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Burnout, emotional labor, and psychological resilience among gastroenterology nurses during COVID-19: A cross-sectional study

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ETHICS APPROVAL

This study was approved by the Branch for Medical Research and Clinical Technology Application, the Ethics Committee of the First Affiliated Hospital of Fujian Medical University (MRCTA, ECFAH of FMU [2021]393).

CONTRIBUTIONS

Zhangjie Li was responsible for manuscript preparation. **Huayan Lin** contributed to

designing the study and supervised the research. **Huayan Lin, Zhangjie Li,** and **Mengting Yan** contributed to the review of the data and manuscript.

DATA AVAILABILITY STATEMENT

Data are available from Huayan Lin (email: fjydfykyxx@163.com) upon reasonable request.

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Abstract

Objectives: To investigate the relationship between burnout, emotional labor, and psychological resilience of gastroenterology nurses during the COVID-19 pandemic and explore the factors associated with them.

Design: A multicenter cross-sectional study with anonymous self-reporting was conducted from November 24, 2021 to December 26, 2021.

Setting: The study was conducted in Fujian Province.

Participants: Participants were 345 gastroenterology nurses of seven tertiary hospitals.

Primary and secondary outcome measures: Burnout, emotional labor, and psychological resilience were the primary outcome measures.

Measures: Using a convenience sampling method, the data were collected using Questionnaire Star (a tool for questionnaire surveys) via WeChat. The Chinese version of Maslach Burnout Inventory, the Chinese version of the Emotional Labor Scale, and the Chinese version of the Psychological Resilience Scale were used to evaluate burnout, emotional labor, and psychological resilience, respectively.

Results: The total scores of burnout, emotional labor, and psychological resilience of gastroenterology nurses were 53.07±19.63, 38.79±12.22, and 69.97±22.38, respectively, with less use of deep play and more use of superficial play. Pearson correlation analysis showed that burnout was positively correlated with both dimensions of emotional labor, surface play, and emotional expression requirements whereas it was negatively correlated with deep play. There was a negative correlation between emotional labor and all three dimensions of psychological resilience.

Conclusions: Greater adoption of deep play by nurses can be promoted by improving their psychological resilience during the pandemic, which can help to improve emotional labor, thereby reducing burnout, and decreasing turnover rates. Senior management in hospitals need to pay attention to the psychological status of nurses. Further interventional studies could be conducted in the future to explore relevant measures.

Keywords burnout; emotional labor; psychological resilience; COVID-19; cross-sectional study

Strengths and Limitations

- The study was implemented to investigate the relationship between burnout, emotional labor, and psychological resilience in gastroenterology nurses during the COVID-19 pandemic.
- This study was conducted only in one province of China using a convenience sampling method, which is not representative of other regions, departments, and other personnel in the hospital, meaning that these findings are not generalizable.
- In addition, 98.8% of the participants were female; more attention should be paid to male nurses in the future.
- As self-reported measures were considered for analysis, the reliability of the results is reduced and these should be interpreted with caution.

Introduction

Since the World Health Organization recognized the Coronavirus disease 2019 (COVID-19) pandemic as a "public health emergency of international concern",[1] more than 243 million confirmed cases and more than 4.9 million deaths have been reported worldwide, as of October 24, 2021.[2]

Annette Kennedy, president of the International Council of Nurses, showed that nurses have played an important role in maintaining people's health during the pandemic.[3] However, the shortage of nurses is a global public health issue. Falatah[4] suggested that the pandemic appeared to have significantly increased the mean nurses' turnover intention rate. By the end of 2020, the total number of registered nurses (RNs) in China exceeded 4.7 million, which translates to 3.35 RNs for every 1000 people.[5] This has not yet reached the world national average of 3.816 RNs per 1000 people.[6]

Since psychological resilience impacts nurses' willingness to leave their profession,[7] understanding the psychological conditions of nurses is crucial. As the backbone of the fight against the pandemic,[8] Chinese nurses take care of patients while undertaking various aspects of prevention and control work. They are prone to psychological adjustment imbalances because of multiple challenges and pressures. Additionally, studies have shown that their mental health is greatly affected in the process,[9] emphasizing the importance of exploring psychological resilience support for medical workers with burnout.[10] Although previous studies have explored the relationship between burnout and emotional labor, and burnout and psychological resilience,[11, 12] the association between them has not been adequately discussed in the background of the COVID-19's situation for gastroenterology nurses. Therefore, the purpose of this study was to investigate the current status of burnout, emotional labor, and psychological resilience among gastroenterology nurses during the COVID-19 pandemic, to explore their associated factors and the relationship between them, and to provide a basis for improving nurses' professional identity and job satisfaction and promoting their psychological health during the COVID-19 pandemic.

Job burnout, also known as "job fatigue," was first discussed by the American psychiatrist Freudenberger[13] in 1974. In 1981, Maslach[14] defined burnout as a syndrome of excessive physical and mental exertion, and energy depletion caused by an individual's prolonged exposure to stress, also known as burnout syndrome. An international survey in the United States shows a global trend in nurse burnout,[15] which is consistent with the findings of Aiken et al.[16] Numerous countries have high rates of burnout among nurses, such as Japan (33%–60%),[16] South Africa[17] (34.6%), and Spain[18] (21%). Moreover, the total burnout detection rate among Chinese nurses is 69.21%.[19] Additionally, numerous studies have shown that nurses are at high risk of burnout[20]; high levels of emotional exhaustion as a response to the outbreak were associated with high work intensity, tension between doctors and patients, and lack of communication with managers.[21] This seriously impacts the physical and mental health of nurses, and also reduces the quality of nursing care.[22] To illustrate, Hong Luo[11] discovered a significant correlation between emotional labor and burnout.

"Emotional labor," first proposed in 1979 by American social psychologist Hochschild,[23], refers to employees who consciously manage their emotions at work and perform external expressions and body movements that are visible to the public, including three variable performance strategies: surface play, deep play, and emotional expression requirements.[24] As an emotionally intensive group, nurses continually confront and manage the negative emotions of patients and their families.[25] Diefendorff et al.[26] found that nurses were subjected to a higher emotional load. Similar results were found in the context of China. Numerous studies have shown the presence of moderate to high level of emotional labor in nurses who work in the emergency [27] and cardiology departments.[28] Frequent and excessive use of emotional labor increased nurses' fatigue and burnout, which increased their propensity to leave their profession.[29] Therefore, it is essential to explore how emotional labor can be properly managed to reduce burnout.

Psychological resilience, also known as "mental toughness" and "bounce-back ability," was a negative predictor of burnout in the United States,[12] in line with the findings of Rushton et al.[12]

It is defined as the ability to move forward in a positive way from a negative, traumatic or stressful experience.[30] In a study supported by the American Association of Critical-Care Nurses, Mealer showed that only 22% of ICU nurses with high levels of psychological resilience[31] exhibited optimism, humor, flexibility, and high morality levels.[32] Individuals with higher psychological resilience are better able to deal with stressful situations and, thus, maintain good mental health.[33] Along with the rapid development of global healthcare, building the psychological resilience of caregivers has been listed as one of the top ten international "standard of care movements".[34]

Methods

Study design

This study used a cross-sectional design.

Research Objectives

This study aims to investigate the situation of burnout, emotional labor, and psychological resilience of nurses in the department of gastroenterology at a hospital in China during the COVID-19 pandemic; it intends to explore their related factors and the relationships among these variables such that after understanding a certain variable, the situation of the other two variables can be inferred according to the relationship between these three variables. This is helpful for hospital managers to understand the professional identity, emotion, and psychological state of nurses and promote the implementation of corresponding treatment measures.

Setting and sample

This study used a convenience sampling method to select gastroenterology nurses in Fujian Province from November 24, 2021 to December 26, 2021.

Inclusion criteria were as follows: (1) Registered and Obtained Chinese Nurse Practitioner Certificate; (2) worked in gastroenterology for ≥ 1 year; and (3) provided informed consent and voluntary participation in this study.

Exclusion criteria were as follows: (1) Those who were on leave; (2) undergoing training; or (3) unable to participate in this study for special reasons.

The sample size was calculated with reference to the sample requirement in the multiple linear regression analysis,[35] which is at least 10 times the number of independent variables. In this study, the number of independent variables was 14. Considering 10%-20% invalid questionnaires, the final sample content was determined to be 154-168 cases. A total of 458 questionnaires were collected; of these, 345 were valid (75.3% valid return rate); 113 responses were either incomplete or invalid and were, therefore, excluded.

Variables and instrument

General demographics and work-related characteristics

General demographic information and work-related characteristics were collected from 345 participants at the beginning of the survey. The information included: gender, age, marital status, number of children, academic qualifications, employment category, working years, professional title, department, directly supervise nursing interns, specialty nurses, number of days per month working at night, number of times per month responsible for epidemic prevention and control posts, and monthly income (RMB).

Chinese version of Maslach Burnout Inventory (MBI-CH)

The Maslach Burnout Inventory is the most extensively used scale.[14] The Chinese version of the Scale, translated and revised by Dr. Mei-Chi Pang in Hong Kong, was used in this study. The 22-item scale included the three dimensions of emotional exhaustion, depersonalization, and personal accomplishment. Using the Likert 7-point scale, higher scores on the emotional exhaustion and depersonalization dimensions and lower scores on the personal accomplishment dimension indicated higher burnout. The homogeneous reliability alpha=0.6260 has been tested in previous studies and has high credibility.[36]

Chinese version of the Emotional Labor Scale (ELS-CH)

In 2003, Grandey[37] developed the Emotional Labor Scale based on the emotion regulation theory.

In this study, the Chinese version of the Emotional Labor Scale, translated and revised by Luo Hong et al.[11] in 2008, was used. The 14-item scale included the three dimensions of surface play, deep play, and emotional expression requirements. A 6-point Likert scale was used, with scores ranging from 1, indicating strong disagreement, to 6, indicating strong agreement. Higher total scores indicate higher levels of emotional labor. The Cronbach's alpha coefficients for the total scale and the three dimensions were 0.811, 0.711, 0.826, and 0.872,[11] respectively, and the scale has good reliability and validity. This scale has been widely used with nurses.

Chinese Psychological Resilience Scale (PRS-CH)

Connor and Davidson[38] jointly developed the Connor-Davidson Psychological Resilience Scale (CD-RISC). In the present study, the Chinese version of the scale, translated by Yu et al.[39] in 2007, was used. With a total of 25 items, it comprises three dimensions: resilience, self-improvement, and optimism. The responses are rated on a 5-point Likert scale, with scores ranging from of 1 (never) to 5 (almost always). Higher scores indicate better psychological resilience. The Cronbach's alpha coefficient of the total scale was 0.91[39] with good reliability and validity.

Data collection

The data were collected through an online survey. The researcher, who was the nursing manager of the gastroenterology department in a tertiary care hospital, used Questionnaire Star (a tool for questionnaire surveys) and sent the URL to the survey respondents via WeChat (a popular social application in China). After describing the aims of the study and obtaining informed consent, a link to these scales was posted on the nurses' workgroups via WeChat, then the nurses filled it out. After the questionnaire was collected, it was entered and checked in pairs, using the software Epidata 3.1, to ensure the validity and completeness of the questionnaire.

Statistical analysis methods

Statistical software (SPSS 24.0) was used for data analysis. Indicators that conform to a normal distribution and those that do not were expressed as mean ± standard deviation (x ± S) and median (Q1, Q3), respectively. The Q1 represents the 25th percentile and the Q3 represents the 75th

percentile. Count data were statistically described using the frequency and composition ratios. Shapiro-Wilk method was used for the normality test. T-test and ANOVA were used for measures that met the normal distribution. The Fisher's least significant difference method was used for two-way comparison if the ANOVA showed statistically significant differences. The Mann–Whitney U rank-sum test and Kruskal-Wallis H test were used for measures that did not meet the normal distribution. The relationship between the two measures' indicators was analyzed using Pearson correlation analysis, and the effects of multiple measures on nurses' burnout, emotional labor, and psychological resilience scores were analyzed using multiple linear regression (stepwise method, inclusion: 0.05, exclusion: 0.1), and the differences were regarded as statistically significant at $P < 0.05$.

Patients and public involvement

The study did not involve patients. All data for this study were obtained from nurses. Neither the participants nor the public participated in the study design.

Results

General information

Basic information of the survey population

Table 1 shows the basic characteristics of the 345 respondents investigated in this study. In total, 341 (98.8%) nurses were women, 166 (48.1%) nurses were younger than 30 years old, 209 (60.6%) nurses were married, 148 (42.9%) nurses had no children, 127 (36.8%) nurses had one child, 172 (49.9%) nurses had a college education, 169 (49.0%) nurses had bachelor's degrees or above, 177 (51.3%) nurses were permanent staff, 168 (48.7%) nurses were in the labor contract category, 179 (51.9%) nurses did not directly supervise nursing interns, and most of them were not specialty nurses and earned more than 6000 RMB per month.

