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# BMJ Open

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

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4 1 **Burnout, emotional labor, and psychological resilience among**  
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7 2 **gastroenterology nurses during COVID-19: A cross-sectional study**  
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10 4 **Huayan Lin<sup>1\*</sup>, Zhangjie Li<sup>2</sup>, Mengting Yan<sup>1</sup>**  
11  
12  
13 5

14 6 <sup>1</sup> Department of Gastroenterology, the first affiliated Hospital of Fujian Medical University,  
15  
16 Fuzhou, China  
17

18 8 <sup>2</sup> The School of Nursing, Fujian Medical University, Fuzhou, China  
19  
20  
21 9

22 10 **ORCID iDs**  
23

24 11 **Huayan Lin** <https://orcid.org/0000-0003-4734-2369>  
25

26 12 **Zhangjie Li** <https://orcid.org/0000-0003-1824-2078>  
27

28 13 **Mengting Yan** <https://orcid.org/0000-0002-6061-3306>  
29  
30  
31 14

32 15 **\*CORRESPONDING AUTHOR**

33 16 Huayan Lin, Department of Gastroenterology, the First Affiliated Hospital of Fujian Medical  
34  
35 University, No.20 Chazhong Road, Taijiang District, Fuzhou City, Fujian Province, 350005,  
36  
37 China; e-mail:fjydfykyxx@163.com; Tel.: +8613655023506  
38  
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42 20 **ETHICS APPROVAL**

43  
44 21 This study was approved by the Branch for Medical Research and Clinical Technology Application,  
45  
46 22 the Ethics Committee of the First Affiliated Hospital of Fujian Medical University (MRCTA,  
47  
48 23 ECFAH of FMU [2021]393).  
49  
50 24

51 25 **CONTRIBUTIONS**  
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53  
54 26 **Zhangjie Li** was responsible for manuscript preparation. **Huayan Lin** contributed to  
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4 27 designing the study and supervised the research. **Huayan Lin, Zhangjie Li,** and  
5  
6  
7 28 **Mengting Yan** contributed to the review of the data and manuscript.  
8  
9

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#### 11 30 **DATA AVAILABILITY STATEMENT**

12  
13 31 Data are available from Huayan Lin (email: fjdffykyxx@163.com) upon reasonable request.  
14  
15

16

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24  
25

26

#### 27 38 **Abstract**

28  
29 39 **Objectives:** To investigate the relationship between burnout, emotional labor, and psychological  
30  
31 40 resilience of gastroenterology nurses during the COVID-19 pandemic and explore the factors  
32  
33 41 associated with them.  
34

35 42 **Design:** A multicenter cross-sectional study with anonymous self-reporting was conducted from  
36  
37 43 November 24, 2021 to December 26, 2021.  
38

39 44 **Setting:** The study was conducted in Fujian Province.  
40

41 45 **Participants:** Participants were 345 gastroenterology nurses of seven tertiary hospitals.  
42

43 46 **Primary and secondary outcome measures:** Burnout, emotional labor, and psychological  
44  
45 47 resilience were the primary outcome measures.  
46

47 48 **Measures:** Using a convenience sampling method, the data were collected using Questionnaire  
48  
49 49 Star (a tool for questionnaire surveys) via WeChat. The Chinese version of Maslach Burnout  
50  
51 50 Inventory, the Chinese version of the Emotional Labor Scale, and the Chinese version of the  
52  
53 51 Psychological Resilience Scale were used to evaluate burnout, emotional labor, and psychological  
54  
55 52 resilience, respectively.  
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4 53 **Results:** The total scores of burnout, emotional labor, and psychological resilience of  
5  
6 54 gastroenterology nurses were  $53.07 \pm 19.63$ ,  $38.79 \pm 12.22$ , and  $69.97 \pm 22.38$ , respectively, with less  
7  
8 55 use of deep play and more use of superficial play. Pearson correlation analysis showed that burnout  
9  
10 56 was positively correlated with both dimensions of emotional labor, surface play, and emotional  
11  
12 57 expression requirements whereas it was negatively correlated with deep play. There was a negative  
13  
14 58 correlation between emotional labor and all three dimensions of psychological resilience.

15  
16 59 **Conclusions:** Greater adoption of deep play by nurses can be promoted by improving their  
17  
18 60 psychological resilience during the pandemic, which can help to improve emotional labor, thereby  
19  
20 61 reducing burnout, and decreasing turnover rates. Senior management in hospitals need to pay  
21  
22 62 attention to the psychological status of nurses. Further interventional studies could be conducted  
23  
24 63 in the future to explore relevant measures.

25  
26 64 **Keywords** burnout; emotional labor; psychological resilience; COVID-19; cross-sectional study  
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29

### 30 66 **Strengths and Limitations**

- 31  
32 67 • The study was implemented to investigate the relationship between burnout, emotional  
33  
34 68 labor, and psychological resilience in gastroenterology nurses during the COVID-19  
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36 69 pandemic.
  - 37  
38 70 • This study was conducted only in one province of China using a convenience sampling  
39  
40 71 method, which is not representative of other regions, departments, and other personnel in  
41  
42 72 the hospital, meaning that these findings are not generalizable.
  - 43  
44 73 • In addition, 98.8% of the participants were female; more attention should be paid to male  
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46 74 nurses in the future.
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48 75 • As self-reported measures were considered for analysis, the reliability of the results is  
49  
50 76 reduced and these should be interpreted with caution.
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### 56 78 **Introduction**

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4 79 Since the World Health Organization recognized the Coronavirus disease 2019 (COVID-19)  
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6 80 pandemic as a “public health emergency of international concern”,<sup>[1]</sup> more than 243 million  
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8 81 confirmed cases and more than 4.9 million deaths have been reported worldwide, as of October  
9  
10 82 24, 2021.<sup>[2]</sup>

11  
12 83 Annette Kennedy, president of the International Council of Nurses, showed that nurses have played  
13  
14 84 an important role in maintaining people's health during the pandemic.<sup>[3]</sup> However, the shortage of  
15  
16 85 nurses is a global public health issue. Falatah<sup>[4]</sup> suggested that the pandemic appeared to have  
17  
18 86 significantly increased the mean nurses' turnover intention rate. By the end of 2020, the total  
19  
20 87 number of registered nurses (RNs) in China exceeded 4.7 million, which translates to 3.35 RNs  
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22 88 for every 1000 people.<sup>[5]</sup> This has not yet reached the world national average of 3.816 RNs per  
23  
24 89 1000 people.<sup>[6]</sup>

25  
26 90 Since psychological resilience impacts nurses' willingness to leave their profession,<sup>[7]</sup>  
27  
28 91 understanding the psychological conditions of nurses is crucial. As the backbone of the fight  
29  
30 92 against the pandemic,<sup>[8]</sup> Chinese nurses take care of patients while undertaking various aspects of  
31  
32 93 prevention and control work. They are prone to psychological adjustment imbalances because of  
33  
34 94 multiple challenges and pressures. Additionally, studies have shown that their mental health is  
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36 95 greatly affected in the process,<sup>[9]</sup> emphasizing the importance of exploring psychological resilience  
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38 96 support for medical workers with burnout.<sup>[10]</sup> Although previous studies have explored the  
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40 97 relationship between burnout and emotional labor, and burnout and psychological resilience,<sup>[11, 12]</sup>  
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42 98 the association between them has not been adequately discussed in the background of the COVID-  
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44 99 19's situation for gastroenterology nurses. Therefore, the purpose of this study was to investigate  
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46 100 the current status of burnout, emotional labor, and psychological resilience among  
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48 101 gastroenterology nurses during the COVID-19 pandemic, to explore their associated factors and  
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50 102 the relationship between them, and to provide a basis for improving nurses' professional identity  
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52 103 and job satisfaction and promoting their psychological health during the COVID-19 pandemic.

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4 104 Job burnout, also known as “job fatigue,” was first discussed by the American psychiatrist  
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6 105 Freudenberger<sup>[13]</sup> in 1974. In 1981, Maslach<sup>[14]</sup> defined burnout as a syndrome of excessive  
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8 106 physical and mental exertion, and energy depletion caused by an individual's prolonged exposure  
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10 107 to stress, also known as burnout syndrome. An international survey in the United States shows a  
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12 108 global trend in nurse burnout,<sup>[15]</sup> which is consistent with the findings of Aiken et al.<sup>[16]</sup> Numerous  
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14 109 countries have high rates of burnout among nurses, such as Japan (33%–60%),<sup>[16]</sup> South Africa<sup>[17]</sup>  
15  
16 110 (34.6%), and Spain<sup>[18]</sup> (21%). Moreover, the total burnout detection rate among Chinese nurses is  
17  
18 111 69.21%.<sup>[19]</sup> Additionally, numerous studies have shown that nurses are at high risk of burnout<sup>[20]</sup>;  
19  
20 112 high levels of emotional exhaustion as a response to the outbreak were associated with high work  
21  
22 113 intensity, tension between doctors and patients, and lack of communication with managers.<sup>[21]</sup> This  
23  
24 114 seriously impacts the physical and mental health of nurses, and also reduces the quality of nursing  
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26 115 care.<sup>[22]</sup> To illustrate, Hong Luo<sup>[11]</sup> discovered a significant correlation between emotional labor  
27  
28 116 and burnout.

29  
30 117 “Emotional labor,” first proposed in 1979 by American social psychologist Hochschild,<sup>[23]</sup> refers  
31  
32 118 to employees who consciously manage their emotions at work and perform external expressions  
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34 119 and body movements that are visible to the public, including three variable performance strategies:  
35  
36 120 surface play, deep play, and emotional expression requirements.<sup>[24]</sup> As an emotionally intensive  
37  
38 121 group, nurses continually confront and manage the negative emotions of patients and their  
39  
40 122 families.<sup>[25]</sup> Diefendorff et al.<sup>[26]</sup> found that nurses were subjected to a higher emotional load.  
41  
42 123 Similar results were found in the context of China. Numerous studies have shown the presence of  
43  
44 124 moderate to high level of emotional labor in nurses who work in the emergency<sup>[27]</sup> and cardiology  
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46 125 departments.<sup>[28]</sup> Frequent and excessive use of emotional labor increased nurses’ fatigue and  
47  
48 126 burnout, which increased their propensity to leave their profession.<sup>[29]</sup> Therefore, it is essential to  
49  
50 127 explore how emotional labor can be properly managed to reduce burnout.

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52 128 Psychological resilience, also known as “mental toughness” and “bounce-back ability,” was a  
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54 129 negative predictor of burnout in the United States,<sup>[12]</sup> in line with the findings of Rushton et al.<sup>[12]</sup>  
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4 130 It is defined as the ability to move forward in a positive way from a negative, traumatic or stressful  
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6 131 experience.<sup>[30]</sup> In a study supported by the American Association of Critical-Care Nurses, Mealer  
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8 132 showed that only 22% of ICU nurses with high levels of psychological resilience<sup>[31]</sup> exhibited  
9  
10 133 optimism, humor, flexibility, and high morality levels.<sup>[32]</sup> Individuals with higher psychological  
11  
12 134 resilience are better able to deal with stressful situations and, thus, maintain good mental health.<sup>[33]</sup>  
13  
14 135 Along with the rapid development of global healthcare, building the psychological resilience of  
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16 136 caregivers has been listed as one of the top ten international “standard of care movements”.<sup>[34]</sup>  
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18 137

## 19 20 138 **Methods**

### 21 22 139 *Study design*

23  
24 140 This study used a cross-sectional design.

### 25 26 141 *Research Objectives*

27  
28 142 This study aims to investigate the situation of burnout, emotional labor, and psychological  
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30 143 resilience of nurses in the department of gastroenterology at a hospital in China during the COVID-  
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32 144 19 pandemic; it intends to explore their related factors and the relationships among these variables  
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34 145 such that after understanding a certain variable, the situation of the other two variables can be  
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36 146 inferred according to the relationship between these three variables. This is helpful for hospital  
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38 147 managers to understand the professional identity, emotion, and psychological state of nurses and  
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40 148 promote the implementation of corresponding treatment measures.

### 41 42 149 *Setting and sample*

43  
44 150 This study used a convenience sampling method to select gastroenterology nurses in Fujian  
45  
46 151 Province from November 24, 2021 to December 26, 2021.

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48 152 Inclusion criteria were as follows: (1) Registered and Obtained Chinese Nurse Practitioner  
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50 153 Certificate; (2) worked in gastroenterology for  $\geq 1$  year; and (3) provided informed consent and  
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52 154 voluntary participation in this study.  
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4 155 Exclusion criteria were as follows: (1) Those who were on leave; (2) undergoing training; or (3)  
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6 156 unable to participate in this study for special reasons.

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8 157 The sample size was calculated with reference to the sample requirement in the multiple linear  
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10 158 regression analysis,<sup>[35]</sup> which is at least 10 times the number of independent variables. In this study,  
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12 159 the number of independent variables was 14. Considering 10%-20% invalid questionnaires, the  
13  
14 160 final sample content was determined to be 154-168 cases. A total of 458 questionnaires were  
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16 161 collected; of these, 345 were valid (75.3% valid return rate); 113 responses were either incomplete  
17  
18 162 or invalid and were, therefore, excluded.

