19S caused 0,867-point increase in the score on the COVID-19-BS (95% CI, 0,734 to 0,999) (Table 5).

## Discussion

### COVID-19 fear levels in the nurses

In the present study, the surgical nurses were found to have a moderate level of COVID-19 fear. There is conflicting evidence in the literature about the severity of COVID-19 fear in nurses [5, 10, 11, 13–18]. While some studies have shown a moderate level of COVID-19 fear in nurses [17, 18], which is consistent with the finding from the present study, others have shown a high level of fear [14–16]. One study including nurses from four countries -Turkey, Brazil, Spain and Italy- showed more than a moderate level of COVID-19-related fear [13]. The surgical nurses' moderate level of fear in the current study despite priority given to health professionals during vaccination against COVID-19 can be explained by emergence of different variants of COVID-19. It may also be related to the fact that nurses are not sure about the protective effects of the vaccine, and therefore they are worried that they may become infected. Psychological status of surgical nurses, who have important roles in surgical procedures, should not be disregarded. Several meta-analyses have revealed negative effects of COVID-19 fear on humans [32, 33]. Therefore, it is necessary to know factors affecting the level of COVID-19 fear and take appropriate precautions in order to decrease this fear.

### Factors affecting COVID-19 fear of the nurses

In the present study, the mean COVID-19 fear score of the female nurses was 2.208 points higher. The evidence from the studies on COVID-19 fear in genders is contradictory to each other. Although some studies [12, 13, 16–18, 34] have shown that nurses had high COVID-19 fear scores, which is congruent with the present study, other studies [5, 10] have revealed either no difference in the COVID-19 scores between genders or higher fear scores in male nurses [15]. Higher COVID-19 fear scores of the female nurses in the present study can be explained by fulfillment of more familial responsibilities by women in Turkish culture and negative effects of the diagnosis of COVID-19 in female nurses on these responsibilities like childcare and household chores. This result may also be related to women's better expression of their emotions. In addition, the differences in the characteristics of the society in which the nurses live may also affect. In Turkish culture, it is a common feature in patriarchal society that men stand strong and do not show their fears.

Working environment is the primary factor that affects psychological health of healthcare professionals [35]. In the present study, the nurses reporting that the number of health professionals was inadequate or extremely inadequate were found to have a higher level of COVID-19 fear. It has been noted in the literature that healthcare staff shortages increase workload of nurses [9]. Yakut et al. demonstrated that increased workload of healthcare professionals worsened the severity of COVID-19 fear [25]. Nurses and other health professionals who work in surgical

**Table 4** Factors Affecting COVID-19 Burnout

Independent variables	Unstandardized coefficients		Standardized coefficients $\beta$	t	p	95,0% CI	
	B	SE				Lower Bound	Upper Bound
<b>Constant</b>	21.638	2.082		10.392	p<0,001*	17.540	25.735
<b>Sex (R = Male)</b>							
Female	5.089	1.702	0.162	2.978	0.003*	1.726	8.453
<b>COVID-19 education receiving status (R = Yes)</b>							
No	1.066	1.519	0.039	0.702	0.483	-1.923	4.055
<b>Being exposed to violence (R = No)</b>							
Yes	1.785	1.165	0.089	1.533	0.126	-0.507	4.077
<b>Number of glasses/face shield (R = Sufficient)</b>							
Very Inadequate	-0.987	3.711	-0.023	-0.266	0.791	-8.289	6.315
Insufficient	1.446	1.963	0.057	0.736	0.462	-2.417	5.308
Moderate	2.204	1.613	0.101	1.366	0.173	-0.70	5.379
<b>Number of aprons/work wear (R = Sufficient)</b>							
Very inadequate	4.577	3.975	0.093	1.151	0.250	-3.245	12.400
Insufficient	1.047	2.115	0.038	0.495	0.621	-3.114	5.208
Moderate	-1.554	1.653	0.070	-0.940	0.348	-4.807	1.698
<b>Number of health workers (R: Sufficient)</b>							
Very Inadequate	4.271	2.131	0.166	2.004	0.046*	0.078	8.465
Insufficient	2.980	1.774	0.143	1.679	0.094	-0.511	6.471
Moderate	-1.013	1.766	-0.046	-0.574	0.566	-4.488	2.461

Dependent variable: COVID-19 Burnout Scale Score,

Durbin-Watson = 1.810; F = 3.422, p < 0,001; R = 0.343; R<sup>2</sup> = 0.118; Adjusted R<sup>2</sup> = 0.083; \* = p < 0.05

CI confidence interval, SE standard error,  $\beta$  standardized regression coefficient, B unstandardized coefficients

units in Turkey had to work in pandemic clinics [36]. The resultant decrease in the number of nurses and other healthcare staff in surgical units might have increased the COVID-19 fear.