233 Table 1. Demographic characteristics of the participants

Variable	n(%)	burnout			emotional labor			psychological resilience		
		mean±SD	*t/t`/F*	*P*	mean±SD	*t/t`/F*	*P*	mean±SD	*t/t`/F*	*P*
Age										
<30	166(48.1)	52.81±21.06	1.21c	0.305	38.54±12.54	0.74c	0.528	69.48±23.07	0.22c	0.883
30–39	136(39.4)	54.45±18.70			39.40±11.84			70.51±20.90		
40–49	40(11.5)	50.73±16.22			38.50±12.20			69.55±25.19		
>50	3(0.9)	35.67±14.01			29.33±12.90			79.00±13.53		
Marital status										
Married	209(60.5)	52.22±21.37	0.66c	0.579	39.49±12.74	3.37c	0.019*	69.05±23.21	0.12c	0.951
Unmarried	126(36.5)	53.27±18.43			37.88±11.73			70.53±22.01		
Divorced	8(2.3)	62.00±22.69			51.25±11.06			69.88±23.85		
Bereaved spouse	2(0.6)	49.50±20.51			40.00±9.90			70.50±6.36		
Number of children										
No children	148(42.8)	52.23±21.11	0.48c	0.618	39.41±12.49	3.99c	0.019*	68.60±23.35	0.87c	0.420
Have a child	127(36.8)	54.43±19.29			40.06±11.83			69.97±22.19		
With two children	70(20.3)	52.37±16.92			35.19±11.78			72.89±20.57		
Academic qualifications										
Secondary School	4(1.2)	42.75±17.29	0.91c	0.437	37.50±4.80	0.26c	0.856	55.50±37.43	1.99c	0.116
College	172(49.8)	52.40±21.28			38.66±12.40			68.19±24.60		
Bachelor's degree or above	169(49.0)	54.11±17.83			38.90±12.20			71.97±19.20		
Employment category										
Permanent staff	177(51.3)	51.98±17.08	-1.05a	0.294	37.09±12.52	-2.68b	0.008**	72.60±22.68	2.26a	0.025*
Category Labor contract	168(48.7)	54.21±21.98			40.58±11.65			67.20±21.77		
Working years										
Within 2 years	62(18.0)	50.35±22.28	0.95c	0.452	39.29±11.85	0.42c	0.834	67.47±22.58	0.49c	0.784
2–5 years	56(16.2)	54.41±19.93			38.04±13.65			70.38±20.98		
6–10 years	79(22.9)	52.57±21.29			38.91±12.45			71.47±23.89		
11–15 years	70(20.3)	54.59±16.83			37.40±11.61			72.30±20.18		

Table 1. Demographic characteristics of the participants (Continued)

Variable	n(%)	burnout			emotional labor			psychological resilience		
		mean±SD	*t/t`/F*	*P*	mean±SD	*t/t`/F*	*P*	mean±SD	*t/t`/F*	*P*
16–20 years	31(9.0)	57.97±16.25			40.42±12.60			67.97±23.11		
More than 20 years	47(13.6)	50.38±18.49			39.83±12.01			68.15±24.25		
Professional title										
Junior	236(68.4)	53.30±20.53	0.192c	0.825	38.39±12.46	3.460c	0.033*	69.86±22.35	1.349c	0.261
Middle	104(30.1)	52.79±17.44			40.30±12.27			69.44±22.67		
Sub-Senior and Senior	5(1.4)	48.00±22.23			26.60±13.76			86.20±11.99		
Directly supervise nursing interns										
No	179(51.9)	50.68±20.30	-2.36a	0.019*	38.50±12.29	-0.46a	0.649	69.69±22.18	-0.25a	0.805
Yes	166(48.1)	55.64±18.60			39.10±12.16			70.28±22.65		
Specialty nurses										
Yes	26(7.5)	52.91±19.76	-0.53a	0.595	38.50±12.36	-1.58a	0.115	70.01±22.57	0.09a	0.429
No	319(92.5)	55.04±18.08			42.42±9.73			69.58±20.21		
Number of days per month working at night										
0	67(19.4)	47.96±20.42	3.34c	0.020*	38.01±11.62	0.31c	0.816	72.18±20.31	0.77c	0.514
1-4	113(32.8)	51.44±19.53			38.30±12.51			69.64±22.85		
5-9	133(38.6)	56.53±19.63			39.37±12.34			68.27±23.66		
⩾10	32(9.3)	55.09±15.71			39.75±12.25			73.63±19.26		
Monthly income (RMB)										
<4000	36(10.4)	47.03±26.51	2.68c	0.070	39.36±11.09	0.47c	0.628	58.86±26.17	5.63c	0.004**
4000-5999	96(27.8)	55.80±17.08			39.68±12.72			69.33±22.60		
⩾6000	213(61.7)	52.85±19.20			38.30±12.20			72.14±21.09		

Note: a: two independent samples t-test; b: t'-test; c: analysis of variance; *$P < 0.05$; **$P < 0.01$

Results of nurse burnout

The total burnout score of nurses was 53.07 ± 19.63 with a mean entry score of 2.41 ± 0.89, with a score of 14.37 ± 13.49 on the dimension of emotional exhaustion, 1.00 (0.00, 5.00) on the dimension of depersonalization, and 35.18 ± 13.40 on the dimension of personal fulfilment as detailed in Table 2. This result indicates that nurses' accomplishments were high, while the levels of emotional exhaustion and depersonalization were low.

Table 2. Scores of MBI-CH, ELS-CH and PRS-CH

Questionnaire	Projects	Entry	Score range	Total Score	Entry parity score
Burnout					
	Emotional exhaustion	9	0–54	14.37±13.49	1.60±1.50
	Depersonalization	5	0–30	1.00 (0.00, 5.00)	0.20 (0.00,1.00)
	Personal fulfilment	8	0–48	35.18±13.40	4.40±1.68
	Total burnout score	22	0–110	53.07±19.63	2.41±0.89
Emotional labor					
	Surface Play	7	7–42	19.71±8.45	2.82±1.21
	Emotional expression requirements	4	4–24	12.01±5.35	3.00±1.34
	Deep Play	3	3–18	7.07±4.12	2.36±1.37
	Total Emotional Labor Score	14	14–84	38.79±12.22	2.77±0.87
Psychological resilience					
	Tough type	13	0–52	37.47±11.89	2.88±0.91
	Self-improvement	8	0–32	21.29±7.48	2.66±0.94
	Optimistic type	4	0–16	11.21±3.98	2.80±0.99
	Total Psychological Resilience Score	25	0–100	69.97±22.38	2.80±0.90

Results of emotional labor for nurses

The total score of the emotional labor of nurses was 38.79 ± 12.22, the mean score of entries was 2.77 ± 0.87, and the mean scores of entries in the three dimensions from highest to lowest, were emotional expression requirement (3.00±1.34), surface play (2.82±1.21), and deep play (2.36±1.37), as shown in Table 2. This result indicates that deep play was less used in nurses' work, while emotional expression requirements and superficial play were more applied.

Outcomes of psychological resilience in nurses

The total psychological resilience score of the nurses was 69.97 ± 22.38 and the mean score of the entries was 2.80 ± 0.90, including the score of the toughness dimension (37.47 ± 11.89), the score of the self-improvement dimension (21.29 ± 7.48), and the score of the optimism dimension (11.21±3.98). These are shown in Table 2.

Effects of different demographic characteristics on burnout, emotional labor, and psychological resilience of nurses

The effect of different demographic characteristics on nurses' burnout

Demographic characteristics such as whether they directly supervise nursing interns and number of days per month working at night affected nurses' burnout, and the differences were statistically significant. Nurses who directly supervise nursing interns have higher levels of burnout, as detailed in Table 1.

Effects of different demographic characteristics on nurses' emotional labor

Demographic characteristics such as marital status, number of children, employment category, and professional title affected nurses' emotional labor, and the differences were statistically significant. A two-by-two comparison showed that, in terms of marital status, widowed = unmarried = married < divorced, indicating that the emotional labor of divorced nurses was higher than that of nurses with other marital status. In terms of the number of children, having two children < no children = having one child. In terms of employment category, permanent staff < category labor contract. In terms of professional title, junior nurse = middle nurse > sub-senior and senior nurse, as detailed in Table 1.

The effect of different demographic characteristics on nurses' psychological resilience

Employment category and monthly income affected nurses' psychological resilience, and the difference was statistically significant. The two comparisons showed that in terms of forms of employment, category labor contract < permanent staff; in terms of monthly income, less than 4000 (RMB) < 4000–5999 (RMB) = greater than or equal to 6000 (RMB), as detailed in Table 1.

The relationship between emotional labor, psychological resilience, and burnout in nurses

The relationship between burnout and emotional labor in nurses

The results of the Pearson correlation analysis showed that nurses' burnout was positively correlated with total emotional labor scores ($r = 0.386$, $P < 0.001$); positively correlated with both dimensions of emotional labor, surface play ($r = 0.450$, $P < 0.001$), and emotional expression requirements ($r = 0.403$, $P < 0.001$); and negatively correlated with deep play ($r = 0.303$, $P < 0.001$).

The relationship between emotional labor and psychological resilience in nurses

The results of the Pearson correlation analysis showed that nurses' emotional labor was negatively correlated with total psychological resilience scores (r = -0.330, $P < 0.001$), and emotional labor was negatively correlated with tough type (r = -0.323, $P < 0.001$), self-improvement (r = -0.297, $P < 0.001$), and optimistic type (r = -0.332, $P < 0.001$) dimensions.

Multiple linear regression analysis of predictors of burnout, emotional labor, and psychological resilience in nurses

Multiple linear regression analysis of predictors of burnout among nurses

The number of days per month working at night and whether they directly supervise nursing interns were predictors of burnout. The results of the multiple linear regression analysis showed that there was a positive relationship between both these factors and burnout, as detailed in Table 3.

Table 3 Results of multiple linear regression of MBI-CH, ELS-CH and PRS-CH

Variables	*B*	*SE*	*b*	*t*	*P*	*R2*	Adjusted *R2*	*F*	*P*
Burnout						0.038	0.032	6.753	0.001
Constant	43.106	3.068	-	14.050	<0.001				
Number of days per month working at night	3.236	1.157	0.149	2.798	0.005				
Directly supervise nursing interns	4.715	2.082	0.120	2.265	0.024				
Emotional Labor						0.044	0.033	3.940	0.004
Constant	36.703	0.971	-	37.811	<0.001				
Employment category	3.196	1.362	0.131	2.346	0.020				
Married	ref								
Unmarried	0.608	1.421	0.024	0.428	0.669				
Divorced	12.550	4.342	0.155	2.890	0.004				
Bereaved spouse	3.297	8.550	0.021	0.386	0.700				
Psychological Resilience						0.027	0.024	9.607	0.002
Constant	56.286	4.574	-	12.307	<0.001				
Monthly income	5.447	1.757	0.165	3.100	0.002				

Note: B: unstandardized coefficients; b: standardized coefficients; SE: standard error.

Multiple linear regression analysis of predictors of nurses' emotional labor

Employment category of nurses and marital status were predictors of emotional labor. The results of the multiple linear regression analysis showed that there was a positive relationship between both these factors and burnout, as detailed in Table 3.

Multiple linear regression analysis of predictors of psychological resilience of nurses

The results of the multiple linear regression analysis showed that the monthly income of nurses was a predictor of psychological resilience and had a positive effect on it, as detailed in Table 3.

Discussion

The objectives of this study were to survey the current status of burnout, emotional labor, and psychological resilience of gastroenterology nurses during the COVID-19 pandemic, to explore the factors associated with them, and to explore the correlation between these factors.

The findings revealed that the total burnout score of nurses was higher than that found by Tian Bei et al. This might be due to the fact that Tian Bei et al.'s[19] survey was conducted in 2014, that is, not during the COVID-19 pandemic. As nurses, who have been the backbone of the fight against the pandemic, have worked more than usual during this time, this might have increased their burnout levels. Many studies have confirmed different levels of burnout among different groups of nurses. Xinzhi Liang[40] showed that the total burnout score of ICU nurses was higher than that of the present study, which may be related to factors such as more severe conditions of ICU patients, more frequent night shifts of nurses, heavier workload, more labor intensity, and a shortage of human resources. The results of a study by Li J[41] showed that nurses in intravenous drug administration centers had higher scores on the dimension of emotional exhaustion and lower scores on the dimension of personal fulfilment than in this study, which may be related to the fact that nurses in intravenous drug administration centers are at a higher risk of occupational injury[41], the working environment is more confined, and nurses have less direct contact with patients and family members.

Regarding emotional labor, the total score obtained by nurses was lower than that of the results reported by Xinjuan Wu et al.[42]. This may be related to the fact that Xinjuan Wu et al. surveyed 11,337 nurses from 92 hospitals, most of whom were from hospital emergency and surgery departments, which have a heavier workload and more intense work compared to gastroenterology. This may have increased the level of emotional labor of nurses to some extent. The present study suggests that nurses tend to adopt more superficial play at work, that is, they often perform emotional camouflage and only show pleasant emotions to patients. To a certain extent, this indicates a poor professional identity of the current group of nurses.[11]

In this study, the psychological resilience scores were higher than those reported by Afshari et

al.[43] The reason for this could be the difference in the time of the study surveys being conducted. When the current study started the survey, there was an increased exploration of the new coronavirus; knowledge of the population about vaccination prevention, smooth vaccination, and implementation; and nurses improved their skills in prevention, control management, and response, resulting in a relatively higher level of psychological resilience. Therefore, nurses are able to deal more positively with stress and recover quickly as well as adapt positively to them.