### 19 20 163 ***Variables and instrument***

#### 21 22 164 *General demographics and work-related characteristics*

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24 165 General demographic information and work-related characteristics were collected from 345  
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26 166 participants at the beginning of the survey. The information included: gender, age, marital status,  
27  
28 167 number of children, academic qualifications, employment category, working years, professional  
29  
30 168 title, department, directly supervise nursing interns, specialty nurses, number of days per month  
31  
32 169 working at night, number of times per month responsible for epidemic prevention and control posts,  
33  
34 170 and monthly income (RMB).

#### 35 36 171 *Chinese version of Maslach Burnout Inventory (MBI-CH)*

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38 172 The Maslach Burnout Inventory is the most extensively used scale.<sup>[14]</sup> The Chinese version of the  
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40 173 Scale, translated and revised by Dr. Mei-Chi Pang in Hong Kong, was used in this study. The 22-  
41  
42 174 item scale included the three dimensions of emotional exhaustion, depersonalization, and personal  
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44 175 accomplishment. Using the Likert 7-point scale, higher scores on the emotional exhaustion and  
45  
46 176 depersonalization dimensions and lower scores on the personal accomplishment dimension  
47  
48 177 indicated higher burnout. The homogeneous reliability  $\alpha=0.6260$  has been tested in previous  
49  
50 178 studies and has high credibility.<sup>[36]</sup>

#### 51 52 179 *Chinese version of the Emotional Labor Scale (ELS-CH)*

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54 180 In 2003, Grandey<sup>[37]</sup> developed the Emotional Labor Scale based on the emotion regulation theory.

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4 181 In this study, the Chinese version of the Emotional Labor Scale, translated and revised by Luo  
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6 182 Hong et al.<sup>[11]</sup> in 2008, was used. The 14-item scale included the three dimensions of surface play,  
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8 183 deep play, and emotional expression requirements. A 6-point Likert scale was used, with scores  
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10 184 ranging from 1, indicating strong disagreement, to 6, indicating strong agreement. Higher total  
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12 185 scores indicate higher levels of emotional labor. The Cronbach's alpha coefficients for the total  
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14 186 scale and the three dimensions were 0.811, 0.711, 0.826, and 0.872,<sup>[11]</sup> respectively, and the scale  
15  
16 187 has good reliability and validity. This scale has been widely used with nurses.

### 188 *Chinese Psychological Resilience Scale (PRS-CH)*

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20 189 Connor and Davidson<sup>[38]</sup> jointly developed the Connor-Davidson Psychological Resilience Scale  
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22 190 (CD-RISC). In the present study, the Chinese version of the scale, translated by Yu et al.<sup>[39]</sup> in  
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24 191 2007, was used. With a total of 25 items, it comprises three dimensions: resilience, self-  
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26 192 improvement, and optimism. The responses are rated on a 5-point Likert scale, with scores ranging  
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28 193 from of 1 (never) to 5 (almost always). Higher scores indicate better psychological resilience. The  
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30 194 Cronbach's alpha coefficient of the total scale was 0.91<sup>[39]</sup> with good reliability and validity.

### 32 195 ***Data collection***

33  
34 196 The data were collected through an online survey. The researcher, who was the nursing manager  
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36 197 of the gastroenterology department in a tertiary care hospital, used Questionnaire Star (a tool for  
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38 198 questionnaire surveys) and sent the URL to the survey respondents via WeChat (a popular social  
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40 199 application in China). After describing the aims of the study and obtaining informed consent, a  
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42 200 link to these scales was posted on the nurses' workgroups via WeChat, then the nurses filled it out.  
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44 201 After the questionnaire was collected, it was entered and checked in pairs, using the software  
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46 202 Epidata 3.1, to ensure the validity and completeness of the questionnaire.

### 48 203 ***Statistical analysis methods***

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50 204 Statistical software (SPSS 24.0) was used for data analysis. Indicators that conform to a normal  
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52 205 distribution and those that do not were expressed as mean  $\pm$  standard deviation ( $\bar{x} \pm S$ ) and median  
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54 206 (Q1, Q3), respectively. The Q1 represents the 25<sup>th</sup> percentile and the Q3 represents the 75<sup>th</sup>

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
<b>Age</b>										
<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		
<b>Marital status</b>										
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		
<b>Number of children</b>										
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		
<b>Academic qualifications</b>										
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		
<b>Employment category</b>										
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		
<b>Working years</b>										
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		

234 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		
<b>Professional title</b>										
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		
<b>Directly supervise nursing interns</b>										
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		
<b>Specialty nurses</b>										
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		
<b>Number of days per month working at night</b>										
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		
<b>Monthly income (RMB)</b>										
<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		

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

236 *Results of nurse burnout*

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

242 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	$14.37 \pm 13.49$	$1.60 \pm 1.50$
	Depersonalization	5	0–30	1.00 (0.00, 5.00)	0.20 (0.00, 1.00)
	Personal fulfilment	8	0–48	$35.18 \pm 13.40$	$4.40 \pm 1.68$
	Total burnout score	22	0–110	$53.07 \pm 19.63$	$2.41 \pm 0.89$
Emotional labor	Surface Play	7	7–42	$19.71 \pm 8.45$	$2.82 \pm 1.21$
	Emotional expression requirements	4	4–24	$12.01 \pm 5.35$	$3.00 \pm 1.34$
	Deep Play	3	3–18	$7.07 \pm 4.12$	$2.36 \pm 1.37$
	Total Emotional Labor Score	14	14–84	$38.79 \pm 12.22$	$2.77 \pm 0.87$
Psychological resilience	Tough type	13	0–52	$37.47 \pm 11.89$	$2.88 \pm 0.91$
	Self-improvement	8	0–32	$21.29 \pm 7.48$	$2.66 \pm 0.94$
	Optimistic type	4	0–16	$11.21 \pm 3.98$	$2.80 \pm 0.99$
	Total Psychological Resilience Score	25	0–100	$69.97 \pm 22.38$	$2.80 \pm 0.90$

243 *Results of emotional labor for nurses*

244 The total score of the emotional labor of nurses was  $38.79 \pm 12.22$ , the mean score of entries was  
 245  $2.77 \pm 0.87$ , and the mean scores of entries in the three dimensions from highest to lowest, were  
 246 emotional expression requirement ( $3.00 \pm 1.34$ ), surface play ( $2.82 \pm 1.21$ ), and deep play  
 247 ( $2.36 \pm 1.37$ ), as shown in Table 2. This result indicates that deep play was less used in nurses' work,  
 248 while emotional expression requirements and superficial play were more applied.

249 *Outcomes of psychological resilience in nurses*

1  
2  
3 250 The total psychological resilience score of the nurses was  $69.97 \pm 22.38$  and the mean score of the  
4  
5 251 entries was  $2.80 \pm 0.90$ , including the score of the toughness dimension ( $37.47 \pm 11.89$ ), the score  
6  
7 252 of the self-improvement dimension ( $21.29 \pm 7.48$ ), and the score of the optimism dimension  
8  
9 253 ( $11.21 \pm 3.98$ ). These are shown in Table 2.

### 254 ***Effects of different demographic characteristics on burnout, emotional labor, and psychological*** 255 ***resilience of nurses***

#### 256 *The effect of different demographic characteristics on nurses' burnout*

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

#### 261 *Effects of different demographic characteristics on nurses' emotional labor*

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

#### 270 *The effect of different demographic characteristics on nurses' psychological resilience*

271 Employment category and monthly income affected nurses' psychological resilience, and the  
272 difference was statistically significant. The two comparisons showed that in terms of forms of  
273 employment, category labor contract < permanent staff; in terms of monthly income, less than  
274 4000 (RMB) < 4000–5999 (RMB) = greater than or equal to 6000 (RMB), as detailed in Table 1.

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

#### 276 *The relationship between burnout and emotional labor in nurses*

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



281 *The relationship between emotional labor and psychological resilience in nurses*

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

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

288 *Multiple linear regression analysis of predictors of burnout among nurses*

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

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

Variables	<i>B</i>	<i>SE</i>	<i>b</i>	<i>t</i>	<i>P</i>	<i>R</i> <sup>2</sup>	Adjusted <i>R</i> <sup>2</sup>	<i>F</i>	<i>P</i>
<b>Burnout</b>						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				
<b>Emotional Labor</b>						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				
<b>Psychological Resilience</b>						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				

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

294 *Multiple linear regression analysis of predictors of nurses' emotional labor*

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

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3 298 *Multiple linear regression analysis of predictors of psychological resilience of nurses*

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5 299 The results of the multiple linear regression analysis showed that the monthly income of nurses  
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7 300 was a predictor of psychological resilience and had a positive effect on it, as detailed in Table 3.  
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9 301

10 302 **Discussion**

11 303 The objectives of this study were to survey the current status of burnout, emotional labor, and  
12 304 psychological resilience of gastroenterology nurses during the COVID-19 pandemic, to explore  
13  
14 305 the factors associated with them, and to explore the correlation between these factors.

15  
16  
17 306 The findings revealed that the total burnout score of nurses was higher than that found by Tian Bei  
18  
19 307 et al. This might be due to the fact that Tian Bei et al.'s<sup>[19]</sup> survey was conducted in 2014, that is,  
20  
21 308 not during the COVID-19 pandemic. As nurses, who have been the backbone of the fight against  
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23 309 the pandemic, have worked more than usual during this time, this might have increased their  
24  
25 310 burnout levels. Many studies have confirmed different levels of burnout among different groups  
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27 311 of nurses. Xinzhi Liang<sup>[40]</sup> showed that the total burnout score of ICU nurses was higher than that  
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29 312 of the present study, which may be related to factors such as more severe conditions of ICU patients,  
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31 313 more frequent night shifts of nurses, heavier workload, more labor intensity, and a shortage of  
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33 314 human resources. The results of a study by Li J<sup>[41]</sup> showed that nurses in intravenous drug  
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35 315 administration centers had higher scores on the dimension of emotional exhaustion and lower  
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37 316 scores on the dimension of personal fulfilment than in this study, which may be related to the fact  
38  
39 317 that nurses in intravenous drug administration centers are at a higher risk of occupational injury<sup>[41]</sup>,  
40  
41 318 the working environment is more confined, and nurses have less direct contact with patients and  
42  
43 319 family members.

44  
45 320 Regarding emotional labor, the total score obtained by nurses was lower than that of the results  
46  
47 321 reported by Xinjuan Wu et al.<sup>[42]</sup>. This may be related to the fact that Xinjuan Wu et al. surveyed  
48  
49 322 11,337 nurses from 92 hospitals, most of whom were from hospital emergency and surgery  
50  
51 323 departments, which have a heavier workload and more intense work compared to gastroenterology.  
52  
53 324 This may have increased the level of emotional labor of nurses to some extent. The present study  
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55 325 suggests that nurses tend to adopt more superficial play at work, that is, they often perform  
56  
57 326 emotional camouflage and only show pleasant emotions to patients. To a certain extent, this  
58  
59 327 indicates a poor professional identity of the current group of nurses.<sup>[11]</sup>

60 328 In this study, the psychological resilience scores were higher than those reported by Afshari et

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2  
3 329 al.<sup>[43]</sup> The reason for this could be the difference in the time of the study surveys being conducted.  
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5 330 When the current study started the survey, there was an increased exploration of the new  
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7 331 coronavirus; knowledge of the population about vaccination prevention, smooth vaccination, and  
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9 332 implementation; and nurses improved their skills in prevention, control management, and response,  
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11 333 resulting in a relatively higher level of psychological resilience. Therefore, nurses are able to deal  
12  
13 334 more positively with stress and recover quickly as well as adapt positively to them.