The evidence about the effect of age on the fear of COVID-19 in the literature is conflicting. Although several studies [17, 34] have shown no effect of age of nurses, which

is compatible with the finding of the present study, other studies [5, 15, 18] have revealed that nurses in advanced ages have high levels of COVID-19 fear. The lack of an effect of age in the present study can be attributed to the fact that more than half of the study sample was younger than 40 years and that the rate of the people vaccinated against COVID-19 throughout the country was high.

**Table 5** Impact of Nurses' COVID-19 Fear on COVID-19 Burnout

Independent variables	Unstandardized coefficients		Standardized coefficients $\beta$	t	p	95,0% CI	
	B	SE				Lower Bound	Upper Bound
<b>Constant</b>	12.190	1.420		8.587	<0,001*	9.397	14,983
<b>COVID-19 Fear Scale</b>	0.867	0.067	0.585	12.892	<0,001*	0.734	0,999

Dependent variable: COVID-19 Burnout Scale Score

Durbin-Watson = 1.827; F = 166.206; p < 0,001; R = 0,585; R<sup>2</sup> = 0,343; Adjusted R<sup>2</sup> = 0.34; \* = p < 0.05

CI confidence interval, SE standard error,  $\beta$  standardized regression coefficient, B unstandardized coefficients

## COVID-19 burnout levels in the nurses

A qualitative study by Mohammadi et al. [37] revealed psychological problems like burnout, anxiety and depression in operating room staff during COVID-19 pandemic [37]. Hu et al. [14] showed in their study in China that nurses had a moderate level of COVID-19 burnout which is compatible with evidence from the present study [14]. However, several studies performed in Belgium and Turkey demonstrated high levels of COVID-19 burnout in nurses [23, 24]. A meta-analysis also showed high levels of burnout in nurses during the pandemic [38]. Out of seven studies included in a systematic review, four showed that nurses had moderate levels of burnout and three determined that nurses had high levels of burnout [39]. It is stated in the literature that surgical nurses' experiences of burnout have negative effects on other health professionals, patients and health institutions [38]. Conflicting evidence about the severity of burnout shown in the studies can be due to conduction of the studies at different stages of the pandemic and different working conditions of nurses. This difference may also vary depending on whether nurses receive support or not. A nurse who has family responsibilities, such as those with children or who does not live alone, may experience more burnout by feeling the anxiety of transmitting the COVID-19 infection intensely.

## Factors affecting COVID-19 burnout in nurses

In the present study, the mean COVID-19 burnout score of the female nurses was 5.089 points higher than that of the male nurses. Congruent with this finding, some studies have revealed high mean scores of COVID-19 burnout in female nurses [14, 21]. However, other studies [16, 19, 24] have shown either no effect of gender on COVID-19 burnout or more severe burnout in male nurses [12, 23]. Galanis et al. [38] stated in their meta-analysis that the relation between gender and COVID-19 burnout in nurses is unclear [38]. Biological conditions like fluctuations in menstrual cycles of women have been reported to be a risk factor of depression [40]. Studies on psychological problems during COVID-19 still have revealed few psychological conditions in females [41]. Since most of the nurses are female, further studies that focus on psychological problems of surgical nurses are needed to understand their role at work.

It has been noted in the literature that workload [20, 24, 25] and excessive emotional load [22] during the pandemic are risk factors of burnout. In the present study, the nurses reporting that the size of health workers was inadequate or extremely inadequate were found to have higher burnout levels. Consistent with this finding, Baysal et al. [13] discovered that nurses working in Turkey during the pandemic and reporting high workload experienced severe

burnout [13]. In the other study noted that each additional patient a nurse must offer care to increased burnout by 23% [42]. Besides, it is stated that lack of job satisfaction and burnout in nurses have a relation with staff shortages [42, 43]. It has been reported that care for each additional patient increases the workload of a nurse and the risk of death after surgical procedures by 7% [42, 43]. It can be suggested that increasing the workforce in surgical units reduces burnout and improves motivation of nurses offering care to surgical patients [14].