This study showed that nurses who directly supervise nursing interns have higher levels of burnout, which may be related to the increased workload of teaching and the emotional drain. The higher level of burnout among nurses with more frequent number of days per month working at night may be related to the increased frequency of changes in work and rest schedules, which increases the physiological and psychological burden on them. This study showed higher levels of emotional labor among divorced nurses, which is aligned with the findings of Hongjuan Zhu et al.[44] This may be linked to the fact that divorce increases the emotional burden on nurses, besides having pressure from work, which makes them more prone to anxiety, sadness, and other negative emotions. The lower level of emotional labor and a higher level of psychological resilience among nurses in the permanent staff may be related to the fact that nurses on staff are more stable and have a lower turnover rate. The higher level of emotional labor among junior nurses and middle nurses than sub-senior and senior nurses may be related to the difference in years of experience and heavier emotional load. Monthly income is the reward given by the hospital to nurses for their hard work and reflects the level of support given to the nursing department. The level of support had a high impact on nurses' psychological resilience; the greater the level of support, the higher the overall level of nurses' psychological resilience.[45]

The present study showed that nurse burnout was negatively correlated with the deep play dimension of emotional labor and positively correlated with the other two dimensions, which is compatible with previous studies.[11] With the progress of society and medicine, patients are paying more attention to their medical experience, and patient satisfaction has become an important criterion for measuring the level of medical care, which requires nurses to have higher competence in handling the nurse-patient relationship. In conjunction with Brotheridge et al.,[46] the behavior of showing emotions, which is inconsistent with the actual inner experience, weakens the sense of self-truth, and this process requires more psychological resources for nurses to show appropriate emotional behavior. Excessive consumption of physical and mental resources over a long period

can easily lead to psychological fatigue, thus aggravating emotional exhaustion and depersonalization. In contrast, deep play means that nurses adjust their internal cognition to adapt to the situation, and the behavior of aligning internal feelings with external emotional performance consumes physical and mental resources. However, individuals do not need to require more resources to suppress their true emotions, and they are compensated with patients' emotional reactions, which helps in achieving a balance of psychological resources, in turn, reducing nurses' burnout. A study by Wang et al.[47] also concluded that the more nurses express their emotions authentically, the more committed they are to their work.

The present study showed that nurses' emotional labor was negatively related to psychological resilience and its three dimensions. Extrapolating the results of this study, the following conclusions can be drawn. Nurses who show more resilience, self-improvement, and optimism in terms of personality are more likely to adopt deeper roles in their work and have a higher sense of professional identity. Therefore, it is necessary to improve the psychological well-being of nurses and increase their psychological resilience during the COVID-19 pandemic. Some studies have shown that mindfulness-based stress reduction and psychotherapy centered on positive thinking can help reduce nurses' workload, help them establish a healthy psychological state,[48] and improve their levels of psychological resilience.[49] Studies have shown that superficial playing is negatively correlated with job satisfaction, while deep playing has a positive relationship with job satisfaction.[42] The results suggested that by improving nurses' psychological resilience, nurses can be encouraged to engage in more deep play, which helps increase nurses' professional identity and job satisfaction.

Conclusion

This study was conducted during the COVID-19 pandemic to investigate whether the pandemic had an impact on the psychological state of nurses and to provide guidance for subsequent prevention and control efforts. Greater adoption of deep play by nurses can be promoted by improving their psychological resilience, which can help improve emotional labor, thereby reducing burnout and decreasing turnover rates. Senior management needs to pay attention to the psychological status of nurses. Therefore, in the future, qualitative, longitudinal, and interventional studies should be conducted to explore the psychological condition of nurses, expand the research indexes of nurses' psychological characteristics, construct a model of nurses' psychological

resilience, and further track the long-term effects of interventions while evaluating the immediate effects of interventions.

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Ethics approval

This study involved human participants and was approved by the Branch for Medical Research and Clinical Technology Application, the Ethics Committee of the First Affiliated Hospital of Fujian Medical University (MRCTA, ECFAH of FMU [2021]393). Participants gave informed consent to participate in the study before taking part.

Contributorship statement

Zhangjie Li was responsible for manuscript preparation. **Huayan Lin** contributed to designing the study and supervised the research. **Huayan Lin, Zhangjie Li,** and **Mengting Yan** contributed to the review of the data and manuscript.

Competing interests

The authors declared no conflict of interest.

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Data availability statement

Data are available from Huayan Lin (email: fjydfykyxx@163.com) upon reasonable request.

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STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	page 2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	page 2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	page 4-6
Objectives	3	State specific objectives, including any prespecified hypotheses	page 4
Methods			
Study design	4	Present key elements of study design early in the paper	page 6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	page 6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	page 6-7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	/
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	page 7-8
Bias	9	Describe any efforts to address potential sources of bias	page 8
Study size	10	Explain how the study size was arrived at	page 7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	/
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	page 8-9
		(*b*) Describe any methods used to examine subgroups and interactions	/
		(*c*) Explain how missing data were addressed	/
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	page 6
		(*e*) Describe any sensitivity analyses	/
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	/
		(b) Give reasons for non-participation at each stage	/
		(c) Consider use of a flow diagram	/
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	page 9-11
		(b) Indicate number of participants with missing data for each variable of interest	/
Outcome data	15*	Report numbers of outcome events or summary measures	page 12-15

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	/
		(*b*) Report category boundaries when continuous variables were categorized	/
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	/
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	/
Discussion			
Key results	18	Summarise key results with reference to study objectives	page 15-17
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	page 3
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	page 17-18
Generalisability	21	Discuss the generalisability (external validity) of the study results	page 3
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	page 18

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Burnout, emotional labor, and psychological resilience among gastroenterology nurses during COVID-19: A cross-sectional study

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Burnout, emotional labor, and psychological resilience among gastroenterology nurses during COVID-19: A cross-sectional study

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Figures: 1

Abstract

Objectives: To investigate the relationship between burnout, emotional labor, and psychological resilience of gastroenterology nurses during the COVID-19 pandemic and explore the factors associated with these specific variables.

Design: A multicenter cross-sectional study with anonymous self-reporting was conducted from November 24, 2021, to December 26, 2021.

Setting: The study was conducted in Fujian Province, China.

Participants: The participants were 345 gastroenterology nurses from seven tertiary hospitals.

Primary and secondary outcome measures: Burnout, emotional labor, and psychological resilience were the primary outcome measures. Using a convenience sampling method, the data were collected using Questionnaire Star (a tool for questionnaire surveys) via WeChat. The Chinese version of the Maslach Burnout Inventory, the Chinese version of the Emotional Labor Scale, and the Chinese version of the Psychological Resilience Scale were used to evaluate burnout, emotional labor, and psychological resilience, respectively.

Results: The total scores for burnout, emotional labor, and psychological resilience in gastroenterology nurses were 53.07±19.63, 38.79±12.22, and 69.97±22.38, respectively, with less use of deep acting and more use of surface acting. Pearson correlation analysis showed that burnout was positively correlated with two dimensions of emotional labor; surface acting and emotional expression, and negatively correlated with deep acting. There was a negative correlation between emotional labor and all three dimensions of psychological resilience.

Conclusions: Greater adoption of deep acting by nurses can be promoted by improving their psychological resilience during events such as the COVID-19 pandemic, which can help improve emotional labor, thereby reducing burnout and decreasing turnover rates. Senior management in

hospitals must pay attention to nurses' psychological status. Further interventional studies could be conducted in the future to explore relevant measures.

Keywords burnout; emotional labor; psychological resilience; COVID-19; cross-sectional study

Strengths and limitations

- The study was implemented to investigate the relationship between burnout, emotional labor, and psychological resilience in gastroenterology nurses during the COVID-19 pandemic.
- Given the possibility of a "social desirability" effect, nurses' self-reported burnout may be lower. Therefore, actual burnout may be higher than the reported results, which would reduce the reliability of the results of this study.
- The response rate was relatively good, although approximately a quarter of the participants did not respond. As not responding may be a sign of burnout, this study might have underestimated the prevalence of burnout among the study population.

Introduction

Following the World Health Organization's declaration that the coronavirus disease 2019 (COVID-19) pandemic was a "public health emergency of international concern,"[1] more than 243 million confirmed cases and over 4.9 million deaths had been reported worldwide, as of October 24, 2021.[2]

Annette Kennedy, president of the International Council of Nurses, highlighted that nurses played an important role in maintaining people's health during the pandemic.[3] However, a shortage of nurses is a global public health issue. Falatah[4] suggested that the pandemic appeared to have significantly increased the mean rate of nurses' turnover intention. By the end of 2020, China's total number of registered nurses (RNs) exceeded 4.7 million, with 3.35 RNs for every 1,000 people,[5] which is less than the world national average of 3.816 RNs per 1,000 people.[6]

As psychological resilience affects nurses' willingness to leave their profession,[7] understanding the psychological conditions of nurses is crucial for retention. Regarding China's policy response to the COVID-19 pandemic, nurses in Fujian Province were deployed and involved in epidemic prevention and control in their units as required under the National Health Commission of the People's Republic of China. Controlling the COVID-19 pandemic remains a significant public health challenge in China. Hospital nurses, as the principal healthcare workers involved in nucleic acid testing for COVID-19, are often required to undertake such testing. Hospitals play a critical role in combating the epidemic, and its impact on nursing staff permeates their work. Therefore, we investigated the current situation concerning burnout, emotional labor, and psychological resilience among gastrointestinal nurses during the COVID-19 pandemic. However, the focus in terms of the study population was not on nurses directly involved in caring for patients with COVID-19.

As key healthcare workers in the fight against the pandemic,[8] Chinese nurses take care of patients while undertaking various aspects of prevention and control. They are prone to psychological adjustment imbalances because of multiple challenges and pressures. Additionally, studies have shown that providing healthcare affects mental health significantly[9] and have emphasized the importance of exploring psychological resilience support for healthcare workers with burnout.[10] The first author of this study has worked in the field of gastroenterology for an extensive period and is very concerned about the psychological condition of gastroenterology nurses. One aim of this study is to prompt future related studies to reduce burnout, manage emotional labor, and improve psychological resilience among gastroenterology nurses.

Job burnout, also known as "job fatigue," was first discussed by the American psychiatrist Herbert Freudenberger[11] in 1974. In 1981, Maslach[12] defined burnout as a syndrome involving excessive physical and mental exertion and energy depletion caused by an individual's prolonged exposure to stress, also known as burnout syndrome. An international survey in the United States showed a growing global trend in nurse burnout,[13] which is consistent with the findings of Aiken et al.[14]

Numerous countries have high rates of burnout among nurses, such as Japan[14] (33%–60%), South Africa[15] (34.6%), and Spain[16] (21%). Moreover, the total burnout detection rate among Chinese nurses has been reported to be 69.21%.[17] Additionally, numerous studies have shown that nurses are at high risk of burnout.[18] High levels of emotional exhaustion in response to the COVID-19 outbreak have been associated with increased work intensity, the tension between doctors and patients, and a lack of communication with managers.[19] This situation seriously affects nurses' physical and mental health and reduces the quality of nursing care.[20] Furthermore, Hong Luo[21] reported a significant correlation between emotional labor and burnout.

"Emotional labor," first proposed in 1979 by the American social psychologist Arlie Hochschild,[22] is a term used about employees who consciously manage their emotions at work and display visible external expressions and body movements to the public.[23] Throughout the interdisciplinary literature, emotional labor has two attributes: a) autonomous or spontaneous emotional expression,[24, 25] also referred to as an autonomic emotional regulation,[26] and b) according to the middle-range theory of emotional labor,[27, 28] representation of the self as a working persona including both surface acting (i.e., expression of superficially felt emotions, including fake, unfelt emotions or suppression of felt emotions)[24, 25] and deep acting (i.e., expression of deeply felt emotions, and modification of felt emotions to match displayed emotions).[24, 25, 29, 30] Surface acting is analogous to a nurse's smile while working in a hospice, in which the nurse seems to care about the patient and tries to match their emotions to the patient's emotions.[31] In contrast, deep acting implies that nurses connect with patients and project themselves therapeutically.[31] As their work is emotionally intensive, nurses continually confront and manage the negative emotions of patients and their families.[32] Diefendorff et al.[33] found that nurses were subjected to a higher emotional load. Similar results have been reported in the Chinese context. Numerous studies have shown moderate to high levels of emotional labor in nurses who work in the emergency[34] and cardiology departments.[35] Frequent and excessive use of emotional labor intensifies nurses'

fatigue and burnout, which increases their propensity to leave their profession.[36] Therefore, it is essential to explore how emotional labor can be properly managed to reduce burnout.