14 335 This study showed that nurses who directly supervise nursing interns have higher levels of burnout,  
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16 336 which may be related to the increased workload of teaching and the emotional drain. The higher  
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18 337 level of burnout among nurses with more frequent number of days per month working at night  
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20 338 may be related to the increased frequency of changes in work and rest schedules, which increases  
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22 339 the physiological and psychological burden on them. This study showed higher levels of emotional  
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24 340 labor among divorced nurses, which is aligned with the findings of Hongjuan Zhu et al.<sup>[44]</sup> This  
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26 341 may be linked to the fact that divorce increases the emotional burden on nurses, besides having  
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28 342 pressure from work, which makes them more prone to anxiety, sadness, and other negative  
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30 343 emotions. The lower level of emotional labor and a higher level of psychological resilience among  
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32 344 nurses in the permanent staff may be related to the fact that nurses on staff are more stable and  
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34 345 have a lower turnover rate. The higher level of emotional labor among junior nurses and middle  
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36 346 nurses than sub-senior and senior nurses may be related to the difference in years of experience  
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38 347 and heavier emotional load. Monthly income is the reward given by the hospital to nurses for their  
39  
40 348 hard work and reflects the level of support given to the nursing department. The level of support  
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42 349 had a high impact on nurses' psychological resilience; the greater the level of support, the higher  
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44 350 the overall level of nurses' psychological resilience.<sup>[45]</sup>

45  
46 351 The present study showed that nurse burnout was negatively correlated with the deep play  
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48 352 dimension of emotional labor and positively correlated with the other two dimensions, which is  
49  
50 353 compatible with previous studies.<sup>[11]</sup> With the progress of society and medicine, patients are paying  
51  
52 354 more attention to their medical experience, and patient satisfaction has become an important  
53  
54 355 criterion for measuring the level of medical care, which requires nurses to have higher competence  
55  
56 356 in handling the nurse-patient relationship. In conjunction with Brotheridge et al.,<sup>[46]</sup> the behavior  
57  
58 357 of showing emotions, which is inconsistent with the actual inner experience, weakens the sense of  
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60 358 self-truth, and this process requires more psychological resources for nurses to show appropriate  
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62 359 emotional behavior. Excessive consumption of physical and mental resources over a long period

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3 360 can easily lead to psychological fatigue, thus aggravating emotional exhaustion and  
4 361 depersonalization. In contrast, deep play means that nurses adjust their internal cognition to adapt  
5 362 to the situation, and the behavior of aligning internal feelings with external emotional performance  
6  
7 363 consumes physical and mental resources. However, individuals do not need to require more  
8  
9 364 resources to suppress their true emotions, and they are compensated with patients' emotional  
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11 365 reactions, which helps in achieving a balance of psychological resources, in turn, reducing nurses'  
12  
13 366 burnout. A study by Wang et al.<sup>[47]</sup> also concluded that the more nurses express their emotions  
14  
15 367 authentically, the more committed they are to their work.

16  
17 368 The present study showed that nurses' emotional labor was negatively related to psychological  
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19 369 resilience and its three dimensions. Extrapolating the results of this study, the following  
20  
21 370 conclusions can be drawn. Nurses who show more resilience, self-improvement, and optimism in  
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23 371 terms of personality are more likely to adopt deeper roles in their work and have a higher sense of  
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25 372 professional identity. Therefore, it is necessary to improve the psychological well-being of nurses  
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27 373 and increase their psychological resilience during the COVID-19 pandemic. Some studies have  
28  
29 374 shown that mindfulness-based stress reduction and psychotherapy centered on positive thinking  
30  
31 375 can help reduce nurses' workload, help them establish a healthy psychological state,<sup>[48]</sup> and  
32  
33 376 improve their levels of psychological resilience.<sup>[49]</sup> Studies have shown that superficial playing is  
34  
35 377 negatively correlated with job satisfaction, while deep playing has a positive relationship with job  
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37 378 satisfaction.<sup>[42]</sup> The results suggested that by improving nurses' psychological resilience, nurses  
38  
39 379 can be encouraged to engage in more deep play, which helps increase nurses' professional identity  
40  
41 380 and job satisfaction.

## 381 382 **Conclusion**

42  
43 383 This study was conducted during the COVID-19 pandemic to investigate whether the pandemic  
44  
45 384 had an impact on the psychological state of nurses and to provide guidance for subsequent  
46  
47 385 prevention and control efforts. Greater adoption of deep play by nurses can be promoted by  
48  
49 386 improving their psychological resilience, which can help improve emotional labor, thereby  
50  
51 387 reducing burnout and decreasing turnover rates. Senior management needs to pay attention to the  
52  
53 388 psychological status of nurses. Therefore, in the future, qualitative, longitudinal, and interventional  
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55 389 studies should be conducted to explore the psychological condition of nurses, expand the research  
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57 390 indexes of nurses' psychological characteristics, construct a model of nurses' psychological

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3 391 resilience, and further track the long-term effects of interventions while evaluating the immediate  
4 effects of interventions.  
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9  
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11 the cooperative hospitals for their support in this study.  
12 396  
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14 397

### 15 398 **Ethics approval**

16  
17 399 This study involved human participants and was approved by the Branch for Medical Research  
18 and Clinical Technology Application, the Ethics Committee of the First Affiliated Hospital of  
19 400 Fujian Medical University (MRCTA, ECFAH of FMU [2021]393). Participants gave informed  
20 401 consent to participate in the study before taking part.  
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22 402  
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24 403

### 25 404 **Contributorship statement**

26  
27 405 **Zhangjie Li** was responsible for manuscript preparation. **Huayan Lin** contributed to designing  
28 the study and supervised the research. **Huayan Lin, Zhangjie Li, and Mengting Yan** contributed  
29 406 to the review of the data and manuscript.  
30  
31 407  
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33 408

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35  
36 410 The authors declared no conflict of interest.  
37  
38 411

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45 415

### 46 416 **Data availability statement**

47  
48 417 Data are available from Huayan Lin (email: [fjydfykyxx@163.com](mailto:fjydfykyxx@163.com)) upon reasonable request.  
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For peer review only

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

	Item No	Recommendation	Page No
<b>Title and abstract</b>	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
<b>Introduction</b>			
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
<b>Methods</b>			
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	/
<b>Results</b>			
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

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2	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
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7			(b) Report category boundaries when continuous variables were categorized
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10			(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
11			/
12	Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
13			/
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15	<b>Discussion</b>		
16	Key results	18	Summarise key results with reference to study objectives
17			page 15-17
18	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
19			page 3
20			
21	Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
22			page 17-18
23			
24			
25	Generalisability	21	Discuss the generalisability (external validity) of the study results
26			page 3
27	<b>Other information</b>		
28	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
29			page 18
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\*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](http://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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1 **Burnout, emotional labor, and psychological resilience among**  
2 **gastroenterology nurses during COVID-19: A cross-sectional study**

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4 **Huayan Lin<sup>1,2\*†</sup>, Zhangjie Li<sup>3†</sup>, Mengting Yan<sup>1,2</sup>**

5  
6 **AUTHOR AFFILIATIONS**

7 † Huayan Lin and Zhangjie Li contributed equally to this work.

8 <sup>1</sup> Department of Gastrointestinal Surgery, the First Affiliated Hospital, Fujian Medical University,  
9 Fuzhou 350005, China.

10 <sup>2</sup> Department of Gastrointestinal Surgery, National Regional Medical Center, Binhai Campus of  
11 the First Affiliated Hospital, Fujian Medical University, Fuzhou 350212, China.

12 <sup>3</sup> The School of Nursing, Fujian Medical University, Fuzhou, China.

13  
14 **ORCID**

15 **Huayan Lin** <https://orcid.org/0000-0003-4734-2369>

16 **Zhangjie Li** <https://orcid.org/0000-0003-1824-2078>

17 **Mengting Yan** <https://orcid.org/0000-0002-6061-3306>

18  
19 **\*CORRESPONDING AUTHOR**

20 Huayan Lin, Department of Gastrointestinal Surgery, the First Affiliated Hospital, Fujian Medical  
21 University, No.20 Chazhong Road, Taijiang District, Fuzhou City, Fujian Province, 350005, China;  
22 Department of Gastrointestinal Surgery, National Regional Medical Center, Binhai Campus of the  
23 First Affiliated Hospital, Fujian Medical University, No.999 Huashan Road, Changle District,  
24 Fuzhou City, Fujian Province, 350212, China; email:fjydfykyxx@163.com; Tel.:  
25 +8613655023506.

26  
27 **Word count**



1  
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4 28 Main body of the manuscript: 4602

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6 29 Tables: 3

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8 30 Figures: 1

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11 32 **Abstract**

12  
13 33 **Objectives:** To investigate the relationship between burnout, emotional labor, and psychological  
14  
15 34 resilience of gastroenterology nurses during the COVID-19 pandemic and explore the factors  
16  
17 35 associated with these specific variables.

18  
19 36 **Design:** A multicenter cross-sectional study with anonymous self-reporting was conducted from  
20  
21 37 November 24, 2021, to December 26, 2021.

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23 38 **Setting:** The study was conducted in Fujian Province, China.

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25 39 **Participants:** The participants were 345 gastroenterology nurses from seven tertiary hospitals.

26  
27 40 **Primary and secondary outcome measures:** Burnout, emotional labor, and psychological  
28  
29 41 resilience were the primary outcome measures. Using a convenience sampling method, the data  
30  
31 42 were collected using Questionnaire Star (a tool for questionnaire surveys) via WeChat. The  
32  
33 43 Chinese version of the Maslach Burnout Inventory, the Chinese version of the Emotional Labor  
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35 44 Scale, and the Chinese version of the Psychological Resilience Scale were used to evaluate burnout,  
36  
37 45 emotional labor, and psychological resilience, respectively.

38  
39 46 **Results:** The total scores for burnout, emotional labor, and psychological resilience in  
40  
41 47 gastroenterology nurses were  $53.07 \pm 19.63$ ,  $38.79 \pm 12.22$ , and  $69.97 \pm 22.38$ , respectively, with less  
42  
43 48 use of deep acting and more use of surface acting. Pearson correlation analysis showed that burnout  
44  
45 49 was positively correlated with two dimensions of emotional labor; surface acting and emotional  
46  
47 50 expression, and negatively correlated with deep acting. There was a negative correlation between  
48  
49 51 emotional labor and all three dimensions of psychological resilience.

50  
51 52 **Conclusions:** Greater adoption of deep acting by nurses can be promoted by improving their  
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53 53 psychological resilience during events such as the COVID-19 pandemic, which can help improve  
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55 54 emotional labor, thereby reducing burnout and decreasing turnover rates. Senior management in

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4 55 hospitals must pay attention to nurses' psychological status. Further interventional studies could  
5  
6 56 be conducted in the future to explore relevant measures.

7  
8 57 **Keywords** burnout; emotional labor; psychological resilience; COVID-19; cross-sectional study  
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### 11 12 59 **Strengths and limitations**

- 13  
14 60 • The study was implemented to investigate the relationship between burnout, emotional  
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16 61 labor, and psychological resilience in gastroenterology nurses during the COVID-19  
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18 62 pandemic.
- 19  
20 63 • Given the possibility of a “social desirability” effect, nurses' self-reported burnout may be  
21  
22 64 lower. Therefore, actual burnout may be higher than the reported results, which would  
23  
24 65 reduce the reliability of the results of this study.
- 25  
26 66 • The response rate was relatively good, although approximately a quarter of the participants  
27  
28 67 did not respond. As not responding may be a sign of burnout, this study might have  
29  
30 68 underestimated the prevalence of burnout among the study population.  
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### 33 34 70 **Introduction**

35  
36 71 Following the World Health Organization's declaration that the coronavirus disease 2019  
37  
38 72 (COVID-19) pandemic was a “public health emergency of international concern,”<sup>[1]</sup> more than  
39  
40 73 243 million confirmed cases and over 4.9 million deaths had been reported worldwide, as of  
41  
42 74 October 24, 2021.<sup>[2]</sup>

43  
44 75 Annette Kennedy, president of the International Council of Nurses, highlighted that nurses played  
45  
46 76 an important role in maintaining people's health during the pandemic.<sup>[3]</sup> However, a shortage of  
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48 77 nurses is a global public health issue. Falatah<sup>[4]</sup> suggested that the pandemic appeared to have  
49  
50 78 significantly increased the mean rate of nurses' turnover intention. By the end of 2020, China's  
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52 79 total number of registered nurses (RNs) exceeded 4.7 million, with 3.35 RNs for every 1,000  
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54 80 people,<sup>[5]</sup> which is less than the world national average of 3.816 RNs per 1,000 people.<sup>[6]</sup>

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4 81 As psychological resilience affects nurses' willingness to leave their profession,<sup>[7]</sup> understanding  
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6 82 the psychological conditions of nurses is crucial for retention. Regarding China's policy response  
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8 83 to the COVID-19 pandemic, nurses in Fujian Province were deployed and involved in epidemic  
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10 84 prevention and control in their units as required under the National Health Commission of the  
11  
12 85 People's Republic of China. Controlling the COVID-19 pandemic remains a significant public  
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14 86 health challenge in China. Hospital nurses, as the principal healthcare workers involved in nucleic  
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16 87 acid testing for COVID-19, are often required to undertake such testing. Hospitals play a critical  
17  
18 88 role in combating the epidemic, and its impact on nursing staff permeates their work. Therefore,  
19  
20 89 we investigated the current situation concerning burnout, emotional labor, and psychological  
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22 90 resilience among gastrointestinal nurses during the COVID-19 pandemic. However, the focus in  
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24 91 terms of the study population was not on nurses directly involved in caring for patients with  
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26 92 COVID-19.

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28 93 As key healthcare workers in the fight against the pandemic,<sup>[8]</sup> Chinese nurses take care of patients  
29  
30 94 while undertaking various aspects of prevention and control. They are prone to psychological  
31  
32 95 adjustment imbalances because of multiple challenges and pressures. Additionally, studies have  
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34 96 shown that providing healthcare affects mental health significantly<sup>[9]</sup> and have emphasized the  
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36 97 importance of exploring psychological resilience support for healthcare workers with burnout.<sup>[10]</sup>  
37  
38 98 The first author of this study has worked in the field of gastroenterology for an extensive period  
39  
40 99 and is very concerned about the psychological condition of gastroenterology nurses. One aim of  
41  
42 100 this study is to prompt future related studies to reduce burnout, manage emotional labor, and  
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44 101 improve psychological resilience among gastroenterology nurses.