In the present study, an overwhelming majority of the nurses were found to receive education about COVID-19. However, having education about COVID-19 was not predictive of COVID-19 burnout in the nurses. Unlike the finding of this study, Hu et al. [14] reported that nurses without education about care for patients with contagious diseases had higher levels of burnout [14]. The nurses included in the current study might have had adequate information and awareness about the disease since the beginning of the pandemic. This might have had an effect on their burnout levels.

Adequacy of personal protective equipment is one of the most commonly reported factors affecting coping strategies of healthcare professionals [2]. Unlike the evidence in the literature [20, 24], the present study showed that adequacy of supplies of goggles/face shields and aprons/work wear were not predictive of COVID-19 burnout. This can be attributed to the fact that nearly half of the participants were working in operating rooms. It can be suggested that the nurses had enough supplies of personal protective equipment. Operating room nurses are accustomed to working with protective equipment on a daily routine. They also has special training in aseptic techniques and hygiene [44]. This finding of our study can be explained by the sufficient number of personal protective equipment in operating rooms.

A meta-analysis by Ramzi et al. [45] revealed that the prevalence of violence against healthcare professionals during COVID-19 pandemic was 47% [45]. Several studies from Turkey also showed that a high rate of the health professionals were affected by violence before and during the pandemic [46, 47]. Consistent with the literature [45–47], the present study also showed that almost half of the nurses (45.80%) were exposed to violence. It was surprising that exposure to violence did not have an effect on COVID-19 burnout. It may be that violence against healthcare professionals has never decreased [48]. However, there have been studies showing a positive correlation between exposure to violence and burnout in nurses [45–47]. Özdamar Ünal et al. [47] reported that health professionals witnessing or exposed to violence had higher levels of emotional burnout and desensitization [47]. Frequent experiences of violence in health institutions may cause nurses to have desensitization.



## The effect of COVID-19 fear on COVID-19 burnout

In this study, fear of COVID-19 explained 34.3% of the variance in COVID-19 burnout, which is compatible with the literature [14, 16, 20, 25, 29]. As COVID-19 fear increased so did COVID-19 burnout. It can be suggested that COVID-19 fear can lead to psychological problems likely to affect nursing care like burnout.

## Limitations

Since the present study was performed in one country, its results cannot be generalized to surgical nurses working in other countries. In addition, data were collected through a Google form due to the pandemic. Therefore, nurses without an Internet connection could not be accessed. Another limitation of the study was that nearly half of the participants in the sample were operating room nurses, who have less contact with patients than those working in clinics.

## Conclusions

The results of this study show that surgical nurses have moderate both fear of COVID-19 and burnout of COVID-19. With the increase in the fear of COVID-19 among surgical nurses, there was a corresponding increase in COVID 19 burnout. In addition, COVID-19 fear is increased for women and for those considering the number of health workers as insufficient and very inadequate. These two factors also increase the COVID-19 burnout. For this reason, the evaluation of the psychological status of surgical nurses, especially female ones, is important for ensuring that psychosocial problems are given appropriate attention. It is recommended that female surgical nurses are given training in psychological support and coping methods. It is also recommended that planning should allow for a sufficient number of healthcare professionals in surgical clinics. It has been found that age does not predict fear of COVID 19. For this reason, nursing managers should consider that all surgical nurses, regardless of age, can be affected by the pandemic. Another findings of this study is that COVID-19 burnout could not be predicted by the following three factors: education about COVID-19, exposure to violence, and adequacy of goggles/face shields and aprons/work wear. In line with these results, perioperative process management can be positively influenced by clinical study planning which specifically considers the factors affecting surgical nurses' fear of COVID-19 and COVID-19 burnout.

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**Author contributions** Study conception and design: AS, ÖK, Data collection: AS, ÖK, Data analysis and interpretation: AS, ÖK, Drafting of the article: AS, ÖK, Critical revision of the article: AS, ÖK.

**Data availability** On request.

## Declarations

**Ethical considerations** Ethical approval was obtained from the ethical board of a university (approval number: B.30.2. Izmir University of Economics Health Science Faculty.O.05.05–20-132 and approval date: 10 August 2021) and the Turkish Ministry of Health (approval number: 2021-08-23T14\_50\_54). Permission was also obtained from the administration of TSORNA. In addition, a written permission was obtained from the scale owners to use the scales. Informed consent was taken from the participants.

**Conflict of interest** The authors declare no conflict of interest.

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