Psychological resilience, also known as "mental toughness" and "bounce-back ability," is a negative predictor of burnout in the United States.[37] It is the ability to move forward positively from a negative, traumatic, or stressful experience.[38] In a study supported by the American Association of Critical-Care Nurses, Mealer showed that 22% of ICU nurses with high levels of psychological resilience[39] tended to exhibit optimism, humor, flexibility, and high ethical standards.[40] Individuals with higher psychological resilience are better able to deal with stressful situations and, thus, maintain good mental health.[41] Along with the rapid development of global healthcare, building the psychological resilience of caregivers has been listed as one of the top ten international "standard of care movements".[42]

Although previous studies have explored the relationship between burnout and emotional labor and between burnout and psychological resilience,[21, 37] the association between these factors has not been adequately discussed in the context of the COVID-19 pandemic concerning gastroenterology nurses. Therefore, this study investigated the current status of burnout, emotional labor, and psychological resilience among gastroenterology nurses during the COVID-19 pandemic, to explore relevant associations among these factors in relation to specific variables, and to provide evidence-based research to help reduce nurses' burnout, increase their job satisfaction, and promote their psychological health during the COVID-19 pandemic.

Methods

Patients and public involvement

The study did not involve patients. All data for this study were obtained from nurses. Neither the study participants nor members of the public participated in the design, implementation, reporting, or dissemination plans of our research.

Study design

This study used a cross-sectional correlational design.

Research Objectives

This study aimed to investigate the situation of burnout, emotional labor, and psychological resilience among nurses in gastroenterology departments in hospitals in China during the COVID-19 pandemic and to explore their related factors and the associations among these variables. The results are intended to help provide a reference point for hospital administrators to implement interventions.

Setting and sample

This study used a convenience sampling method to select gastroenterology nurses working in Fujian Province, China, from November 24, 2021, to December 26, 2021.

Inclusion criteria were as follows: (1) those who were registered and had a Chinese Nurse Practitioner Certificate; (2) those who had worked in gastroenterology for ≥ 1 year; and (3) those who provided informed consent to participate in this study voluntarily.

Exclusion criteria were as follows: (1) those who were on leave; (2) those undergoing training; or (3) those unable to participate in this study for special reasons (e.g., being hospitalized and having their status changed from nurse to patient; uninterested in participating; having already participated in a similar study and not wanting to participate again; being too busy with work and thus did not have time to participate).

The sample size was calculated with reference to the sample requirement for multiple linear regression analysis,[43] which is at least ten times the number of independent variables. In this study, the number of independent variables was 14. Considering the likelihood of 10%-20% invalid questionnaires, the final sample content was determined to be 154-168 cases. A total of 458 questionnaires were collected; 345 were valid (75.3% valid return rate); 113 responses were either incomplete or invalid and were excluded, as detailed in a CONSORT diagram in Figure 1.

Variables and instruments

General demographics and work-related characteristics

General demographic information and work-related characteristics were collected from 345 participants at the beginning of the survey. The information included: sex, age, marital status, number of children, academic qualifications, employment category, working years, professional title, department, directly supervised nursing interns, specialty nurses, number of days per month working at night, number of times per month responsible for epidemic prevention and control posts, and monthly income (RMB).

Chinese version of the Maslach Burnout Inventory (MBI-CH)

The Maslach Burnout Inventory is the most extensively used scale for burnout assessment.[12] The Chinese version of the inventory, translated and revised by Dr. Mei-Chi Pang in Hong Kong, was used in this study. The 22-item MBI-CH includes the three dimensions of emotional exhaustion, depersonalization, and personal accomplishment. Regarding its 7-point Likert scale measurement, higher scores on the emotional exhaustion and depersonalization dimensions and lower scores on the personal accomplishment dimension indicate higher burnout. The Cronbach's alpha coefficient was 0.6260,[44] with acceptable reliability.

Chinese version of the Emotional Labor Scale (ELS-CH)

In 2003, Grandey[45] developed the Emotional Labor Scale based on emotion regulation theory. This study uses the Chinese version of this Emotional Labor Scale translated and revised by Luo Hong et al.[21] The 14-item ELS-CH scale includes the three dimensions of surface acting, deep acting, and emotional expression. On its 6-point Likert scale, scores range from 1, indicating strong disagreement, to 6, indicating strong agreement, with higher total scores indicating higher levels of emotional labor. The Cronbach's alpha coefficients for the total scale and the three dimensions were 0.811, 0.711, 0.826, and 0.872,[21] respectively, and the scale has good reliability and validity. This scale has been widely used in studies on nurses.

Chinese Psychological Resilience Scale (PRS-CH)

Connor and Davidson[46] jointly developed the Connor–Davidson Psychological Resilience Scale (CD-RISC). The present study employed the Chinese version of the scale, translated by Yu et al.[47] With a total of 25 items, the PRS-CH comprises three dimensions: resilience, self-improvement, and optimism. The responses are rated on a 5-point Likert scale, with scores ranging from 1 (never) to 5 (almost always). Higher scores indicate better psychological resilience. The Cronbach's alpha coefficient of the total scale was 0.91[47], showing good reliability and validity.

Data collection

The data were collected through an online survey. The researcher, who was the nursing manager of the gastroenterology department in a tertiary care hospital, used Questionnaire Star (a tool for questionnaire surveys) and sent the URL to the survey respondents via WeChat (a popular social application in China). After describing the study's aims and obtaining informed consent, a link to the survey was posted on the nurses' workgroups via WeChat, and the nurses then completed it. After the questionnaire was collected, it was entered and checked by two researchers using Epidata 3.1 software to ensure the validity and completeness of the questionnaire.

Statistical analysis methods

Statistical software (SPSS 24.0) was used for data analysis. Indicators that conform to a normal distribution and those that do not were expressed as mean ± standard deviation (x ± S) and median (Q1, Q3), respectively. Q1 represents the 25th percentile, and Q3 represents the 75th percentile. Count data were statistically described using frequency and composition ratios. The Shapiro-Wilk method was used for normality testing. T-tests and analysis of variance (ANOVA) were used for measures that met the normal distribution. Fisher's least significant difference method was used for two-way comparison if the ANOVA results showed statistically significant differences. The Mann–Whitney U rank-sum test and the Kruskal–Wallis H test were used for measures that did not meet the normal distribution. The relationship between the two measures' indicators was analyzed using Pearson correlation analysis. The effects of multiple measures on nurses' burnout,

emotional labor, and psychological resilience scores were analyzed using multiple linear regression (stepwise method, inclusion: 0.05, exclusion: 0.1), and the differences were regarded as statistically significant at $P < 0.05$.

Results

General information

Basic information about the survey population

Table 1 shows the basic characteristics of the 345 respondents investigated in this study. In total, 341 (98.8%) nurses were women, 166 (48.1%) were under 30 years, 209 (60.6%) were married, 148 (42.9%) had no children, 127 (36.8%) had one child, 172 (49.9%) had a college education, 169 (49.0%) had bachelor's degrees or higher, 177 (51.3%) were permanent staff, 168 (48.7%) were in the labor contract category, 179 (51.9%) did not directly supervise nursing interns, 319 (92.5) were not specialty nurses, and 213 (61.7) earned more than 6,000 RMB per month.

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Table 1. Demographic characteristics of the participants

Variable	n(%)	Burnout			Emotional labor			Psychological resilience		
		mean±SD	*t/t`/F*	*P*	mean±SD	*t/t`/F*	*P*	mean±SD	*t/t`/F*	*P*
Age (years)										
<30	166(48.1)	52.81±21.06	1.21c	0.305	38.54±12.54	0.74c	0.528	69.48±23.07	0.22c	0.883
30–39	136(39.4)	54.45±18.70			39.40±11.84			70.51±20.90		
40–49	40(11.5)	50.73±16.22			38.50±12.20			69.55±25.19		
>50	3(0.9)	35.67±14.01			29.33±12.90			79.00±13.53		
Marital status										
Married	209(60.5)	52.22±21.37	0.66c	0.579	39.49±12.74	3.37c	0.019*	69.05±23.21	0.12c	0.951
Unmarried	126(36.5)	53.27±18.43			37.88±11.73			70.53±22.01		
Divorced	8(2.3)	62.00±22.69			51.25±11.06			69.88±23.85		
Bereaved spouse	2(0.6)	49.50±20.51			40.00±9.90			70.50±6.36		
Number of children										
None	148(42.8)	52.23±21.11	0.48c	0.618	39.41±12.49	3.99c	0.019*	68.60±23.35	0.87c	0.420
One	127(36.8)	54.43±19.29			40.06±11.83			69.97±22.19		
Two	70(20.3)	52.37±16.92			35.19±11.78			72.89±20.57		
Academic qualifications										
Secondary School	4(1.2)	42.75±17.29	0.91c	0.437	37.50±4.80	0.26c	0.856	55.50±37.43	1.99c	0.116
College	172(49.8)	52.40±21.28			38.66±12.40			68.19±24.60		
Bachelor's degree or higher	169(49.0)	54.11±17.83			38.90±12.20			71.97±19.20		
Employment category										
Permanent staff	177(51.3)	51.98±17.08	-1.05a	0.294	37.09±12.52	-2.68b	0.008**	72.60±22.68	2.26a	0.025*
Category Labor contract	168(48.7)	54.21±21.98			40.58±11.65			67.20±21.77		
Working years										
<2	62(18.0)	50.35±22.28	0.95c	0.452	39.29±11.85	0.42c	0.834	67.47±22.58	0.49c	0.784
2–5	56(16.2)	54.41±19.93			38.04±13.65			70.38±20.98		
6–10	79(22.9)	52.57±21.29			38.91±12.45			71.47±23.89		
11–15	70(20.3)	54.59±16.83			37.40±11.61			72.30±20.18		

Table 1. Demographic characteristics of the participants (Continued)

Variable	n(%)	burnout			emotional labor			psychological resilience		
		mean±SD	*t/t`/F*	*P*	mean±SD	*t/t`/F*	*P*	mean±SD	*t/t`/F*	*P*
16–20	31(9.0)	57.97±16.25			40.42±12.60			67.97±23.11		
20+	47(13.6)	50.38±18.49			39.83±12.01			68.15±24.25		
Professional title										
Junior	236(68.4)	53.30±20.53	0.192c	0.825	38.39±12.46	3.460c	0.033*	69.86±22.35	1.349c	0.261
Middle	104(30.1)	52.79±17.44			40.30±12.27			69.44±22.67		
Sub-Senior and Senior	5(1.4)	48.00±22.23			26.60±13.76			86.20±11.99		
Directly supervising nursing interns										
No	179(51.9)	50.68±20.30	-2.36a	0.019*	38.50±12.29	-0.46a	0.649	69.69±22.18	-0.25a	0.805
Yes	166(48.1)	55.64±18.60			39.10±12.16			70.28±22.65		
Specialty nurses										
Yes	26(7.5)	52.91±19.76	-0.53a	0.595	38.50±12.36	-1.58a	0.115	70.01±22.57	0.09a	0.429
No	319(92.5)	55.04±18.08			42.42±9.73			69.58±20.21		
Number of days per month working at night										
0	67(19.4)	47.96±20.42	3.34c	0.020*	38.01±11.62	0.31c	0.816	72.18±20.31	0.77c	0.514
1-4	113(32.8)	51.44±19.53			38.30±12.51			69.64±22.85		
5-9	133(38.6)	56.53±19.63			39.37±12.34			68.27±23.66		
⩾10	32(9.3)	55.09±15.71			39.75±12.25			73.63±19.26		
Monthly income (RMB)										
<4000	36(10.4)	47.03±26.51	2.68c	0.070	39.36±11.09	0.47c	0.628	58.86±26.17	5.63c	0.004**
4000-5999	96(27.8)	55.80±17.08			39.68±12.72			69.33±22.60		
⩾6000	213(61.7)	52.85±19.20			38.30±12.20			72.14±21.09		

Note: a: two independent samples t-test; b: t'-test; c: analysis of variance; *$P < 0.05$； **$P < 0.01$

Burnout score results for the nurses

The total burnout score of nurses was 53.07 ± 19.63 with a mean entry score of 2.41 ± 0.89, with a score of 14.37 ± 13.49 on the dimension of emotional exhaustion, 1.00 (0.00, 5.00) on the dimension of depersonalization, and 35.18 ± 13.40 on the dimension of personal fulfilment as detailed in Table 2. This result indicates that nurses' accomplishments were high, while the levels of emotional exhaustion and depersonalization were low.

Table 2. MBI-CH, ELS-CH, and PRS-CH scores

Questionnaire	Projects	Entry	Score range	Total Score	Entry parity score
Burnout					
	Emotional exhaustion	9	0–54	14.37±13.49	1.60±1.50
	Depersonalization	5	0–30	1.00 (0.00, 5.00)	0.20 (0.00,1.00)
	Personal fulfillment	8	0–48	35.18±13.40	4.40±1.68
	Total burnout score	22	0–110	53.07±19.63	2.41±0.89
Emotional labor					
	Surface acting	7	7–42	19.71±8.45	2.82±1.21
	Emotional expression	4	4–24	12.01±5.35	3.00±1.34
	Deep acting	3	3–18	7.07±4.12	2.36±1.37
	Total Emotional Labor Score	14	14–84	38.79±12.22	2.77±0.87
Psychological resilience					
	Toughness	13	0–52	37.47±11.89	2.88±0.91
	Self-improvement	8	0–32	21.29±7.48	2.66±0.94
	Optimism	4	0–16	11.21±3.98	2.80±0.99
	Total Psychological Resilience Score	25	0–100	69.97±22.38	2.80±0.90

Emotional labor score results for the nurses

The total score of the emotional labor of nurses was 38.79 ± 12.22, the mean score of entries was 2.77 ± 0.87, and the mean scores of entries in the three dimensions from highest to lowest, were emotional expression (3.00±1.34), surface acting (2.82±1.21), and deep acting (2.36±1.37), as shown in Table 2. This result indicates that deep acting was less used in nurses' work, while emotional expression and superficial play were more applied.