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46 102 Job burnout, also known as "job fatigue," was first discussed by the American psychiatrist Herbert  
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48 103 Freudenberger<sup>[11]</sup> in 1974. In 1981, Maslach<sup>[12]</sup> defined burnout as a syndrome involving excessive  
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50 104 physical and mental exertion and energy depletion caused by an individual's prolonged exposure  
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52 105 to stress, also known as burnout syndrome. An international survey in the United States showed a  
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54 106 growing global trend in nurse burnout,<sup>[13]</sup> which is consistent with the findings of Aiken et al.<sup>[14]</sup>

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4 107 Numerous countries have high rates of burnout among nurses, such as Japan<sup>[14]</sup> (33%–60%), South  
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6 108 Africa<sup>[15]</sup> (34.6%), and Spain<sup>[16]</sup> (21%). Moreover, the total burnout detection rate among Chinese  
7  
8 109 nurses has been reported to be 69.21%.<sup>[17]</sup> Additionally, numerous studies have shown that nurses  
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10 110 are at high risk of burnout.<sup>[18]</sup> High levels of emotional exhaustion in response to the COVID-19  
11  
12 111 outbreak have been associated with increased work intensity, the tension between doctors and  
13  
14 112 patients, and a lack of communication with managers.<sup>[19]</sup> This situation seriously affects nurses’  
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16 113 physical and mental health and reduces the quality of nursing care.<sup>[20]</sup> Furthermore, Hong Luo<sup>[21]</sup>  
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18 114 reported a significant correlation between emotional labor and burnout.  
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20 115 “Emotional labor,” first proposed in 1979 by the American social psychologist Arlie Hochschild,<sup>[22]</sup>  
21  
22 116 is a term used about employees who consciously manage their emotions at work and display visible  
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24 117 external expressions and body movements to the public.<sup>[23]</sup> Throughout the interdisciplinary  
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26 118 literature, emotional labor has two attributes: a) autonomous or spontaneous emotional  
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28 119 expression,<sup>[24, 25]</sup> also referred to as an autonomic emotional regulation,<sup>[26]</sup> and b) according to the  
29  
30 120 middle-range theory of emotional labor,<sup>[27, 28]</sup> representation of the self as a working persona  
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32 121 including both surface acting (i.e., expression of superficially felt emotions, including fake, unfelt  
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34 122 emotions or suppression of felt emotions)<sup>[24, 25]</sup> and deep acting (i.e., expression of deeply felt  
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36 123 emotions, and modification of felt emotions to match displayed emotions).<sup>[24, 25, 29, 30]</sup> Surface  
37  
38 124 acting is analogous to a nurse’s smile while working in a hospice, in which the nurse seems to care  
39  
40 125 about the patient and tries to match their emotions to the patient’s emotions.<sup>[31]</sup> In contrast, deep  
41  
42 126 acting implies that nurses connect with patients and project themselves therapeutically.<sup>[31]</sup> As their  
43  
44 127 work is emotionally intensive, nurses continually confront and manage the negative emotions of  
45  
46 128 patients and their families.<sup>[32]</sup> Diefendorff et al.<sup>[33]</sup> found that nurses were subjected to a higher  
47  
48 129 emotional load. Similar results have been reported in the Chinese context. Numerous studies have  
49  
50 130 shown moderate to high levels of emotional labor in nurses who work in the emergency<sup>[34]</sup> and  
51  
52 131 cardiology departments.<sup>[35]</sup> Frequent and excessive use of emotional labor intensifies nurses’

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4 132 fatigue and burnout, which increases their propensity to leave their profession.<sup>[36]</sup> Therefore, it is  
5  
6 133 essential to explore how emotional labor can be properly managed to reduce burnout.

7  
8 134 Psychological resilience, also known as “mental toughness” and “bounce-back ability,” is a  
9  
10 135 negative predictor of burnout in the United States.<sup>[37]</sup> It is the ability to move forward positively  
11  
12 136 from a negative, traumatic, or stressful experience.<sup>[38]</sup> In a study supported by the American  
13  
14 137 Association of Critical-Care Nurses, Mealer showed that 22% of ICU nurses with high levels of  
15  
16 138 psychological resilience<sup>[39]</sup> tended to exhibit optimism, humor, flexibility, and high ethical  
17  
18 139 standards.<sup>[40]</sup> Individuals with higher psychological resilience are better able to deal with stressful  
19  
20 140 situations and, thus, maintain good mental health.<sup>[41]</sup> Along with the rapid development of global  
21  
22 141 healthcare, building the psychological resilience of caregivers has been listed as one of the top ten  
23  
24 142 international “standard of care movements”.<sup>[42]</sup>

25  
26 143 Although previous studies have explored the relationship between burnout and emotional labor  
27  
28 144 and between burnout and psychological resilience,<sup>[21, 37]</sup> the association between these factors has  
29  
30 145 not been adequately discussed in the context of the COVID-19 pandemic concerning  
31  
32 146 gastroenterology nurses. Therefore, this study investigated the current status of burnout, emotional  
33  
34 147 labor, and psychological resilience among gastroenterology nurses during the COVID-19  
35  
36 148 pandemic, to explore relevant associations among these factors in relation to specific variables,  
37  
38 149 and to provide evidence-based research to help reduce nurses’ burnout, increase their job  
39  
40 150 satisfaction, and promote their psychological health during the COVID-19 pandemic.

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## 45 152 **Methods**

### 46 153 *Patients and public involvement*

47  
48 154 The study did not involve patients. All data for this study were obtained from nurses. Neither the  
49  
50 155 study participants nor members of the public participated in the design, implementation, reporting,  
51  
52 156 or dissemination plans of our research.

### 53 54 55 157 *Study design*

1  
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4 158 This study used a cross-sectional correlational design.  
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6

7 159 ***Research Objectives***

8  
9 160 This study aimed to investigate the situation of burnout, emotional labor, and psychological  
10  
11 161 resilience among nurses in gastroenterology departments in hospitals in China during the COVID-  
12  
13 162 19 pandemic and to explore their related factors and the associations among these variables. The  
14  
15 163 results are intended to help provide a reference point for hospital administrators to implement  
16  
17 164 interventions.  
18

19  
20 165 ***Setting and sample***

21  
22 166 This study used a convenience sampling method to select gastroenterology nurses working in  
23  
24 167 Fujian Province, China, from November 24, 2021, to December 26, 2021.

25  
26 168 Inclusion criteria were as follows: (1) those who were registered and had a Chinese Nurse  
27  
28 169 Practitioner Certificate; (2) those who had worked in gastroenterology for  $\geq 1$  year; and (3) those  
29  
30 170 who provided informed consent to participate in this study voluntarily.

31  
32 171 Exclusion criteria were as follows: (1) those who were on leave; (2) those undergoing training; or  
33  
34 172 (3) those unable to participate in this study for special reasons (e.g., being hospitalized and having  
35  
36 173 their status changed from nurse to patient; uninterested in participating; having already participated  
37  
38 174 in a similar study and not wanting to participate again; being too busy with work and thus did not  
39  
40 175 have time to participate).

41  
42 176 The sample size was calculated with reference to the sample requirement for multiple linear  
43  
44 177 regression analysis,<sup>[43]</sup> which is at least ten times the number of independent variables. In this  
45  
46 178 study, the number of independent variables was 14. Considering the likelihood of 10%-20%  
47  
48 179 invalid questionnaires, the final sample content was determined to be 154-168 cases. A total of  
49  
50 180 458 questionnaires were collected; 345 were valid (75.3% valid return rate); 113 responses were  
51  
52 181 either incomplete or invalid and were excluded, as detailed in a CONSORT diagram in Figure 1.  
53

54  
55 182 ***Variables and instruments***

### 183 *General demographics and work-related characteristics*

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

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

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

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

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

### 207 *Chinese Psychological Resilience Scale (PRS-CH)*

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4 208 Connor and Davidson<sup>[46]</sup> jointly developed the Connor–Davidson Psychological Resilience Scale  
5  
6 209 (CD-RISC). The present study employed the Chinese version of the scale, translated by Yu et al.<sup>[47]</sup>  
7  
8 210 With a total of 25 items, the PRS-CH comprises three dimensions: resilience, self-improvement,  
9  
10 211 and optimism. The responses are rated on a 5-point Likert scale, with scores ranging from 1 (never)  
11  
12 212 to 5 (almost always). Higher scores indicate better psychological resilience. The Cronbach's alpha  
13  
14 213 coefficient of the total scale was 0.91<sup>[47]</sup>, showing good reliability and validity.

### 17 214 ***Data collection***

18  
19 215 The data were collected through an online survey. The researcher, who was the nursing manager  
20  
21 216 of the gastroenterology department in a tertiary care hospital, used Questionnaire Star (a tool for  
22  
23 217 questionnaire surveys) and sent the URL to the survey respondents via WeChat (a popular social  
24  
25 218 application in China). After describing the study's aims and obtaining informed consent, a link to  
26  
27 219 the survey was posted on the nurses' workgroups via WeChat, and the nurses then completed it.  
28  
29 220 After the questionnaire was collected, it was entered and checked by two researchers using Epidata  
30  
31 221 3.1 software to ensure the validity and completeness of the questionnaire.

### 34 222 ***Statistical analysis methods***

35  
36 223 Statistical software (SPSS 24.0) was used for data analysis. Indicators that conform to a normal  
37  
38 224 distribution and those that do not were expressed as mean  $\pm$  standard deviation ( $\bar{x} \pm S$ ) and median  
39  
40 225 (Q1, Q3), respectively. Q1 represents the 25<sup>th</sup> percentile, and Q3 represents the 75<sup>th</sup> percentile.  
41  
42 226 Count data were statistically described using frequency and composition ratios. The Shapiro-Wilk  
43  
44 227 method was used for normality testing. T-tests and analysis of variance (ANOVA) were used for  
45  
46 228 measures that met the normal distribution. Fisher's least significant difference method was used  
47  
48 229 for two-way comparison if the ANOVA results showed statistically significant differences. The  
49  
50 230 Mann–Whitney U rank-sum test and the Kruskal–Wallis H test were used for measures that did  
51  
52 231 not meet the normal distribution. The relationship between the two measures' indicators was  
53  
54 232 analyzed using Pearson correlation analysis. The effects of multiple measures on nurses' burnout,  
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4 233 emotional labor, and psychological resilience scores were analyzed using multiple linear  
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6 234 regression (stepwise method, inclusion: 0.05, exclusion: 0.1), and the differences were regarded  
7  
8 235 as statistically significant at  $P < 0.05$ .  
9  
10 236

## 11 237 **Results**

### 12 238 ***General information***

#### 13 239 *Basic information about the survey population*

14 240 Table 1 shows the basic characteristics of the 345 respondents investigated in this study. In total,  
15  
16 241 341 (98.8%) nurses were women, 166 (48.1%) were under 30 years, 209 (60.6%) were married,  
17  
18 242 148 (42.9%) had no children, 127 (36.8%) had one child, 172 (49.9%) had a college education,  
19  
20 243 169 (49.0%) had bachelor's degrees or higher, 177 (51.3%) were permanent staff, 168 (48.7%)  
21  
22 244 were in the labor contract category, 179 (51.9%) did not directly supervise nursing interns, 319  
23  
24 245 (92.5) were not specialty nurses, and 213 (61.7) earned more than 6,000 RMB per month.  
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248 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
<b>Age (years)</b>										
<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		
<b>Marital status</b>										
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		
<b>Number of children</b>										
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		
<b>Academic qualifications</b>										
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		
<b>Employment category</b>										
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		
<b>Working years</b>										
<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		

249

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		
<b>Professional title</b>										
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		
<b>Directly supervising nursing interns</b>										
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		
<b>Specialty nurses</b>										
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		
<b>Number of days per month working at night</b>										
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		
<b>Monthly income (RMB)</b>										
<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		

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

251 *Burnout score results for the nurses*

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

257 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	$14.37 \pm 13.49$	$1.60 \pm 1.50$
	Depersonalization	5	0–30	1.00 (0.00, 5.00)	0.20 (0.00, 1.00)
	Personal fulfilment	8	0–48	$35.18 \pm 13.40$	$4.40 \pm 1.68$
	Total burnout score	22	0–110	$53.07 \pm 19.63$	$2.41 \pm 0.89$
Emotional labor	Surface acting	7	7–42	$19.71 \pm 8.45$	$2.82 \pm 1.21$
	Emotional expression	4	4–24	$12.01 \pm 5.35$	$3.00 \pm 1.34$
	Deep acting	3	3–18	$7.07 \pm 4.12$	$2.36 \pm 1.37$
	Total Emotional Labor Score	14	14–84	$38.79 \pm 12.22$	$2.77 \pm 0.87$
Psychological resilience	Toughness	13	0–52	$37.47 \pm 11.89$	$2.88 \pm 0.91$
	Self-improvement	8	0–32	$21.29 \pm 7.48$	$2.66 \pm 0.94$
	Optimism	4	0–16	$11.21 \pm 3.98$	$2.80 \pm 0.99$
	Total Psychological Resilience Score	25	0–100	$69.97 \pm 22.38$	$2.80 \pm 0.90$

258

259 *Emotional labor score results for the nurses*

260 The total score of the emotional labor of nurses was  $38.79 \pm 12.22$ , the mean score of entries was  
 261  $2.77 \pm 0.87$ , and the mean scores of entries in the three dimensions from highest to lowest, were  
 262 emotional expression ( $3.00 \pm 1.34$ ), surface acting ( $2.82 \pm 1.21$ ), and deep acting ( $2.36 \pm 1.37$ ), as  
 263 shown in Table 2. This result indicates that deep acting was less used in nurses' work, while  
 264 emotional expression and superficial play were more applied.

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2  
3 265 *Psychological resilience score results for the nurses*

4  
5 266 The total psychological resilience score of the nurses was  $69.97 \pm 22.38$  and the mean score of the  
6  
7 267 entries was  $2.80 \pm 0.90$ , including the score of the toughness dimension ( $37.47 \pm 11.89$ ), the score  
8  
9 268 of the self-improvement dimension ( $21.29 \pm 7.48$ ), and the score of the optimism dimension  
10 269 ( $11.21 \pm 3.98$ ). These are shown in Table 2.  
11  
12 270

13  
14 271 ***Effects of different demographic characteristics on burnout, emotional labor, and psychological***  
15 272 ***resilience of nurses***

16  
17 273 *The effect of different demographic characteristics on nurses' burnout*

18  
19 274 Demographic characteristics such as whether they directly supervised nursing interns and the  
20  
21 275 number of days per month working at night affected nurses' burnout, and the differences were  
22  
23 276 statistically significant. Nurses who directly supervised nursing interns had higher levels of  
24 277 burnout, as detailed in Table 1.  
25

26  
27 278 *Effects of different demographic characteristics on nurses' emotional labor*

28  
29 279 Demographic characteristics such as marital status, number of children, employment category, and  
30  
31 280 professional title affected nurses' emotional labor, and the differences were statistically significant.  
32  
33 281 A two-by-two comparison showed that, in terms of marital status, widowed = unmarried = married  
34 282 < divorced, indicating that the emotional labor of divorced nurses was higher than that of nurses  
35 283 with other marital status. In terms of the number of children, having two children < no children =  
36  
37 284 having one child. In terms of employment category, permanent staff < category labor contract. In  
38  
39 285 terms of professional title, junior nurse = middle nurse > sub-senior and senior nurse, as detailed  
40 286 in Table 1.  
41  
42 287

43  
44 288 *The effect of different demographic characteristics on nurses' psychological resilience*

45  
46 289 Employment category and monthly income affected nurses' psychological resilience, and the  
47  
48 290 difference was statistically significant. A two-by-two comparison showed that, in terms of forms  
49  
50 291 of employment, category labor contract < permanent staff; in terms of monthly income, less than  
51 292 4000 (RMB) < 4000–5999 (RMB) = greater than or equal to 6000 (RMB), as detailed in Table 1.  
52  
53 293

54 294 ***The relationship between emotional labor, psychological resilience, and burnout in nurses***

55  
56 295 *The relationship between burnout and emotional labor in nurses*  
57

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	<i>B</i>	<i>SE</i>	<i>b</i>	<i>t</i>	<i>P</i>	<i>R</i> <sup>2</sup>	Adjusted <i>R</i> <sup>2</sup>	<i>F</i>	<i>P</i>
<b>Burnout</b>						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				
<b>Emotional Labor</b>						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				

<b>Psychological Resilience</b>					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			

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

### 315 *Multiple linear regression analysis of predictors of the nurses' emotional labor*

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

### 319 *Multiple linear regression analysis of predictors of psychological resilience of the nurses*

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

## 323 **Discussion**

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

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

1  
2  
3 341 The findings revealed that the total burnout score of nurses was higher than that of Tian et al.,<sup>[17]</sup>  
4 342 which may be explained by that study conducted in 2014, that is, the pre-COVID-19 period. As  
5 343 nurses working in the fight against the pandemic have worked more than usual during this time,  
6 344 this might have increased their burnout levels. Many studies have reported varying levels of  
7 345 burnout among different groups of nurses. Liang<sup>[48]</sup> showed that the total burnout score of ICU  
8 346 nurses was higher than that found in this study, which may be related to factors such as the more  
9 347 severe conditions of ICU patients, more frequent night shifts for nurses, heavier workloads, greater  
10 348 labor intensity, and a shortage of human resources. A study by Li <sup>[49]</sup> showed that nurses in  
11 349 intravenous drug administration centers had higher scores on the dimension of emotional  
12 350 exhaustion and lower scores on the dimension of personal fulfillment than in this study, which  
13 351 may be related to the fact that nurses in intravenous drug administration centers are at a higher risk  
14 352 of occupational injury,<sup>[49]</sup> the working environment is more confined, and nurses have less direct  
15 353 contact with patients and family members.

16 354 Regarding emotional labor, the total score found for the nurses was lower than that reported by  
17 355 Wu et al.<sup>[50]</sup> This may be related to the fact that Wu et al. surveyed 11,337 nurses from 92 hospitals,  
18 356 most of whom were from hospital emergency and surgery departments, which have a heavier  
19 357 workload and more intense work compared to gastroenterology. This may have increased the level  
20 358 of emotional labor of nurses to some extent. The present study suggests that the nurses tended to  
21 359 adopt more superficial play at work; they often engaged in emotional camouflage and only  
22 360 displayed pleasing emotions to patients. To a certain extent, this indicates a poor professional  
23 361 identity among these nurses.<sup>[21]</sup>

24 362 In this study, the psychological resilience scores were higher than those of Afshari et al.<sup>[51]</sup> The  
25 363 reason for this could be the difference in the time of the study surveys being conducted. When the  
26 364 current study was initiated, understanding of the new coronavirus was more significant, as was  
27 365 knowledge among the population concerning the preventive effects of vaccination and how to  
28 366 implement and run vaccination programs smoothly. Nurses have improved their prevention,  
29 367 control management, and response skills, resulting in a relatively higher level of psychological  
30 368 resilience. Therefore, nurses have been able to deal more positively with stress, recover quickly,  
31 369 and adapt positively to stress factors.

32 370 This study showed that nurses who directly supervised nursing interns had higher levels of burnout,  
33 371 which may be related to the increased teaching workload and the emotional drain. The higher level



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3 372 of burnout among nurses with a more frequent number of days per month working at night may be  
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5 373 related to the increased frequency of changes in work and rest schedules, which would have  
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7 374 increased the physiological and psychological burden placed on them. This study showed higher  
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9 375 levels of emotional labor among divorced nurses, which accords with the findings of Zhu et al.<sup>[52]</sup>  
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11 376 This may be linked to the fact that divorce increases the emotional burden on nurses, alongside  
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13 377 work pressure, which renders them more prone to anxiety, sadness, and other negative emotions.  
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15 378 The lower level of emotional labor and the higher level of psychological resilience found among  
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17 379 the nurses on the permanent staff may be related to the fact that nurses on staff are more stable and  
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19 380 have a lower turnover rate. The higher level of emotional labor among junior and middle nurses  
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21 381 than among the sub-senior and senior nurses may be related to the difference in years of experience  
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23 382 and heavier emotional load. The monthly income level indicates the value hospitals place on their  
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25 383 nurses for their hard work and reflects the level of support given to the nursing department. This  
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27 384 level of support has a significant effect on nurses' psychological resilience; the greater the level of  
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29 385 support, the higher the overall level of nurses' psychological resilience.<sup>[53]</sup>  
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31 386 The present study showed that nurse burnout was negatively correlated with the deep acting  
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33 387 dimension of emotional labor and was positively correlated with the other two dimensions, which  
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35 388 accords with a previous study.<sup>[21]</sup> With developing awareness among increasing numbers of  
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37 389 individuals in medicine, patients are paying more attention to their medical experience, and patient  
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39 390 satisfaction has become an important criterion for measuring the level of medical care, which  
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41 391 requires nurses to have advanced levels of competence in handling the nurse-patient relationship.  
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43 392 As shown in Brotheridge et al.,<sup>[54]</sup> the behavior of showing emotions that are inconsistent with  
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45 393 one's actual inner experience weakens one's sense of self-worth, and this process requires more  
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47 394 psychological resources for nurses to show appropriate emotional behavior. Excessive  
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49 395 consumption of physical and mental resources over a long period can easily lead to psychological  
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51 396 fatigue, thus aggravating emotional exhaustion and depersonalization. In contrast, deep acting  
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53 397 means that nurses can adjust their genuine feelings and understanding to adapt to the situation, and  
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55 398 such behavior of aligning internal feelings with external emotional performance appropriately  
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57 399 consumes less physical and mental resources. However, individuals do not need to require more  
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59 400 resources to suppress their true emotions, and they are compensated with patients' emotional  
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401 reactions, which helps in achieving a balance of psychological resources, in turn, reducing nurses'  
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burnout. A study by Wang et al.<sup>[55]</sup> concluded that the more nurses express their emotions

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3 403 authentically, the more committed they are to their work.

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5 404 The present study showed that nurses' emotional labor was negatively related to psychological  
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7 405 resilience and its three dimensions. From this study's results, it would appear that nurses who show  
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9 406 more resilience, self-improvement, and optimism are more likely to adopt deeper roles in their  
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11 407 work and have a higher sense of professional identity. Therefore, it is necessary to improve the  
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13 408 psychological well-being of nurses and increase their psychological resilience during the COVID-  
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15 409 19 pandemic and other similar events. Some studies have shown that mindfulness-based stress  
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17 410 reduction and psychotherapy centered on positive thinking can help reduce nurses' workload stress,  
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19 411 help them establish a healthy psychological state,<sup>[56]</sup> and improve their levels of psychological  
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21 412 resilience.<sup>[57]</sup> Studies have shown that surface acting negatively correlates with job satisfaction,  
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23 413 while deep acting has a positive relationship with job satisfaction.<sup>[50]</sup> This study's results suggest  
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25 414 that, by improving nurses' psychological resilience, nurses can be encouraged to engage in more  
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27 415 deep acting, which is likely to help increase nurses' professional identity and job satisfaction.

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29 416 This study provides valuable insights into the current state of burnout, emotional labor, and  
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31 417 psychological resilience among gastroenterology nurses during the COVID-19 pandemic.  
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33 418 However, the study has several limitations. First, the findings are cross-sectional, precluding the  
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35 419 drawing of any conclusions about the impact of COVID-19. Comparison of the findings with pre-  
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37 420 pandemic studies requires caution, as the observed status may be due to factors unrelated to the  
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39 421 pandemic. Second, this study was only conducted in one province of China using a convenience  
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41 422 sampling method, which is not representative of other regions, or of departments and other  
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43 423 personnel in hospitals, meaning that these findings are not generalizable. Third, as 98.8% of the  
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45 424 participants were female, more attention should be paid to male nurses in the future. Fourth, the  
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47 425 difficulty of data collection during the pandemic may have led to possible bias in data  
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49 426 interpretation. In addition, the scope of one questionnaire may not be sufficient to summarize  
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51 427 nurses' actual levels of burnout, emotional labor, and psychological resilience.

## 52 53 54 55 56 57 58 59 60 428 429 **Conclusion**

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

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3 434 psychological resilience, which can help improve emotional labor, thereby reducing burnout and  
4 435 decreasing turnover rates. Senior management needs to pay attention to the psychological status  
5 436 of nurses. Therefore, qualitative, longitudinal, and interventional studies should be conducted to  
6 437 explore the psychological condition of nurses, expand the research indexes of nurses'  
7 438 psychological characteristics, construct models of nurses' psychological resilience, and further  
8 439 track the long-term effects of interventions while evaluating the immediate effects of interventions.  
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16  
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### 22 445 **Ethics approval**

23  
24 446 This study involved human participants and was approved by the Branch for Medical Research  
25 447 and Clinical Technology Application, the Ethics Committee of the First Affiliated Hospital of  
26 448 Fujian Medical University (MRCTA, ECFAH of FMU [2021]393). The participants gave  
27 449 informed consent to participate in the study before taking part.  
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### 31 450 32 451 **Author contribution statement**

33  
34 452 **Huayan Lin** and **Zhangjie Li** contributed equally to this study. **Zhangjie Li** was responsible for  
35 453 manuscript preparation. **Huayan Lin** contributed to designing the study and supervised the  
36 454 research. **Huayan Lin**, **Zhangjie Li**, and **Mengting Yan** contributed to the review of the data and  
37 455 manuscript. All authors have reviewed and approved the manuscript.  
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### 41 456 42 457 **Competing interests**

43 458 The authors declared no conflict of interest.  
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### 54 463 55 464 **Data availability statement**

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3 465 Data are available from Huayan Lin (email: [fjydfkyxx@163.com](mailto:fjydfkyxx@163.com)) upon reasonable request.  
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Figure 1 CONSORT diagram regarding the sampling process

For peer review only



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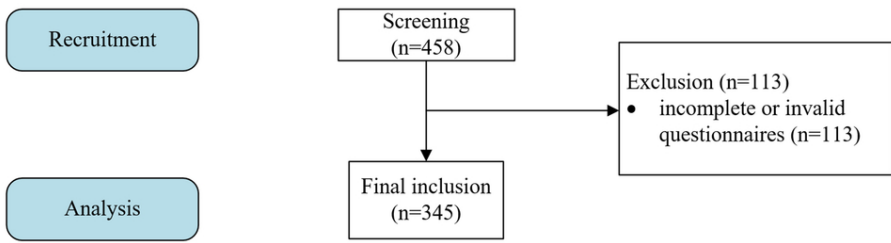


Figure 1 CONSORT diagram regarding the sampling process  
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STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page No
<b>Title and abstract</b>	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
<b>Introduction</b>			
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
<b>Methods</b>			
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	/
<b>Results</b>			
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	/
<b>Discussion</b>			
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
<b>Other information</b>			
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](http://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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1 **Burnout, emotional labor, and psychological resilience among**  
2 **gastroenterology nurses during COVID-19: A cross-sectional study**

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4 **Huayan Lin<sup>1,2\*†</sup>, Zhangjie Li<sup>3†</sup>, Mengting Yan<sup>1,2</sup>**

5  
6 **AUTHOR AFFILIATIONS**

7 † Huayan Lin and Zhangjie Li contributed equally to this work.