Psychological resilience score results for the nurses

The total psychological resilience score of the nurses was 69.97 ± 22.38 and the mean score of the entries was 2.80 ± 0.90, including the score of the toughness dimension (37.47 ± 11.89), the score of the self-improvement dimension (21.29 ± 7.48), and the score of the optimism dimension (11.21±3.98). These are shown in Table 2.

Effects of different demographic characteristics on burnout, emotional labor, and psychological resilience of nurses

The effect of different demographic characteristics on nurses' burnout

Demographic characteristics such as whether they directly supervised nursing interns and the number of days per month working at night affected nurses' burnout, and the differences were statistically significant. Nurses who directly supervised nursing interns had higher levels of burnout, as detailed in Table 1.

Effects of different demographic characteristics on nurses' emotional labor

Demographic characteristics such as marital status, number of children, employment category, and professional title affected nurses' emotional labor, and the differences were statistically significant. A two-by-two comparison showed that, in terms of marital status, widowed = unmarried = married < divorced, indicating that the emotional labor of divorced nurses was higher than that of nurses with other marital status. In terms of the number of children, having two children < no children = having one child. In terms of employment category, permanent staff < category labor contract. In terms of professional title, junior nurse = middle nurse > sub-senior and senior nurse, as detailed in Table 1.

The effect of different demographic characteristics on nurses' psychological resilience

Employment category and monthly income affected nurses' psychological resilience, and the difference was statistically significant. A two-by-two comparison showed that, in terms of forms of employment, category labor contract < permanent staff; in terms of monthly income, less than 4000 (RMB) < 4000–5999 (RMB) = greater than or equal to 6000 (RMB), as detailed in Table 1.

The relationship between emotional labor, psychological resilience, and burnout in nurses

The relationship between burnout and emotional labor in nurses

The results of the Pearson correlation analysis showed that the nurses' burnout was positively correlated with their total emotional labor scores (r = 0.386, $P < 0.001$) and that their burnout was positively correlated with two dimensions of emotional labor, namely, surface acting (r = 0.450, $P < 0.001$), and emotional expression (r = 0.403, $P < 0.001$) and negatively correlated with deep acting (r = 0.303, $P < 0.001$).

The relationship between emotional labor and psychological resilience in nurses

The results of the Pearson correlation analysis showed that the nurses' emotional labor was negatively correlated with their total psychological resilience scores (r = -0.330, $P < 0.001$) and that their emotional labor was negatively correlated with toughness (r = -0.323, $P < 0.001$), self-improvement (r = -0.297, $P < 0.001$), and optimism (r = -0.332, $P < 0.001$).

Multiple linear regression analysis of predictors of burnout, emotional labor, and psychological resilience in nurses

Multiple linear regression analysis of predictors of burnout among the nurses

The number of days per month working at night and whether they directly supervised nursing interns were predictors of burnout. The results of the multiple linear regression analysis showed that there was a positive relationship between both these factors and burnout, as detailed in Table 3.

Table 3. Results of multiple linear regression in terms of MBI-CH, ELS-CH, and PRS-CH scores

Variables	*B*	*SE*	*b*	*t*	*P*	*R2*	Adjusted *R2*	*F*	*P*
Burnout						0.038	0.032	6.753	0.001
Constant	43.106	3.068	-	14.050	<0.001				
Number of days per month working at night	3.236	1.157	0.149	2.798	0.005				
Directly supervising nursing interns	4.715	2.082	0.120	2.265	0.024				
Emotional Labor						0.044	0.033	3.940	0.004
Constant	36.703	0.971	-	37.811	<0.001				
Employment category	3.196	1.362	0.131	2.346	0.020				
Married	ref								
Unmarried	0.608	1.421	0.024	0.428	0.669				
Divorced	12.550	4.342	0.155	2.890	0.004				
Bereaved spouse	3.297	8.550	0.021	0.386	0.700				

Psychological Resilience						0.027	0.024	9.607	0.002
Constant	56.286	4.574	-	12.307	<0.001				
Monthly income	5.447	1.757	0.165	3.100	0.002				

Note: B: unstandardized coefficients; b: standardized coefficients; SE: standard error.

Multiple linear regression analysis of predictors of the nurses' emotional labor

The nurses' employment category and marital status were predictors of emotional labor. The results of the multiple linear regression analysis showed that there was a positive relationship between both these factors and burnout, as detailed in Table 3.

Multiple linear regression analysis of predictors of psychological resilience of the nurses

The results of the multiple linear regression analysis showed that the monthly income of the nurses was a predictor of psychological resilience, with a positive effect, as detailed in Table 3.

Discussion

The objectives of this study were to survey the current status of burnout, emotional labor, and psychological resilience among gastroenterology nurses during the COVID-19 pandemic, to explore the factors associated with them.

According to the China Health Statistics Yearbook 2020, RNs with a bachelor's degree or higher accounted for 23.8% of nurses, graduate students accounted for only 0.2%, and nurses with secondary school education accounted for 26.8%. However, the sites where the data were collected for this study were all tertiary class A hospitals, which recruit nurses with a higher educational threshold, which explains why the percentage of nurses with bachelor's degrees or higher was 49.0% in this study compared with what was generally the case in 2020. It should also be noted that most of the included nurses with high seniority did not have a bachelor's degree when they joined the profession. However, in recent years, China has increasingly emphasized the importance of the nursing workforce in terms of policy and encouraged in-service nursing staff to upgrade their education. They also promoted nursing staff to improve their research ability and consequently their ability to care for patients. In response, hospitals have gradually increased their recruitment of bachelor's degree graduates; however, the finding that half of the nurses still did not have a bachelor's degree indicates that this commitment to fostering higher levels of education among nurses is an ongoing process.

The findings revealed that the total burnout score of nurses was higher than that of Tian et al.,[17] which may be explained by that study conducted in 2014, that is, the pre-COVID-19 period. As nurses working in the fight against the pandemic have worked more than usual during this time, this might have increased their burnout levels. Many studies have reported varying levels of burnout among different groups of nurses. Liang[48] showed that the total burnout score of ICU nurses was higher than that found in this study, which may be related to factors such as the more severe conditions of ICU patients, more frequent night shifts for nurses, heavier workloads, greater labor intensity, and a shortage of human resources. A study by Li [49] showed that nurses in intravenous drug administration centers had higher scores on the dimension of emotional exhaustion and lower scores on the dimension of personal fulfillment than in this study, which may be related to the fact that nurses in intravenous drug administration centers are at a higher risk of occupational injury,[49] the working environment is more confined, and nurses have less direct contact with patients and family members.

Regarding emotional labor, the total score found for the nurses was lower than that reported by Wu et al.[50] This may be related to the fact that Wu et al. surveyed 11,337 nurses from 92 hospitals, most of whom were from hospital emergency and surgery departments, which have a heavier workload and more intense work compared to gastroenterology. This may have increased the level of emotional labor of nurses to some extent. The present study suggests that the nurses tended to adopt more superficial play at work; they often engaged in emotional camouflage and only displayed pleasing emotions to patients. To a certain extent, this indicates a poor professional identity among these nurses.[21]

In this study, the psychological resilience scores were higher than those of Afshari et al.[51] The reason for this could be the difference in the time of the study surveys being conducted. When the current study was initiated, understanding of the new coronavirus was more significant, as was knowledge among the population concerning the preventive effects of vaccination and how to implement and run vaccination programs smoothly. Nurses have improved their prevention, control management, and response skills, resulting in a relatively higher level of psychological resilience. Therefore, nurses have been able to deal more positively with stress, recover quickly, and adapt positively to stress factors.

This study showed that nurses who directly supervised nursing interns had higher levels of burnout, which may be related to the increased teaching workload and the emotional drain. The higher level

of burnout among nurses with a more frequent number of days per month working at night may be related to the increased frequency of changes in work and rest schedules, which would have increased the physiological and psychological burden placed on them. This study showed higher levels of emotional labor among divorced nurses, which accords with the findings of Zhu et al.[52] This may be linked to the fact that divorce increases the emotional burden on nurses, alongside work pressure, which renders them more prone to anxiety, sadness, and other negative emotions. The lower level of emotional labor and the higher level of psychological resilience found among the nurses on the permanent staff may be related to the fact that nurses on staff are more stable and have a lower turnover rate. The higher level of emotional labor among junior and middle nurses than among the sub-senior and senior nurses may be related to the difference in years of experience and heavier emotional load. The monthly income level indicates the value hospitals place on their nurses for their hard work and reflects the level of support given to the nursing department. This level of support has a significant effect on nurses' psychological resilience; the greater the level of support, the higher the overall level of nurses' psychological resilience.[53]

The present study showed that nurse burnout was negatively correlated with the deep acting dimension of emotional labor and was positively correlated with the other two dimensions, which accords with a previous study.[21] With developing awareness among increasing numbers of individuals in medicine, patients are paying more attention to their medical experience, and patient satisfaction has become an important criterion for measuring the level of medical care, which requires nurses to have advanced levels of competence in handling the nurse-patient relationship. As shown in Brotheridge et al.,[54] the behavior of showing emotions that are inconsistent with one's actual inner experience weakens one's sense of self-worth, and this process requires more psychological resources for nurses to show appropriate emotional behavior. Excessive consumption of physical and mental resources over a long period can easily lead to psychological fatigue, thus aggravating emotional exhaustion and depersonalization. In contrast, deep acting means that nurses can adjust their genuine feelings and understanding to adapt to the situation, and such behavior of aligning internal feelings with external emotional performance appropriately consumes less physical and mental resources. However, individuals do not need to require more resources to suppress their true emotions, and they are compensated with patients' emotional reactions, which helps in achieving a balance of psychological resources, in turn, reducing nurses' burnout. A study by Wang et al.[55] concluded that the more nurses express their emotions

authentically, the more committed they are to their work.

The present study showed that nurses' emotional labor was negatively related to psychological resilience and its three dimensions. From this study's results, it would appear that nurses who show more resilience, self-improvement, and optimism are more likely to adopt deeper roles in their work and have a higher sense of professional identity. Therefore, it is necessary to improve the psychological well-being of nurses and increase their psychological resilience during the COVID-19 pandemic and other similar events. Some studies have shown that mindfulness-based stress reduction and psychotherapy centered on positive thinking can help reduce nurses' workload stress, help them establish a healthy psychological state,[56] and improve their levels of psychological resilience.[57] Studies have shown that surface acting negatively correlates with job satisfaction, while deep acting has a positive relationship with job satisfaction.[50] This study's results suggest that, by improving nurses' psychological resilience, nurses can be encouraged to engage in more deep acting, which is likely to help increase nurses' professional identity and job satisfaction.

This study provides valuable insights into the current state of burnout, emotional labor, and psychological resilience among gastroenterology nurses during the COVID-19 pandemic. However, the study has several limitations. First, the findings are cross-sectional, precluding the drawing of any conclusions about the impact of COVID-19. Comparison of the findings with pre-pandemic studies requires caution, as the observed status may be due to factors unrelated to the pandemic. Second, this study was only conducted in one province of China using a convenience sampling method, which is not representative of other regions, or of departments and other personnel in hospitals, meaning that these findings are not generalizable. Third, as 98.8% of the participants were female, more attention should be paid to male nurses in the future. Fourth, the difficulty of data collection during the pandemic may have led to possible bias in data interpretation. In addition, the scope of one questionnaire may not be sufficient to summarize nurses' actual levels of burnout, emotional labor, and psychological resilience.

Conclusion

This study was conducted during the COVID-19 pandemic to investigate whether the pandemic impacted the psychological state of nurses in relation to burnout, emotional labor, and psychological resilience and to provide guidance for subsequent burnout prevention and control efforts. Greater adoption of deep acting by nurses can be promoted by improving their

psychological resilience, which can help improve emotional labor, thereby reducing burnout and decreasing turnover rates. Senior management needs to pay attention to the psychological status of nurses. Therefore, qualitative, longitudinal, and interventional studies should be conducted to explore the psychological condition of nurses, expand the research indexes of nurses' psychological characteristics, construct models of nurses' psychological resilience, and further track the long-term effects of interventions while evaluating the immediate effects of interventions.

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Ethics approval

This study involved human participants and was approved by the Branch for Medical Research and Clinical Technology Application, the Ethics Committee of the First Affiliated Hospital of Fujian Medical University (MRCTA, ECFAH of FMU [2021]393). The participants gave informed consent to participate in the study before taking part.

Author contribution statement

Huayan Lin and **Zhangjie Li** contributed equally to this study. **Zhangjie Li** was responsible for manuscript preparation. **Huayan Lin** contributed to designing the study and supervised the research. **Huayan Lin, Zhangjie Li,** and **Mengting Yan** contributed to the review of the data and manuscript. All authors have reviewed and approved the manuscript.