8 <sup>1</sup> Department of Gastrointestinal Surgery, the First Affiliated Hospital, Fujian Medical University,  
9 Fuzhou 350005, China.

10 <sup>2</sup> Department of Gastrointestinal Surgery, National Regional Medical Center, Binhai Campus of  
11 the First Affiliated Hospital, Fujian Medical University, Fuzhou 350212, China.

12 <sup>3</sup> The School of Nursing, Fujian Medical University, Fuzhou, China.

13  
14 **ORCID**

15 **Huayan Lin** <https://orcid.org/0000-0003-4734-2369>

16 **Zhangjie Li** <https://orcid.org/0000-0003-1824-2078>

17 **Mengting Yan** <https://orcid.org/0000-0002-6061-3306>

18  
19 **\*CORRESPONDING AUTHOR**

20 Huayan Lin, Department of Gastrointestinal Surgery, the First Affiliated Hospital, Fujian Medical  
21 University, No.20 Chazhong Road, Taijiang District, Fuzhou City, Fujian Province, 350005, China;  
22 Department of Gastrointestinal Surgery, National Regional Medical Center, Binhai Campus of the  
23 First Affiliated Hospital, Fujian Medical University, No.999 Huashan Road, Changle District,  
24 Fuzhou City, Fujian Province, 350212, China; email:fjydfykyxx@163.com; Tel.:  
25 +8613655023506.

26  
27 **Word count**

1  
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4 28 Main body of the manuscript: 4838

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6 29 Tables: 3

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8 30 Figures: 1

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11 32 **Abstract**

12  
13 33 **Objectives:** To investigate the relationship between burnout, emotional labor, and psychological  
14  
15 34 resilience of gastroenterology nurses during the COVID-19 pandemic and explore the factors  
16  
17 35 associated with these specific variables.

18  
19 36 **Design:** A multicenter cross-sectional study with anonymous self-reporting was conducted from  
20  
21 37 November 24, 2021, to December 26, 2021.

22  
23 38 **Setting:** The study was conducted in Fujian Province, China.

24  
25 39 **Participants:** The participants were 345 gastroenterology nurses from seven tertiary hospitals.

26  
27 40 **Primary and secondary outcome measures:** Burnout, emotional labor, and psychological  
28  
29 41 resilience were the primary outcome measures. Using a convenience sampling method, the data  
30  
31 42 were collected using Questionnaire Star (a tool for questionnaire surveys) via WeChat. The  
32  
33 43 Chinese version of the Maslach Burnout Inventory, the Chinese version of the Emotional Labor  
34  
35 44 Scale, and the Chinese version of the Psychological Resilience Scale were used to evaluate burnout,  
36  
37 45 emotional labor, and psychological resilience, respectively.

38  
39 46 **Results:** The total scores for burnout, emotional labor, and psychological resilience in  
40  
41 47 gastroenterology nurses were  $53.07 \pm 19.63$ ,  $38.79 \pm 12.22$ , and  $69.97 \pm 22.38$ , respectively, with less  
42  
43 48 use of deep acting and more use of surface acting. Pearson correlation analysis showed that burnout  
44  
45 49 was positively correlated with two dimensions of emotional labor; surface acting and emotional  
46  
47 50 expression, and negatively correlated with deep acting. There was a negative correlation between  
48  
49 51 emotional labor and all three dimensions of psychological resilience.

50  
51 52 **Conclusions:** Greater adoption of deep acting by nurses can be promoted by improving their  
52  
53 53 psychological resilience during events such as the COVID-19 pandemic, which can help improve  
54  
55 54 emotional labor, thereby reducing burnout and decreasing turnover rates. Senior management in

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4 55 hospitals must pay attention to nurses' psychological status. Further interventional studies could  
5  
6 56 be conducted in the future to explore relevant measures.

7  
8 57 **Keywords** burnout; emotional labor; psychological resilience; COVID-19; cross-sectional study  
9

10 58

### 11 12 59 **Strengths and limitations**

- 13  
14 60 • This study provides valuable insights into the current state of burnout, emotional labor, and  
15  
16 61 psychological resilience among gastroenterology nurses during the COVID-19 pandemic.
- 17  
18 62 • Participating nurses may not be representative of all populations in all countries.
- 19  
20 63 • Such cross-sectional studies can only imply association, not causation.
- 21  
22 64 • Nurses were self-selected to participate, exposing the study to selection and response bias.
- 23  
24 65 • The difficulty of data collection during the pandemic may have led to possible bias in data  
25  
26 66 interpretation.

27  
28 67

### 29 30 68 **Introduction**

31  
32 69 Following the World Health Organization's declaration that the coronavirus disease 2019  
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34 70 (COVID-19) pandemic was a "public health emergency of international concern,"<sup>[1]</sup> more than  
35  
36 71 243 million confirmed cases and over 4.9 million deaths had been reported worldwide, as of  
37  
38 72 October 24, 2021.<sup>[2]</sup>

39  
40 73 Annette Kennedy, president of the International Council of Nurses, highlighted that nurses played  
41  
42 74 an important role in maintaining people's health during the pandemic.<sup>[3]</sup> However, a shortage of  
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44 75 nurses is a global public health issue. Falatah<sup>[4]</sup> suggested that the pandemic appeared to have  
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46 76 significantly increased the mean rate of nurses' turnover intention. By the end of 2020, China's  
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48 77 total number of registered nurses (RNs) exceeded 4.7 million, with 3.35 RNs for every 1,000  
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50 78 people,<sup>[5]</sup> which is less than the world national average of 3.816 RNs per 1,000 people.<sup>[6]</sup>

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52 79 According to Global Cancer Statistics 2020, there are nearly 19.3 million new cancer cases and  
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54 80 approximately 10.0 million cancer deaths in 185 countries in 2020. Colorectal cancer (10%) ranks



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4 81 third in new cancer cases and gastric cancer (5.6%) ranks fifth; colorectal cancer (9.4%) ranks  
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6 82 second and gastric cancer (7.7%) ranks fourth in the number of cancer deaths.<sup>[7]</sup> Recent study data  
7  
8 83 suggest an increased burden of colon cancer in China and the United States, it is estimated that  
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10 84 colon and gastric cancers in China and colon cancer in the United States are covered in the top five  
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12 85 cancer types to be diagnosed in 2022.<sup>[8]</sup> Therefore, the workload of gastroenterology nurses is  
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14 86 severe and there may be a significant increase in stress co-occurring with the COVID-2019.<sup>[9]</sup> And  
15  
16 87 the quality of nursing staff is closely related to the overall satisfaction of the hospital.<sup>[10]</sup> Studies  
17  
18 88 have shown that the mental health of healthcare providers cannot be ignored and there is a need to  
19  
20 89 enhance their mental health.<sup>[11]</sup>

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22 90 As psychological resilience affects nurses' willingness to leave their profession,<sup>[12]</sup> understanding  
23  
24 91 the psychological conditions of nurses is crucial for retention. Regarding China's policy response  
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26 92 to the COVID-19 pandemic, nurses in Fujian Province were deployed and involved in epidemic  
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28 93 prevention and control in their units as required under the National Health Commission of the  
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30 94 People's Republic of China. Controlling the COVID-19 pandemic remains a significant public  
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32 95 health challenge in China. Hospital nurses, as the principal healthcare workers involved in nucleic  
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34 96 acid testing for COVID-19, are often required to undertake such testing. Hospitals play a critical  
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36 97 role in combating the epidemic, and its impact on nursing staff permeates their work. Therefore,  
37  
38 98 we investigated the current situation concerning burnout, emotional labor, and psychological  
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40 99 resilience among gastrointestinal nurses during the COVID-19 pandemic. However, the focus in  
41  
42 100 terms of the study population was not on nurses directly involved in caring for patients with  
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44 101 COVID-19.

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46 102 As key healthcare workers in the fight against the pandemic,<sup>[13]</sup> Chinese nurses take care of patients  
47  
48 103 while undertaking various aspects of prevention and control. They are prone to psychological  
49  
50 104 adjustment imbalances because of multiple challenges and pressures. Additionally, studies have  
51  
52 105 shown that providing healthcare affects mental health significantly<sup>[14]</sup> and have emphasized the  
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54 106 importance of exploring psychological resilience support for healthcare workers with burnout.<sup>[15]</sup>

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4 107 The first author of this study has worked in the field of gastroenterology for an extensive period  
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6 108 and is very concerned about the psychological condition of gastroenterology nurses. One aim of  
7  
8 109 this study is to prompt future related studies to reduce burnout, manage emotional labor, and  
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10 110 improve psychological resilience among gastroenterology nurses.

11  
12 111 Job burnout, also known as “job fatigue,” was first discussed by the American psychiatrist Herbert  
13  
14 112 Freudenberger<sup>[16]</sup> in 1974. In 1981, Maslach<sup>[17]</sup> defined burnout as a syndrome involving excessive  
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16 113 physical and mental exertion and energy depletion caused by an individual’s prolonged exposure  
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18 114 to stress, also known as burnout syndrome. An international survey in the United States showed a  
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20 115 growing global trend in nurse burnout,<sup>[18]</sup> which is consistent with the findings of Aiken et al.<sup>[19]</sup>  
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22 116 Numerous countries have high rates of burnout among nurses, such as Japan<sup>[19]</sup> (33%–60%), South  
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24 117 Africa<sup>[20]</sup> (34.6%), and Spain<sup>[21]</sup> (21%). Moreover, the total burnout detection rate among Chinese  
25  
26 118 nurses has been reported to be 69.21%.<sup>[22]</sup> Additionally, numerous studies have shown that nurses  
27  
28 119 are at high risk of burnout.<sup>[23]</sup> High levels of emotional exhaustion in response to the COVID-19  
29  
30 120 outbreak have been associated with increased work intensity, the tension between doctors and  
31  
32 121 patients, and a lack of communication with managers.<sup>[24]</sup> This situation seriously affects nurses’  
33  
34 122 physical and mental health and reduces the quality of nursing care.<sup>[25]</sup> Furthermore, Hong Luo<sup>[26]</sup>  
35  
36 123 reported a significant correlation between emotional labor and burnout.

37  
38 124 “Emotional labor,” first proposed in 1979 by the American social psychologist Arlie Hochschild,<sup>[27]</sup>  
39  
40 125 is a term used about employees who consciously manage their emotions at work and display visible  
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42 126 external expressions and body movements to the public.<sup>[28]</sup> Throughout the interdisciplinary  
43  
44 127 literature, emotional labor has two attributes: a) autonomous or spontaneous emotional  
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46 128 expression,<sup>[29, 30]</sup> also referred to as an autonomic emotional regulation,<sup>[31]</sup> and b) according to the  
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48 129 middle-range theory of emotional labor,<sup>[32, 33]</sup> representation of the self as a working persona  
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50 130 including both surface acting (i.e., expression of superficially felt emotions, including fake, unfelt  
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52 131 emotions or suppression of felt emotions)<sup>[29, 30]</sup> and deep acting (i.e., expression of deeply felt  
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54 132 emotions, and modification of felt emotions to match displayed emotions).<sup>[29, 30, 34, 35]</sup> Surface  
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4 133 acting is analogous to a nurse's smile while working in a hospice, in which the nurse seems to care  
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6 134 about the patient and tries to match their emotions to the patient's emotions.<sup>[36]</sup> In contrast, deep  
7  
8 135 acting implies that nurses connect with patients and project themselves therapeutically.<sup>[36]</sup> As their  
9  
10 136 work is emotionally intensive, nurses continually confront and manage the negative emotions of  
11  
12 137 patients and their families.<sup>[37]</sup> Diefendorff et al.<sup>[38]</sup> found that nurses were subjected to a higher  
13  
14 138 emotional load. Similar results have been reported in the Chinese context. Numerous studies have  
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16 139 shown moderate to high levels of emotional labor in nurses who work in the emergency<sup>[39]</sup> and  
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18 140 cardiology departments.<sup>[40]</sup> Frequent and excessive use of emotional labor intensifies nurses'  
19  
20 141 fatigue and burnout, which increases their propensity to leave their profession.<sup>[41]</sup> Therefore, it is  
21  
22 142 essential to explore how emotional labor can be properly managed to reduce burnout.

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24 143 Psychological resilience, also known as "mental toughness" and "bounce-back ability," is a  
25  
26 144 negative predictor of burnout in the United States.<sup>[42]</sup> It is the ability to move forward positively  
27  
28 145 from a negative, traumatic, or stressful experience.<sup>[43]</sup> In a study supported by the American  
29  
30 146 Association of Critical-Care Nurses, Mealer showed that 22% of ICU nurses with high levels of  
31  
32 147 psychological resilience<sup>[44]</sup> tended to exhibit optimism, humor, flexibility, and high ethical  
33  
34 148 standards.<sup>[45]</sup> Individuals with higher psychological resilience are better able to deal with stressful  
35  
36 149 situations and, thus, maintain good mental health.<sup>[46]</sup> Along with the rapid development of global  
37  
38 150 healthcare, building the psychological resilience of caregivers has been listed as one of the top ten  
39  
40 151 international "standard of care movements".<sup>[47]</sup>

41  
42 152 Although previous studies have explored the relationship between burnout and emotional labor  
43  
44 153 and between burnout and psychological resilience,<sup>[26, 42]</sup> the association between these factors has  
45  
46 154 not been adequately discussed in the context of the COVID-19 pandemic concerning  
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48 155 gastroenterology nurses. Therefore, this study investigated the current status of burnout, emotional  
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50 156 labor, and psychological resilience among gastroenterology nurses during the COVID-19  
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52 157 pandemic, to explore relevant associations among these factors in relation to specific variables,  
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4 158 and to provide evidence-based research to help reduce nurses' burnout, increase their job  
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6 159 satisfaction, and promote their psychological health during the COVID-19 pandemic.  
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## 10 161 **Methods**

### 11 162 *Patients and public involvement*

13 163 The study did not involve patients. All data for this study were obtained from nurses. Neither the  
14 164 study participants nor members of the public participated in the design, implementation, reporting,  
15  
16 164 study participants nor members of the public participated in the design, implementation, reporting,  
17  
18 165 or dissemination plans of our research.  
19  
20

### 21 166 *Study design*

22  
23 167 This study used a cross-sectional correlational design.  
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### 26 168 *Research Objectives*

27  
28 169 This study aimed to investigate the situation of burnout, emotional labor, and psychological  
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30 170 resilience among nurses in gastroenterology departments in hospitals in China during the COVID-  
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32 171 19 pandemic and to explore their related factors and the associations among these variables. The  
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34 172 results are intended to help provide a reference point for hospital administrators to implement  
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36 173 interventions.  
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### 39 174 *Setting and sample*

40  
41 175 This study used a convenience sampling method to select gastroenterology nurses working in  
42  
43 176 Fujian Province, China, from November 24, 2021, to December 26, 2021.  
44

45 177 Inclusion criteria were as follows: (1) those who were registered and had a Chinese Nurse  
46  
47 178 Practitioner Certificate; (2) those who had worked in gastroenterology for  $\geq 1$  year; and (3) those  
48  
49 179 who provided informed consent to participate in this study voluntarily.  
50

51 180 Exclusion criteria were as follows: (1) those who were on leave; (2) those undergoing training; or  
52  
53 181 (3) those unable to participate in this study for special reasons (e.g., being hospitalized and having  
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55 182 their status changed from nurse to patient; uninterested in participating; having already participated  
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4 183 in a similar study and not wanting to participate again; being too busy with work and thus did not  
5  
6 184 have time to participate).

7  
8 185 The sample size was calculated with reference to the sample requirement for multiple linear  
9  
10 186 regression analysis,<sup>[48]</sup> which is at least ten times the number of independent variables. In this study,  
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12 187 the number of independent variables was 14. Considering the likelihood of 10%-20% invalid  
13  
14 188 questionnaires, the final sample content was determined to be 154-168 cases. A total of 458  
15  
16 189 questionnaires were collected; 345 were valid (75.3% valid return rate); 113 responses were either  
17  
18 190 incomplete or invalid and were excluded, as detailed in a CONSORT diagram in Figure 1.

## 19 20 21 191 ***Variables and instruments***

### 22 23 192 *General demographics and work-related characteristics*

24  
25 193 General demographic information and work-related characteristics were collected from 345  
26  
27 194 participants at the beginning of the survey. The information included: sex, age, marital status,  
28  
29 195 number of children, academic qualifications, employment category, working years, professional  
30  
31 196 title, department, directly supervised nursing interns, specialty nurses, number of days per month  
32  
33 197 working at night, number of times per month responsible for epidemic prevention and control posts,  
34  
35 198 and monthly income (RMB).

### 36 37 38 199 *Chinese version of the Maslach Burnout Inventory (MBI-CH)*

39  
40 200 The Maslach Burnout Inventory is the most extensively used scale for burnout assessment.<sup>[17]</sup> The  
41  
42 201 Chinese version of the inventory, translated and revised by Dr. Mei-Chi Pang in Hong Kong, was  
43  
44 202 used in this study. The 22-item MBI-CH includes the three dimensions of emotional exhaustion,  
45  
46 203 depersonalization, and personal accomplishment. Regarding its 7-point Likert scale measurement,  
47  
48 204 higher scores on the emotional exhaustion and depersonalization dimensions and lower scores on  
49  
50 205 the personal accomplishment dimension indicate higher burnout. The Cronbach's alpha coefficient  
51  
52 206 was 0.6260,<sup>[49]</sup> with acceptable reliability.

### 53 54 55 207 *Chinese version of the Emotional Labor Scale (ELS-CH)*

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4 208 In 2003, Grandey<sup>[50]</sup> developed the Emotional Labor Scale based on emotion regulation theory.  
5  
6 209 This study uses the Chinese version of this Emotional Labor Scale translated and revised by Luo  
7  
8 210 Hong et al.<sup>[26]</sup> The 14-item ELS-CH scale includes the three dimensions of surface acting, deep  
9  
10 211 acting, and emotional expression. On its 6-point Likert scale, scores range from 1, indicating strong  
11  
12 212 disagreement, to 6, indicating strong agreement, with higher total scores indicating higher levels  
13  
14 213 of emotional labor. The Cronbach's alpha coefficients for the total scale and the three dimensions  
15  
16 214 were 0.811, 0.711, 0.826, and 0.872,<sup>[26]</sup> respectively, and the scale has good reliability and validity.  
17  
18 215 This scale has been widely used in studies on nurses.

#### 216 *Chinese Psychological Resilience Scale (PRS-CH)*

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

#### 223 **Data collection**

224 The data were collected through an online survey. The researcher, who was the nursing manager  
225 of the gastroenterology department in a tertiary care hospital, used Questionnaire Star (a tool for  
226 questionnaire surveys) and sent the URL to the survey respondents via WeChat (a popular social  
227 application in China). After describing the study's aims and obtaining informed consent, a link to  
228 the survey was posted on the nurses' workgroups via WeChat, and the nurses then completed it.  
229 After the questionnaire was collected, it was entered and checked by two researchers using Epidata  
230 3.1 software to ensure the validity and completeness of the questionnaire.

#### 231 **Statistical analysis methods**

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

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4 233 distribution and those that do not were expressed as mean  $\pm$  standard deviation ( $\bar{x} \pm S$ ) and median  
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6 234 (Q1, Q3), respectively. Q1 represents the 25<sup>th</sup> percentile, and Q3 represents the 75<sup>th</sup> percentile.  
7  
8 235 Count data were statistically described using frequency and composition ratios. The Shapiro-Wilk  
9  
10 236 method was used for normality testing. T-tests and analysis of variance (ANOVA) were used for  
11  
12 237 measures that met the normal distribution. Fisher's least significant difference method was used  
13  
14 238 for two-way comparison if the ANOVA results showed statistically significant differences. The  
15  
16 239 Mann-Whitney U rank-sum test and the Kruskal-Wallis H test were used for measures that did  
17  
18 240 not meet the normal distribution. The relationship between the two measures' indicators was  
19  
20 241 analyzed using Pearson correlation analysis. The effects of multiple measures on nurses' burnout,  
21  
22 242 emotional labor, and psychological resilience scores were analyzed using multiple linear  
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24 243 regression (stepwise method, inclusion: 0.05, exclusion: 0.1), and the differences were regarded  
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26 244 as statistically significant at  $P < 0.05$ .

245

## 246 **Results**

### 247 ***General information***

#### 248 *Basic information about the survey population*

249 Table 1 shows the basic characteristics of the 345 respondents investigated in this study. In total,  
250 341 (98.8%) nurses were women, 166 (48.1%) were under 30 years, 209 (60.6%) were married,  
251 148 (42.9%) had no children, 127 (36.8%) had one child, 172 (49.9%) had a college education,  
252 169 (49.0%) had bachelor's degrees or higher, 177 (51.3%) were permanent staff, 168 (48.7%)  
253 were in the labor contract category, 179 (51.9%) did not directly supervise nursing interns, 319  
254 (92.5) were not specialty nurses, and 213 (61.7) earned more than 6,000 RMB per month.

255

256

257 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
<b>Age (years)</b>										
<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		
<b>Marital status</b>										
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		
<b>Number of children</b>										
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		
<b>Academic qualifications</b>										
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		
<b>Employment category</b>										
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		
<b>Working years</b>										
<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		



258 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		
<b>Professional title</b>										
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		
<b>Directly supervising nursing interns</b>										
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		
<b>Specialty nurses</b>										
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		
<b>Number of days per month working at night</b>										
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		
<b>Monthly income (RMB)</b>										
<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		

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

260 *Burnout score results for the nurses*

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

266 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	$14.37 \pm 13.49$	$1.60 \pm 1.50$
	Depersonalization	5	0–30	1.00 (0.00, 5.00)	0.20 (0.00, 1.00)
	Personal fulfillment	8	0–48	$35.18 \pm 13.40$	$4.40 \pm 1.68$
	Total burnout score	22	0–110	$53.07 \pm 19.63$	$2.41 \pm 0.89$
Emotional labor	Surface acting	7	7–42	$19.71 \pm 8.45$	$2.82 \pm 1.21$
	Emotional expression	4	4–24	$12.01 \pm 5.35$	$3.00 \pm 1.34$
	Deep acting	3	3–18	$7.07 \pm 4.12$	$2.36 \pm 1.37$
	Total Emotional Labor Score	14	14–84	$38.79 \pm 12.22$	$2.77 \pm 0.87$
Psychological resilience	Toughness	13	0–52	$37.47 \pm 11.89$	$2.88 \pm 0.91$
	Self-improvement	8	0–32	$21.29 \pm 7.48$	$2.66 \pm 0.94$
	Optimism	4	0–16	$11.21 \pm 3.98$	$2.80 \pm 0.99$
	Total Psychological Resilience Score	25	0–100	$69.97 \pm 22.38$	$2.80 \pm 0.90$

267

268 *Emotional labor score results for the nurses*

269 The total score of the emotional labor of nurses was  $38.79 \pm 12.22$ , the mean score of entries was  
 270  $2.77 \pm 0.87$ , and the mean scores of entries in the three dimensions from highest to lowest, were  
 271 emotional expression ( $3.00 \pm 1.34$ ), surface acting ( $2.82 \pm 1.21$ ), and deep acting ( $2.36 \pm 1.37$ ), as  
 272 shown in Table 2. This result indicates that deep acting was less used in nurses' work, while  
 273 emotional expression and superficial play were more applied.