Competing interests

The authors declared no conflict of interest.

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Data availability statement

Data are available from Huayan Lin (email: fjydfykyxx@163.com) upon reasonable request.

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Figure 1 CONSORT diagram regarding the sampling process

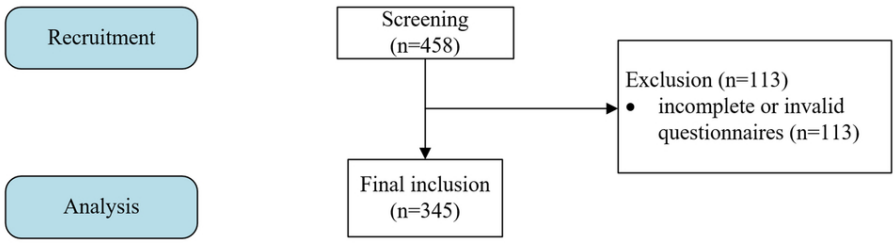

Figure 1 CONSORT diagram regarding the sampling process

90x90mm (300 x 300 DPI)

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	pages 1-2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	pages 2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	pages 3-6
Objectives	3	State specific objectives, including any prespecified hypotheses	page 6
Methods			
Study design	4	Present key elements of study design early in the paper	pages 6-7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	page 7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	page 7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	/
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	pages 8-9
Bias	9	Describe any efforts to address potential sources of bias	page 9
Study size	10	Explain how the study size was arrived at	page 7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	/
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	pages 9-10
		(*b*) Describe any methods used to examine subgroups and interactions	/
		(*c*) Explain how missing data were addressed	/
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	page 7
		(*e*) Describe any sensitivity analyses	/
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	/
		(b) Give reasons for non-participation at each stage	/
		(c) Consider use of a flow diagram	page 7
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	pages 10-12
		(b) Indicate number of participants with missing data for each variable of interest	/

Outcome data	15*	Report numbers of outcome events or summary measures	pages 13-16
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	/
		(*b*) Report category boundaries when continuous variables were categorized	/
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	/
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	/
Discussion			
Key results	18	Summarise key results with reference to study objectives	pages 16-19
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	pages 3, 19
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	pages 19-20
Generalisability	21	Discuss the generalisability (external validity) of the study results	page 19
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	page 20

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Burnout, emotional labor, and psychological resilience among gastroenterology nurses during COVID-19: A cross-sectional study

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Burnout, emotional labor, and psychological resilience among gastroenterology nurses during COVID-19: A cross-sectional study

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Figures: 1

Abstract

Objectives: To investigate the relationship between burnout, emotional labor, and psychological resilience of gastroenterology nurses during the COVID-19 pandemic and explore the factors associated with these specific variables.

Design: A multicenter cross-sectional study with anonymous self-reporting was conducted from November 24, 2021, to December 26, 2021.

Setting: The study was conducted in Fujian Province, China.

Participants: The participants were 345 gastroenterology nurses from seven tertiary hospitals.

Primary and secondary outcome measures: Burnout, emotional labor, and psychological resilience were the primary outcome measures. Using a convenience sampling method, the data were collected using Questionnaire Star (a tool for questionnaire surveys) via WeChat. The Chinese version of the Maslach Burnout Inventory, the Chinese version of the Emotional Labor Scale, and the Chinese version of the Psychological Resilience Scale were used to evaluate burnout, emotional labor, and psychological resilience, respectively.

Results: The total scores for burnout, emotional labor, and psychological resilience in gastroenterology nurses were 53.07±19.63, 38.79±12.22, and 69.97±22.38, respectively, with less use of deep acting and more use of surface acting. Pearson correlation analysis showed that burnout was positively correlated with two dimensions of emotional labor; surface acting and emotional expression, and negatively correlated with deep acting. There was a negative correlation between emotional labor and all three dimensions of psychological resilience.

Conclusions: Greater adoption of deep acting by nurses can be promoted by improving their psychological resilience during events such as the COVID-19 pandemic, which can help improve emotional labor, thereby reducing burnout and decreasing turnover rates. Senior management in

hospitals must pay attention to nurses' psychological status. Further interventional studies could be conducted in the future to explore relevant measures.

Keywords burnout; emotional labor; psychological resilience; COVID-19; cross-sectional study

Strengths and limitations

- This study provides valuable insights into the current state of burnout, emotional labor, and psychological resilience among gastroenterology nurses during the COVID-19 pandemic.
- Participating nurses may not be representative of all populations in all countries.
- Such cross-sectional studies can only imply association, not causation.
- Nurses were self-selected to participate, exposing the study to selection and response bias.
- The difficulty of data collection during the pandemic may have led to possible bias in data interpretation.

Introduction

Following the World Health Organization's declaration that the coronavirus disease 2019 (COVID-19) pandemic was a "public health emergency of international concern,"[1] more than 243 million confirmed cases and over 4.9 million deaths had been reported worldwide, as of October 24, 2021.[2]

Annette Kennedy, president of the International Council of Nurses, highlighted that nurses played an important role in maintaining people's health during the pandemic.[3] However, a shortage of nurses is a global public health issue. Falatah[4] suggested that the pandemic appeared to have significantly increased the mean rate of nurses' turnover intention. By the end of 2020, China's total number of registered nurses (RNs) exceeded 4.7 million, with 3.35 RNs for every 1,000 people,[5] which is less than the world national average of 3.816 RNs per 1,000 people.[6]

According to Global Cancer Statistics 2020, there are nearly 19.3 million new cancer cases and approximately 10.0 million cancer deaths in 185 countries in 2020. Colorectal cancer (10%) ranks

third in new cancer cases and gastric cancer (5.6%) ranks fifth; colorectal cancer (9.4%) ranks second and gastric cancer (7.7%) ranks fourth in the number of cancer deaths.[7] Recent study data suggest an increased burden of colon cancer in China and the United States, it is estimated that colon and gastric cancers in China and colon cancer in the United States are covered in the top five cancer types to be diagnosed in 2022.[8] Therefore, the workload of gastroenterology nurses is severe and there may be a significant increase in stress co-occurring with the COVID-2019.[9] And the quality of nursing staff is closely related to the overall satisfaction of the hospital.[10] Studies have shown that the mental health of healthcare providers cannot be ignored and there is a need to enhance their mental health.[11]

As psychological resilience affects nurses' willingness to leave their profession,[12] understanding the psychological conditions of nurses is crucial for retention. Regarding China's policy response to the COVID-19 pandemic, nurses in Fujian Province were deployed and involved in epidemic prevention and control in their units as required under the National Health Commission of the People's Republic of China. Controlling the COVID-19 pandemic remains a significant public health challenge in China. Hospital nurses, as the principal healthcare workers involved in nucleic acid testing for COVID-19, are often required to undertake such testing. Hospitals play a critical role in combating the epidemic, and its impact on nursing staff permeates their work. Therefore, we investigated the current situation concerning burnout, emotional labor, and psychological resilience among gastrointestinal nurses during the COVID-19 pandemic. However, the focus in terms of the study population was not on nurses directly involved in caring for patients with COVID-19.

As key healthcare workers in the fight against the pandemic,[13] Chinese nurses take care of patients while undertaking various aspects of prevention and control. They are prone to psychological adjustment imbalances because of multiple challenges and pressures. Additionally, studies have shown that providing healthcare affects mental health significantly[14] and have emphasized the importance of exploring psychological resilience support for healthcare workers with burnout.[15]

The first author of this study has worked in the field of gastroenterology for an extensive period and is very concerned about the psychological condition of gastroenterology nurses. One aim of this study is to prompt future related studies to reduce burnout, manage emotional labor, and improve psychological resilience among gastroenterology nurses.

Job burnout, also known as "job fatigue," was first discussed by the American psychiatrist Herbert Freudenberger[16] in 1974. In 1981, Maslach[17] defined burnout as a syndrome involving excessive physical and mental exertion and energy depletion caused by an individual's prolonged exposure to stress, also known as burnout syndrome. An international survey in the United States showed a growing global trend in nurse burnout,[18] which is consistent with the findings of Aiken et al.[19] Numerous countries have high rates of burnout among nurses, such as Japan[19] (33%–60%), South Africa[20] (34.6%), and Spain[21] (21%). Moreover, the total burnout detection rate among Chinese nurses has been reported to be 69.21%.[22] Additionally, numerous studies have shown that nurses are at high risk of burnout.[23] High levels of emotional exhaustion in response to the COVID-19 outbreak have been associated with increased work intensity, the tension between doctors and patients, and a lack of communication with managers.[24] This situation seriously affects nurses' physical and mental health and reduces the quality of nursing care.[25] Furthermore, Hong Luo[26] reported a significant correlation between emotional labor and burnout.

"Emotional labor," first proposed in 1979 by the American social psychologist Arlie Hochschild,[27] is a term used about employees who consciously manage their emotions at work and display visible external expressions and body movements to the public.[28] Throughout the interdisciplinary literature, emotional labor has two attributes: a) autonomous or spontaneous emotional expression,[29, 30] also referred to as an autonomic emotional regulation,[31] and b) according to the middle-range theory of emotional labor,[32, 33] representation of the self as a working persona including both surface acting (i.e., expression of superficially felt emotions, including fake, unfelt emotions or suppression of felt emotions)[29, 30] and deep acting (i.e., expression of deeply felt emotions, and modification of felt emotions to match displayed emotions).[29, 30, 34, 35] Surface

acting is analogous to a nurse's smile while working in a hospice, in which the nurse seems to care about the patient and tries to match their emotions to the patient's emotions.[36] In contrast, deep acting implies that nurses connect with patients and project themselves therapeutically.[36] As their work is emotionally intensive, nurses continually confront and manage the negative emotions of patients and their families.[37] Diefendorff et al.[38] found that nurses were subjected to a higher emotional load. Similar results have been reported in the Chinese context. Numerous studies have shown moderate to high levels of emotional labor in nurses who work in the emergency[39] and cardiology departments.[40] Frequent and excessive use of emotional labor intensifies nurses' fatigue and burnout, which increases their propensity to leave their profession.[41] Therefore, it is essential to explore how emotional labor can be properly managed to reduce burnout.

Psychological resilience, also known as "mental toughness" and "bounce-back ability," is a negative predictor of burnout in the United States.[42] It is the ability to move forward positively from a negative, traumatic, or stressful experience.[43] In a study supported by the American Association of Critical-Care Nurses, Mealer showed that 22% of ICU nurses with high levels of psychological resilience[44] tended to exhibit optimism, humor, flexibility, and high ethical standards.[45] Individuals with higher psychological resilience are better able to deal with stressful situations and, thus, maintain good mental health.[46] Along with the rapid development of global healthcare, building the psychological resilience of caregivers has been listed as one of the top ten international "standard of care movements".[47]

Although previous studies have explored the relationship between burnout and emotional labor and between burnout and psychological resilience,[26, 42] the association between these factors has not been adequately discussed in the context of the COVID-19 pandemic concerning gastroenterology nurses. Therefore, this study investigated the current status of burnout, emotional labor, and psychological resilience among gastroenterology nurses during the COVID-19 pandemic, to explore relevant associations among these factors in relation to specific variables,

and to provide evidence-based research to help reduce nurses' burnout, increase their job satisfaction, and promote their psychological health during the COVID-19 pandemic.

Methods

Patients and public involvement

The study did not involve patients. All data for this study were obtained from nurses. Neither the study participants nor members of the public participated in the design, implementation, reporting, or dissemination plans of our research.

Study design

This study used a cross-sectional correlational design.

Research Objectives

This study aimed to investigate the situation of burnout, emotional labor, and psychological resilience among nurses in gastroenterology departments in hospitals in China during the COVID-19 pandemic and to explore their related factors and the associations among these variables. The results are intended to help provide a reference point for hospital administrators to implement interventions.

Setting and sample

This study used a convenience sampling method to select gastroenterology nurses working in Fujian Province, China, from November 24, 2021, to December 26, 2021.

Inclusion criteria were as follows: (1) those who were registered and had a Chinese Nurse Practitioner Certificate; (2) those who had worked in gastroenterology for ≥ 1 year; and (3) those who provided informed consent to participate in this study voluntarily.

Exclusion criteria were as follows: (1) those who were on leave; (2) those undergoing training; or (3) those unable to participate in this study for special reasons (e.g., being hospitalized and having their status changed from nurse to patient; uninterested in participating; having already participated

in a similar study and not wanting to participate again; being too busy with work and thus did not have time to participate).

The sample size was calculated with reference to the sample requirement for multiple linear regression analysis,[48] which is at least ten times the number of independent variables. In this study, the number of independent variables was 14. Considering the likelihood of 10%-20% invalid questionnaires, the final sample content was determined to be 154-168 cases. A total of 458 questionnaires were collected; 345 were valid (75.3% valid return rate); 113 responses were either incomplete or invalid and were excluded, as detailed in a CONSORT diagram in Figure 1.

Variables and instruments

General demographics and work-related characteristics

General demographic information and work-related characteristics were collected from 345 participants at the beginning of the survey. The information included: sex, age, marital status, number of children, academic qualifications, employment category, working years, professional title, department, directly supervised nursing interns, specialty nurses, number of days per month working at night, number of times per month responsible for epidemic prevention and control posts, and monthly income (RMB).