274 *Psychological resilience score results for the nurses*

275 The total psychological resilience score of the nurses was  $69.97 \pm 22.38$  and the mean score of the

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3 276 entries was  $2.80 \pm 0.90$ , including the score of the toughness dimension ( $37.47 \pm 11.89$ ), the score  
4  
5 277 of the self-improvement dimension ( $21.29 \pm 7.48$ ), and the score of the optimism dimension  
6  
7 278 ( $11.21 \pm 3.98$ ). These are shown in Table 2.  
8  
9 279

## 280 ***Effects of different demographic characteristics on burnout, emotional labor, and psychological*** 281 ***resilience of nurses***

### 282 *The effect of different demographic characteristics on nurses' burnout*

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

### 287 *Effects of different demographic characteristics on nurses' emotional labor*

288 Demographic characteristics such as marital status, number of children, employment category, and  
289 professional title affected nurses' emotional labor, and the differences were statistically significant.  
290 A two-by-two comparison showed that, in terms of marital status, widowed = unmarried = married  
291 < divorced, indicating that the emotional labor of divorced nurses was higher than that of nurses  
292 with other marital status. In terms of the number of children, having two children < no children =  
293 having one child. In terms of employment category, permanent staff < category labor contract. In  
294 terms of professional title, junior nurse = middle nurse > sub-senior and senior nurse, as detailed  
295 in Table 1.  
296

### 297 *The effect of different demographic characteristics on nurses' psychological resilience*

298 Employment category and monthly income affected nurses' psychological resilience, and the  
299 difference was statistically significant. A two-by-two comparison showed that, in terms of forms  
300 of employment, category labor contract < permanent staff; in terms of monthly income, less than  
301 4000 (RMB) < 4000–5999 (RMB) = greater than or equal to 6000 (RMB), as detailed in Table 1.  
302

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

### 304 *The relationship between burnout and emotional labor in nurses*

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

307 positively correlated with two dimensions of emotional labor, namely, surface acting ( $r = 0.450$ ,  $P$   
 308  $< 0.001$ ), and emotional expression ( $r = 0.403$ ,  $P < 0.001$ ) and negatively correlated with deep  
 309 acting ( $r = 0.303$ ,  $P < 0.001$ ).

### 310 *The relationship between emotional labor and psychological resilience in nurses*

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

### 315 ***Multiple linear regression analysis of predictors of burnout, emotional labor, and psychological 316 resilience in nurses***

#### 317 *Multiple linear regression analysis of predictors of burnout among the nurses*

318 The number of days per month working at night and whether they directly supervised nursing  
 319 interns were predictors of burnout. The results of the multiple linear regression analysis showed  
 320 that there was a positive relationship between both these factors and burnout, as detailed in Table  
 321 3.

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

Variables	<i>B</i>	<i>SE</i>	<i>b</i>	<i>t</i>	<i>P</i>	<i>R</i> <sup>2</sup>	Adjusted <i>R</i> <sup>2</sup>	<i>F</i>	<i>P</i>
<b>Burnout</b>						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				
<b>Emotional Labor</b>						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				
<b>Psychological Resilience</b>						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
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323 Note: B: unstandardized coefficients; b: standardized coefficients; SE: standard error.

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

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

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

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

332 **Discussion**

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

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

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

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3 352 nurses working in the fight against the pandemic have worked more than usual during this time,  
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5 353 this might have increased their burnout levels. Many studies have reported varying levels of  
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7 354 burnout among different groups of nurses. Liang<sup>[53]</sup> showed that the total burnout score of ICU  
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9 355 nurses was higher than that found in this study, which may be related to factors such as the more  
10  
11 356 severe conditions of ICU patients, more frequent night shifts for nurses, heavier workloads, greater  
12  
13 357 labor intensity, and a shortage of human resources. A study by Li <sup>[54]</sup> showed that nurses in  
14  
15 358 intravenous drug administration centers had higher scores on the dimension of emotional  
16  
17 359 exhaustion and lower scores on the dimension of personal fulfillment than in this study, which  
18  
19 360 may be related to the fact that nurses in intravenous drug administration centers are at a higher risk  
20  
21 361 of occupational injury,<sup>[54]</sup> the working environment is more confined, and nurses have less direct  
22  
23 362 contact with patients and family members.

24  
25 363 Regarding emotional labor, the total score found for the nurses was lower than that reported by  
26  
27 364 Wu et al.<sup>[55]</sup> This may be related to the fact that Wu et al. surveyed 11,337 nurses from 92 hospitals,  
28  
29 365 most of whom were from hospital emergency and surgery departments, which have a heavier  
30  
31 366 workload and more intense work compared to gastroenterology. This may have increased the level  
32  
33 367 of emotional labor of nurses to some extent. The present study suggests that the nurses tended to  
34  
35 368 adopt more superficial play at work; they often engaged in emotional camouflage and only  
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37 369 displayed pleasing emotions to patients. To a certain extent, this indicates a poor professional  
38  
39 370 identity among these nurses.<sup>[26]</sup>

40  
41 371 In this study, the psychological resilience scores were higher than those of Afshari et al.<sup>[56]</sup> The  
42  
43 372 reason for this could be the difference in the time of the study surveys being conducted. When the  
44  
45 373 current study was initiated, understanding of the new coronavirus was more significant, as was  
46  
47 374 knowledge among the population concerning the preventive effects of vaccination and how to  
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49 375 implement and run vaccination programs smoothly. Nurses have improved their prevention,  
50  
51 376 control management, and response skills, resulting in a relatively higher level of psychological  
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53 377 resilience. Therefore, nurses have been able to deal more positively with stress, recover quickly,  
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55 378 and adapt positively to stress factors.

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57 379 This study showed that nurses who directly supervised nursing interns had higher levels of burnout,  
58  
59 380 which may be related to the increased teaching workload and the emotional drain. The higher level  
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381 of burnout among nurses with a more frequent number of days per month working at night may be  
382 related to the increased frequency of changes in work and rest schedules, which would have

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3 383 increased the physiological and psychological burden placed on them. This study showed higher  
4 384 levels of emotional labor among divorced nurses, which accords with the findings of Zhu et al.<sup>[57]</sup>  
5 385 This may be linked to the fact that divorce increases the emotional burden on nurses, alongside  
6 386 work pressure, which renders them more prone to anxiety, sadness, and other negative emotions.  
7 387 The lower level of emotional labor and the higher level of psychological resilience found among  
8 388 the nurses on the permanent staff may be related to the fact that nurses on staff are more stable and  
9 389 have a lower turnover rate. The higher level of emotional labor among junior and middle nurses  
10 390 than among the sub-senior and senior nurses may be related to the difference in years of experience  
11 391 and heavier emotional load. The monthly income level indicates the value hospitals place on their  
12 392 nurses for their hard work and reflects the level of support given to the nursing department. This  
13 393 level of support has a significant effect on nurses' psychological resilience; the greater the level of  
14 394 support, the higher the overall level of nurses' psychological resilience.<sup>[58]</sup>  
15 395 The present study showed that nurse burnout was negatively correlated with the deep acting  
16 396 dimension of emotional labor and was positively correlated with the other two dimensions, which  
17 397 accords with a previous study.<sup>[26]</sup> With developing awareness among increasing numbers of  
18 398 individuals in medicine, patients are paying more attention to their medical experience, and patient  
19 399 satisfaction has become an important criterion for measuring the level of medical care, which  
20 400 requires nurses to have advanced levels of competence in handling the nurse-patient relationship.  
21 401 As shown in Brotheridge et al.,<sup>[59]</sup> the behavior of showing emotions that are inconsistent with  
22 402 one's actual inner experience weakens one's sense of self-worth, and this process requires more  
23 403 psychological resources for nurses to show appropriate emotional behavior. Excessive  
24 404 consumption of physical and mental resources over a long period can easily lead to psychological  
25 405 fatigue, thus aggravating emotional exhaustion and depersonalization. In contrast, deep acting  
26 406 means that nurses can adjust their genuine feelings and understanding to adapt to the situation, and  
27 407 such behavior of aligning internal feelings with external emotional performance appropriately  
28 408 consumes less physical and mental resources. However, individuals do not need to require more  
29 409 resources to suppress their true emotions, and they are compensated with patients' emotional  
30 410 reactions, which helps in achieving a balance of psychological resources, in turn, reducing nurses'  
31 411 burnout. A study by Wang et al.<sup>[60]</sup> concluded that the more nurses express their emotions  
32 412 authentically, the more committed they are to their work.  
33 413 The present study showed that nurses' emotional labor was negatively related to psychological

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3 414 resilience and its three dimensions. From this study's results, it would appear that nurses who show  
4 415 more resilience, self-improvement, and optimism are more likely to adopt deeper roles in their  
5 416 work and have a higher sense of professional identity. Therefore, it is necessary to improve the  
6 417 psychological well-being of nurses and increase their psychological resilience during the COVID-  
7 418 19 pandemic and other similar events. Some studies have shown that mindfulness-based stress  
8 419 reduction and psychotherapy centered on positive thinking can help reduce nurses' workload stress,  
9 420 help them establish a healthy psychological state,<sup>[61]</sup> and improve their levels of psychological  
10 421 resilience.<sup>[62]</sup> Studies have shown that surface acting negatively correlates with job satisfaction,  
11 422 while deep acting has a positive relationship with job satisfaction.<sup>[55]</sup> This study's results suggest  
12 423 that, by improving nurses' psychological resilience, nurses can be encouraged to engage in more  
13 424 deep acting, which is likely to help increase nurses' professional identity and job satisfaction.  
14 425 This study provides valuable insights into the current state of burnout, emotional labor, and  
15 426 psychological resilience among gastroenterology nurses during the COVID-19 pandemic.  
16 427 However, the study has several limitations. First, the findings are cross-sectional, precluding the  
17 428 drawing of any conclusions about the impact of COVID-19. Comparison of the findings with pre-  
18 429 pandemic studies requires caution, as the observed status may be due to factors unrelated to the  
19 430 pandemic. Second, this study was only conducted in one province of China using a convenience  
20 431 sampling method, which is not representative of other regions, or of departments and other  
21 432 personnel in hospitals, meaning that these findings are not generalizable. Third, as 98.8% of the  
22 433 participants were female, more attention should be paid to male nurses in the future. Fourth, the  
23 434 difficulty of data collection during the pandemic may have led to possible bias in data  
24 435 interpretation. In addition, the scope of one questionnaire may not be sufficient to summarize  
25 436 nurses' actual levels of burnout, emotional labor, and psychological resilience. Given the  
26 437 possibility of a "social desirability" effect, nurses' self-reported burnout may be lower. Therefore,  
27 438 actual burnout may be higher than the reported results, which would reduce the reliability of the  
28 439 results of this study. The response rate was relatively good, although approximately a quarter of  
29 440 the participants did not respond. As not responding may be a sign of burnout, this study might  
30 441 have underestimated the prevalence of burnout among the study population.  
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## 443 **Conclusion**

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



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3 445 impacted the psychological state of nurses in relation to burnout, emotional labor, and  
4 446 psychological resilience and to provide guidance for subsequent burnout prevention and control  
5 447 efforts. Greater adoption of deep acting by nurses can be promoted by improving their  
6 448 psychological resilience, which can help improve emotional labor, thereby reducing burnout and  
7 449 decreasing turnover rates. Senior management needs to pay attention to the psychological status  
8 450 of nurses. Therefore, qualitative, longitudinal, and interventional studies should be conducted to  
9 451 explore the psychological condition of nurses, expand the research indexes of nurses'  
10 452 psychological characteristics, construct models of nurses' psychological resilience, and further  
11 453 track the long-term effects of interventions while evaluating the immediate effects of interventions.  
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### 21 455 **Acknowledgments**

22 456 The authors thank all the participants for their cooperation and the nursing management staff of  
23 457 the cooperative hospitals for their support in this study.  
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### 27 459 **Ethics approval**

28  
29 460 This study involved human participants and was approved by the Branch for Medical Research  
30 461 and Clinical Technology Application, the Ethics Committee of the First Affiliated Hospital of  
31 462 Fujian Medical University (MRCTA, ECFAH of FMU [2021]393). The participants gave  
32 463 informed consent to participate in the study before taking part.  
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### 37 465 **Author contribution statement**

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39 466 **Huayan Lin** and **Zhangjie Li** contributed equally to this study. **Zhangjie Li** was responsible for  
40 467 manuscript preparation. **Huayan Lin** contributed to designing the study and supervised the  
41 468 research. **Huayan Lin, Zhangjie Li, and Mengting Yan** contributed to the review of the data and  
42 469 manuscript. All authors have reviewed and approved the manuscript.  
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### 47 471 **Competing interests**

48  
49 472 All authors have no conflict of interest.  
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54  
55 475 This research received no specific grant from any funding agency in public, commercial or not-  
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3 476 for-profit sectors.  
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## 6 478 **Data availability statement**

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8 479 Data are available from Huayan Lin (email: [fjydfkyxx@163.com](mailto:fjydfkyxx@163.com)) upon reasonable request.  
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Figure 1 CONSORT diagram regarding the sampling process

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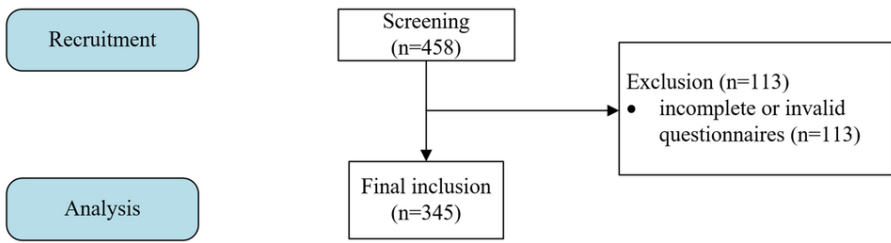


Figure 1 CONSORT diagram regarding the sampling process  
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STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page No
<b>Title and abstract</b>	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
<b>Introduction</b>			
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
<b>Methods</b>			
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	/
<b>Results</b>			
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	/
<b>Discussion</b>			
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
<b>Other information</b>			
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](http://www.strobe-statement.org).