Chinese version of the Maslach Burnout Inventory (MBI-CH)

The Maslach Burnout Inventory is the most extensively used scale for burnout assessment.[17] The Chinese version of the inventory, translated and revised by Dr. Mei-Chi Pang in Hong Kong, was used in this study. The 22-item MBI-CH includes the three dimensions of emotional exhaustion, depersonalization, and personal accomplishment. Regarding its 7-point Likert scale measurement, higher scores on the emotional exhaustion and depersonalization dimensions and lower scores on the personal accomplishment dimension indicate higher burnout. The Cronbach's alpha coefficient was 0.6260,[49] with acceptable reliability.

Chinese version of the Emotional Labor Scale (ELS-CH)

In 2003, Grandey[50] developed the Emotional Labor Scale based on emotion regulation theory. This study uses the Chinese version of this Emotional Labor Scale translated and revised by Luo Hong et al.[26] The 14-item ELS-CH scale includes the three dimensions of surface acting, deep acting, and emotional expression. On its 6-point Likert scale, scores range from 1, indicating strong disagreement, to 6, indicating strong agreement, with higher total scores indicating higher levels of emotional labor. The Cronbach's alpha coefficients for the total scale and the three dimensions were 0.811, 0.711, 0.826, and 0.872,[26] respectively, and the scale has good reliability and validity. This scale has been widely used in studies on nurses.

Chinese Psychological Resilience Scale (PRS-CH)

Connor and Davidson[51] jointly developed the Connor–Davidson Psychological Resilience Scale (CD-RISC). The present study employed the Chinese version of the scale, translated by Yu et al.[52] With a total of 25 items, the PRS-CH comprises three dimensions: resilience, self-improvement, and optimism. The responses are rated on a 5-point Likert scale, with scores ranging from 1 (never) to 5 (almost always). Higher scores indicate better psychological resilience. The Cronbach's alpha coefficient of the total scale was 0.91[52], showing good reliability and validity.

Data collection

The data were collected through an online survey. The researcher, who was the nursing manager of the gastroenterology department in a tertiary care hospital, used Questionnaire Star (a tool for questionnaire surveys) and sent the URL to the survey respondents via WeChat (a popular social application in China). After describing the study's aims and obtaining informed consent, a link to the survey was posted on the nurses' workgroups via WeChat, and the nurses then completed it. After the questionnaire was collected, it was entered and checked by two researchers using Epidata 3.1 software to ensure the validity and completeness of the questionnaire.

Statistical analysis methods

Statistical software (SPSS 24.0) was used for data analysis. Indicators that conform to a normal

distribution and those that do not were expressed as mean ± standard deviation (x ± S) and median (Q1, Q3), respectively. Q1 represents the 25th percentile, and Q3 represents the 75th percentile. Count data were statistically described using frequency and composition ratios. The Shapiro-Wilk method was used for normality testing. T-tests and analysis of variance (ANOVA) were used for measures that met the normal distribution. Fisher's least significant difference method was used for two-way comparison if the ANOVA results showed statistically significant differences. The Mann–Whitney U rank-sum test and the Kruskal–Wallis H test were used for measures that did not meet the normal distribution. The relationship between the two measures' indicators was analyzed using Pearson correlation analysis. The effects of multiple measures on nurses' burnout, emotional labor, and psychological resilience scores were analyzed using multiple linear regression (stepwise method, inclusion: 0.05, exclusion: 0.1), and the differences were regarded as statistically significant at $P < 0.05$.

Results

General information

Basic information about the survey population

Table 1 shows the basic characteristics of the 345 respondents investigated in this study. In total, 341 (98.8%) nurses were women, 166 (48.1%) were under 30 years, 209 (60.6%) were married, 148 (42.9%) had no children, 127 (36.8%) had one child, 172 (49.9%) had a college education, 169 (49.0%) had bachelor's degrees or higher, 177 (51.3%) were permanent staff, 168 (48.7%) were in the labor contract category, 179 (51.9%) did not directly supervise nursing interns, 319 (92.5) were not specialty nurses, and 213 (61.7) earned more than 6,000 RMB per month.

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Table 1. Demographic characteristics of the participants

Variable	n(%)	Burnout			Emotional labor			Psychological resilience		
		mean±SD	*t/t`/F*	*P*	mean±SD	*t/t`/F*	*P*	mean±SD	*t/t`/F*	*P*
Age (years)										
<30	166(48.1)	52.81±21.06	1.21c	0.305	38.54±12.54	0.74c	0.528	69.48±23.07	0.22c	0.883
30–39	136(39.4)	54.45±18.70			39.40±11.84			70.51±20.90		
40–49	40(11.5)	50.73±16.22			38.50±12.20			69.55±25.19		
>50	3(0.9)	35.67±14.01			29.33±12.90			79.00±13.53		
Marital status										
Married	209(60.5)	52.22±21.37	0.66c	0.579	39.49±12.74	3.37c	0.019*	69.05±23.21	0.12c	0.951
Unmarried	126(36.5)	53.27±18.43			37.88±11.73			70.53±22.01		
Divorced	8(2.3)	62.00±22.69			51.25±11.06			69.88±23.85		
Bereaved spouse	2(0.6)	49.50±20.51			40.00±9.90			70.50±6.36		
Number of children										
None	148(42.8)	52.23±21.11	0.48c	0.618	39.41±12.49	3.99c	0.019*	68.60±23.35	0.87c	0.420
One	127(36.8)	54.43±19.29			40.06±11.83			69.97±22.19		
Two	70(20.3)	52.37±16.92			35.19±11.78			72.89±20.57		
Academic qualifications										
Secondary School	4(1.2)	42.75±17.29	0.91c	0.437	37.50±4.80	0.26c	0.856	55.50±37.43	1.99c	0.116
College	172(49.8)	52.40±21.28			38.66±12.40			68.19±24.60		
Bachelor's degree or higher	169(49.0)	54.11±17.83			38.90±12.20			71.97±19.20		
Employment category										
Permanent staff	177(51.3)	51.98±17.08	-1.05a	0.294	37.09±12.52	-2.68b	0.008**	72.60±22.68	2.26a	0.025*
Category Labor contract	168(48.7)	54.21±21.98			40.58±11.65			67.20±21.77		
Working years										
<2	62(18.0)	50.35±22.28	0.95c	0.452	39.29±11.85	0.42c	0.834	67.47±22.58	0.49c	0.784
2–5	56(16.2)	54.41±19.93			38.04±13.65			70.38±20.98		
6–10	79(22.9)	52.57±21.29			38.91±12.45			71.47±23.89		
11–15	70(20.3)	54.59±16.83			37.40±11.61			72.30±20.18		

Table 1. Demographic characteristics of the participants (Continued)

Variable	n(%)	burnout			emotional labor			psychological resilience		
		mean±SD	*t/t`/F*	*P*	mean±SD	*t/t`/F*	*P*	mean±SD	*t/t`/F*	*P*
16–20	31(9.0)	57.97±16.25			40.42±12.60			67.97±23.11		
20+	47(13.6)	50.38±18.49			39.83±12.01			68.15±24.25		
Professional title										
Junior	236(68.4)	53.30±20.53	0.192c	0.825	38.39±12.46	3.460c	0.033*	69.86±22.35	1.349c	0.261
Middle	104(30.1)	52.79±17.44			40.30±12.27			69.44±22.67		
Sub-Senior and Senior	5(1.4)	48.00±22.23			26.60±13.76			86.20±11.99		
Directly supervising nursing interns										
No	179(51.9)	50.68±20.30	-2.36a	0.019*	38.50±12.29	-0.46a	0.649	69.69±22.18	-0.25a	0.805
Yes	166(48.1)	55.64±18.60			39.10±12.16			70.28±22.65		
Specialty nurses										
Yes	26(7.5)	52.91±19.76	-0.53a	0.595	38.50±12.36	-1.58a	0.115	70.01±22.57	0.09a	0.429
No	319(92.5)	55.04±18.08			42.42±9.73			69.58±20.21		
Number of days per month working at night										
0	67(19.4)	47.96±20.42	3.34c	0.020*	38.01±11.62	0.31c	0.816	72.18±20.31	0.77c	0.514
1-4	113(32.8)	51.44±19.53			38.30±12.51			69.64±22.85		
5-9	133(38.6)	56.53±19.63			39.37±12.34			68.27±23.66		
≥10	32(9.3)	55.09±15.71			39.75±12.25			73.63±19.26		
Monthly income (RMB**)**										
<4000	36(10.4)	47.03±26.51	2.68c	0.070	39.36±11.09	0.47c	0.628	58.86±26.17	5.63c	0.004**
4000-5999	96(27.8)	55.80±17.08			39.68±12.72			69.33±22.60		
≥6000	213(61.7)	52.85±19.20			38.30±12.20			72.14±21.09		

Note: a: two independent samples t-test; b: t'-test; c: analysis of variance; *$P < 0.05$； **$P < 0.01$.

Burnout score results for the nurses

The total burnout score of nurses was 53.07 ± 19.63 with a mean entry score of 2.41 ± 0.89, with a score of 14.37 ± 13.49 on the dimension of emotional exhaustion, 1.00 (0.00, 5.00) on the dimension of depersonalization, and 35.18 ± 13.40 on the dimension of personal fulfilment as detailed in Table 2. This result indicates that nurses' accomplishments were high, while the levels of emotional exhaustion and depersonalization were low.

Table 2. MBI-CH, ELS-CH, and PRS-CH scores

Questionnaire	Projects	Entry	Score range	Total Score	Entry parity score
Burnout					
	Emotional exhaustion	9	0–54	14.37±13.49	1.60±1.50
	Depersonalization	5	0–30	1.00 (0.00, 5.00)	0.20 (0.00,1.00)
	Personal fulfillment	8	0–48	35.18±13.40	4.40±1.68
	Total burnout score	22	0–110	53.07±19.63	2.41±0.89
Emotional labor					
	Surface acting	7	7–42	19.71±8.45	2.82±1.21
	Emotional expression	4	4–24	12.01±5.35	3.00±1.34
	Deep acting	3	3–18	7.07±4.12	2.36±1.37
	Total Emotional Labor Score	14	14–84	38.79±12.22	2.77±0.87
Psychological resilience					
	Toughness	13	0–52	37.47±11.89	2.88±0.91
	Self-improvement	8	0–32	21.29±7.48	2.66±0.94
	Optimism	4	0–16	11.21±3.98	2.80±0.99
	Total Psychological Resilience Score	25	0–100	69.97±22.38	2.80±0.90

Emotional labor score results for the nurses

The total score of the emotional labor of nurses was 38.79 ± 12.22, the mean score of entries was 2.77 ± 0.87, and the mean scores of entries in the three dimensions from highest to lowest, were emotional expression (3.00±1.34), surface acting (2.82±1.21), and deep acting (2.36±1.37), as shown in Table 2. This result indicates that deep acting was less used in nurses' work, while emotional expression and superficial play were more applied.

Psychological resilience score results for the nurses

The total psychological resilience score of the nurses was 69.97 ± 22.38 and the mean score of the

entries was 2.80 ± 0.90, including the score of the toughness dimension (37.47 ± 11.89), the score of the self-improvement dimension (21.29 ± 7.48), and the score of the optimism dimension (11.21±3.98). These are shown in Table 2.

Effects of different demographic characteristics on burnout, emotional labor, and psychological resilience of nurses

The effect of different demographic characteristics on nurses' burnout

Demographic characteristics such as whether they directly supervised nursing interns and the number of days per month working at night affected nurses' burnout, and the differences were statistically significant. Nurses who directly supervised nursing interns had higher levels of burnout, as detailed in Table 1.

Effects of different demographic characteristics on nurses' emotional labor

Demographic characteristics such as marital status, number of children, employment category, and professional title affected nurses' emotional labor, and the differences were statistically significant. A two-by-two comparison showed that, in terms of marital status, widowed = unmarried = married < divorced, indicating that the emotional labor of divorced nurses was higher than that of nurses with other marital status. In terms of the number of children, having two children < no children = having one child. In terms of employment category, permanent staff < category labor contract. In terms of professional title, junior nurse = middle nurse > sub-senior and senior nurse, as detailed in Table 1.

The effect of different demographic characteristics on nurses' psychological resilience

Employment category and monthly income affected nurses' psychological resilience, and the difference was statistically significant. A two-by-two comparison showed that, in terms of forms of employment, category labor contract < permanent staff; in terms of monthly income, less than 4000 (RMB) < 4000–5999 (RMB) = greater than or equal to 6000 (RMB), as detailed in Table 1.

The relationship between emotional labor, psychological resilience, and burnout in nurses

The relationship between burnout and emotional labor in nurses

The results of the Pearson correlation analysis showed that the nurses' burnout was positively correlated with their total emotional labor scores ($r = 0.386$, $P < 0.001$) and that their burnout was

positively correlated with two dimensions of emotional labor, namely, surface acting (r = 0.450, $P < 0.001$), and emotional expression (r = 0.403, $P < 0.001$) and negatively correlated with deep acting (r = 0.303, $P < 0.001$).

The relationship between emotional labor and psychological resilience in nurses

The results of the Pearson correlation analysis showed that the nurses' emotional labor was negatively correlated with their total psychological resilience scores (r = -0.330, $P < 0.001$) and that their emotional labor was negatively correlated with toughness (r = -0.323, $P < 0.001$), self-improvement (r = -0.297, $P < 0.001$), and optimism (r = -0.332, $P < 0.001$).

Multiple linear regression analysis of predictors of burnout, emotional labor, and psychological resilience in nurses

Multiple linear regression analysis of predictors of burnout among the nurses

The number of days per month working at night and whether they directly supervised nursing interns were predictors of burnout. The results of the multiple linear regression analysis showed that there was a positive relationship between both these factors and burnout, as detailed in Table 3.

Table 3. Results of multiple linear regression in terms of MBI-CH, ELS-CH, and PRS-CH scores

Variables	*B*	*SE*	*b*	*t*	*P*	*R2*	Adjusted *R2*	*F*	*P*
Burnout						0.038	0.032	6.753	0.001
Constant	43.106	3.068	-	14.050	<0.001				
Number of days per month working at night	3.236	1.157	0.149	2.798	0.005				
Directly supervising nursing interns	4.715	2.082	0.120	2.265	0.024				
Emotional Labor						0.044	0.033	3.940	0.004
Constant	36.703	0.971	-	37.811	<0.001				
Employment category	3.196	1.362	0.131	2.346	0.020				
Married	ref								
Unmarried	0.608	1.421	0.024	0.428	0.669				
Divorced	12.550	4.342	0.155	2.890	0.004				
Bereaved spouse	3.297	8.550	0.021	0.386	0.700				
Psychological Resilience						0.027	0.024	9.607	0.002
Constant	56.286	4.574	-	12.307	<0.001				

Monthly income	5.447	1.757	0.165	3.100	0.002

Note: B: unstandardized coefficients; b: standardized coefficients; SE: standard error.

Multiple linear regression analysis of predictors of the nurses' emotional labor

The nurses' employment category and marital status were predictors of emotional labor. The results of the multiple linear regression analysis showed that there was a positive relationship between both these factors and burnout, as detailed in Table 3.

Multiple linear regression analysis of predictors of psychological resilience of the nurses

The results of the multiple linear regression analysis showed that the monthly income of the nurses was a predictor of psychological resilience, with a positive effect, as detailed in Table 3.

Discussion

The objectives of this study were to survey the current status of burnout, emotional labor, and psychological resilience among gastroenterology nurses during the COVID-19 pandemic, to explore the factors associated with them.

According to the China Health Statistics Yearbook 2020, RNs with a bachelor's degree or higher accounted for 23.8% of nurses, graduate students accounted for only 0.2%, and nurses with secondary school education accounted for 26.8%. However, the sites where the data were collected for this study were all tertiary class A hospitals, which recruit nurses with a higher educational threshold, which explains why the percentage of nurses with bachelor's degrees or higher was 49.0% in this study compared with what was generally the case in 2020. It should also be noted that most of the included nurses with high seniority did not have a bachelor's degree when they joined the profession. However, in recent years, China has increasingly emphasized the importance of the nursing workforce in terms of policy and encouraged in-service nursing staff to upgrade their education. They also promoted nursing staff to improve their research ability and consequently their ability to care for patients. In response, hospitals have gradually increased their recruitment of bachelor's degree graduates; however, the finding that half of the nurses still did not have a bachelor's degree indicates that this commitment to fostering higher levels of education among nurses is an ongoing process.

The findings revealed that the total burnout score of nurses was higher than that of Tian et al.,[22] which may be explained by that study conducted in 2014, that is, the pre-COVID-19 period. As

nurses working in the fight against the pandemic have worked more than usual during this time, this might have increased their burnout levels. Many studies have reported varying levels of burnout among different groups of nurses. Liang[53] showed that the total burnout score of ICU nurses was higher than that found in this study, which may be related to factors such as the more severe conditions of ICU patients, more frequent night shifts for nurses, heavier workloads, greater labor intensity, and a shortage of human resources. A study by Li [54] showed that nurses in intravenous drug administration centers had higher scores on the dimension of emotional exhaustion and lower scores on the dimension of personal fulfillment than in this study, which may be related to the fact that nurses in intravenous drug administration centers are at a higher risk of occupational injury,[54] the working environment is more confined, and nurses have less direct contact with patients and family members.

Regarding emotional labor, the total score found for the nurses was lower than that reported by Wu et al.[55] This may be related to the fact that Wu et al. surveyed 11,337 nurses from 92 hospitals, most of whom were from hospital emergency and surgery departments, which have a heavier workload and more intense work compared to gastroenterology. This may have increased the level of emotional labor of nurses to some extent. The present study suggests that the nurses tended to adopt more superficial play at work; they often engaged in emotional camouflage and only displayed pleasing emotions to patients. To a certain extent, this indicates a poor professional identity among these nurses.[26]

In this study, the psychological resilience scores were higher than those of Afshari et al.[56] The reason for this could be the difference in the time of the study surveys being conducted. When the current study was initiated, understanding of the new coronavirus was more significant, as was knowledge among the population concerning the preventive effects of vaccination and how to implement and run vaccination programs smoothly. Nurses have improved their prevention, control management, and response skills, resulting in a relatively higher level of psychological resilience. Therefore, nurses have been able to deal more positively with stress, recover quickly, and adapt positively to stress factors.

This study showed that nurses who directly supervised nursing interns had higher levels of burnout, which may be related to the increased teaching workload and the emotional drain. The higher level of burnout among nurses with a more frequent number of days per month working at night may be related to the increased frequency of changes in work and rest schedules, which would have

increased the physiological and psychological burden placed on them. This study showed higher levels of emotional labor among divorced nurses, which accords with the findings of Zhu et al.[57] This may be linked to the fact that divorce increases the emotional burden on nurses, alongside work pressure, which renders them more prone to anxiety, sadness, and other negative emotions. The lower level of emotional labor and the higher level of psychological resilience found among the nurses on the permanent staff may be related to the fact that nurses on staff are more stable and have a lower turnover rate. The higher level of emotional labor among junior and middle nurses than among the sub-senior and senior nurses may be related to the difference in years of experience and heavier emotional load. The monthly income level indicates the value hospitals place on their nurses for their hard work and reflects the level of support given to the nursing department. This level of support has a significant effect on nurses' psychological resilience; the greater the level of support, the higher the overall level of nurses' psychological resilience.[58]

The present study showed that nurse burnout was negatively correlated with the deep acting dimension of emotional labor and was positively correlated with the other two dimensions, which accords with a previous study.[26] With developing awareness among increasing numbers of individuals in medicine, patients are paying more attention to their medical experience, and patient satisfaction has become an important criterion for measuring the level of medical care, which requires nurses to have advanced levels of competence in handling the nurse-patient relationship. As shown in Brotheridge et al.,[59] the behavior of showing emotions that are inconsistent with one's actual inner experience weakens one's sense of self-worth, and this process requires more psychological resources for nurses to show appropriate emotional behavior. Excessive consumption of physical and mental resources over a long period can easily lead to psychological fatigue, thus aggravating emotional exhaustion and depersonalization. In contrast, deep acting means that nurses can adjust their genuine feelings and understanding to adapt to the situation, and such behavior of aligning internal feelings with external emotional performance appropriately consumes less physical and mental resources. However, individuals do not need to require more resources to suppress their true emotions, and they are compensated with patients' emotional reactions, which helps in achieving a balance of psychological resources, in turn, reducing nurses' burnout. A study by Wang et al.[60] concluded that the more nurses express their emotions authentically, the more committed they are to their work.

The present study showed that nurses' emotional labor was negatively related to psychological

resilience and its three dimensions. From this study's results, it would appear that nurses who show more resilience, self-improvement, and optimism are more likely to adopt deeper roles in their work and have a higher sense of professional identity. Therefore, it is necessary to improve the psychological well-being of nurses and increase their psychological resilience during the COVID-19 pandemic and other similar events. Some studies have shown that mindfulness-based stress reduction and psychotherapy centered on positive thinking can help reduce nurses' workload stress, help them establish a healthy psychological state,[61] and improve their levels of psychological resilience.[62] Studies have shown that surface acting negatively correlates with job satisfaction, while deep acting has a positive relationship with job satisfaction.[55] This study's results suggest that, by improving nurses' psychological resilience, nurses can be encouraged to engage in more deep acting, which is likely to help increase nurses' professional identity and job satisfaction.

This study provides valuable insights into the current state of burnout, emotional labor, and psychological resilience among gastroenterology nurses during the COVID-19 pandemic. However, the study has several limitations. First, the findings are cross-sectional, precluding the drawing of any conclusions about the impact of COVID-19. Comparison of the findings with pre-pandemic studies requires caution, as the observed status may be due to factors unrelated to the pandemic. Second, this study was only conducted in one province of China using a convenience sampling method, which is not representative of other regions, or of departments and other personnel in hospitals, meaning that these findings are not generalizable. Third, as 98.8% of the participants were female, more attention should be paid to male nurses in the future. Fourth, the difficulty of data collection during the pandemic may have led to possible bias in data interpretation. In addition, the scope of one questionnaire may not be sufficient to summarize nurses' actual levels of burnout, emotional labor, and psychological resilience. Given the possibility of a "social desirability" effect, nurses' self-reported burnout may be lower. Therefore, actual burnout may be higher than the reported results, which would reduce the reliability of the results of this study. The response rate was relatively good, although approximately a quarter of the participants did not respond. As not responding may be a sign of burnout, this study might have underestimated the prevalence of burnout among the study population.

Conclusion

This study was conducted during the COVID-19 pandemic to investigate whether the pandemic

impacted the psychological state of nurses in relation to burnout, emotional labor, and psychological resilience and to provide guidance for subsequent burnout prevention and control efforts. Greater adoption of deep acting by nurses can be promoted by improving their psychological resilience, which can help improve emotional labor, thereby reducing burnout and decreasing turnover rates. Senior management needs to pay attention to the psychological status of nurses. Therefore, qualitative, longitudinal, and interventional studies should be conducted to explore the psychological condition of nurses, expand the research indexes of nurses' psychological characteristics, construct models of nurses' psychological resilience, and further track the long-term effects of interventions while evaluating the immediate effects of interventions.

Acknowledgments

The authors thank all the participants for their cooperation and the nursing management staff of the cooperative hospitals for their support in this study.

Ethics approval

This study involved human participants and was approved by the Branch for Medical Research and Clinical Technology Application, the Ethics Committee of the First Affiliated Hospital of Fujian Medical University (MRCTA, ECFAH of FMU [2021]393). The participants gave informed consent to participate in the study before taking part.

Author contribution statement

Huayan Lin and **Zhangjie Li** contributed equally to this study. **Zhangjie Li** was responsible for manuscript preparation. **Huayan Lin** contributed to designing the study and supervised the research. **Huayan Lin, Zhangjie Li,** and **Mengting Yan** contributed to the review of the data and manuscript. All authors have reviewed and approved the manuscript.

Competing interests

All authors have no conflict of interest.

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for-profit sectors.

Data availability statement

Data are available from Huayan Lin (email: fjydfykyxx@163.com) upon reasonable request.

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Figure 1 CONSORT diagram regarding the sampling process

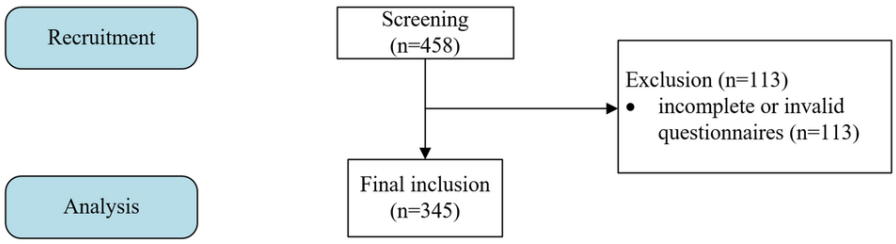

Figure 1 CONSORT diagram regarding the sampling process

90x90mm (300 x 300 DPI)

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	pages 1-2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	pages 2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	pages 3-7
Objectives	3	State specific objectives, including any prespecified hypotheses	pages 6-7
Methods			
Study design	4	Present key elements of study design early in the paper	page 7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	pages 7-8
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	pages 7-8
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	/
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	pages 8-9
Bias	9	Describe any efforts to address potential sources of bias	page 9
Study size	10	Explain how the study size was arrived at	page 8
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	/
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	pages 9-10
		(*b*) Describe any methods used to examine subgroups and interactions	/
		(*c*) Explain how missing data were addressed	/
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	page 7
		(*e*) Describe any sensitivity analyses	/
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	/
		(b) Give reasons for non-participation at each stage	/
		(c) Consider use of a flow diagram	page 8
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	pages 10-12
		(b) Indicate number of participants with missing data for each variable of interest	/

Outcome data	15*	Report numbers of outcome events or summary measures	pages 13-16
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	/
		(*b*) Report category boundaries when continuous variables were categorized	/
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	/
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	/
Discussion			
Key results	18	Summarise key results with reference to study objectives	pages 16-19
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	page 19
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	page 20
Generalisability	21	Discuss the generalisability (external validity) of the study results	page 19
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	page 21

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.