

## Mental Health Status of Chinese Student Nurses during COVID-19: A Cross-sectional Study

Pan Li<sup>1</sup>, Lingyao Meng<sup>2</sup>, Min Ouyang<sup>3,\*</sup>

<sup>1</sup>School of Nursing, Xiangnan University, No. 889, Chenzhou Avenue, Chenzhou, 423099, Hunan, China

<sup>2</sup>Xiangya Nursing School, Central South University, Changsha, 410013, Hunan, China

<sup>3</sup>College of Educational Sciences, Xiangnan University, No. 889, Chenzhou Avenue, Chenzhou, 423099, Hunan, China

\*Corresponding Author: Min Ouyang

### **Abstract:**

**Objective:** To investigate the mental health status of student nurses under COVID-19 outbreak and analyze its influencing factors. **Design:** A Cross-sectional Study. **Methods:** A total of 448 student nurses who had internships in various hospitals, were collected and investigated by a network questionnaire survey with symptom check list 90 (SCL-90) from March 2020. To evaluate the mental health status of student nurses though the level comparing with the national norm. To analyze the affecting factors of the mental health status of nursing students by methods of analysis of variance (ANOVA), T test and multiple linear stepwise regression analysis. **Results:** During the outbreaks of COVID-19, the total score of SCL-90 of student nurses was  $131.23 \pm 10.34$ , besides, the level of total average, somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, phobic anxiety and psychotic of SCL-90 were significantly higher than those of national norm, it showed a statistically significant difference ( $P < 0.05$ ), whereas there was no significant difference in hostility and paranoid thoughts ( $P > 0.05$ ). The results of ANOVA showed that there were significant differences in total scores of SCL-90 among the student nurses with different education levels, perceived health status and whether they were class leaders ( $P < 0.05$ ). The results of multivariate analysis showed that education level, perceived health status and whether they were class leaders were the correlative factors affecting the mental health status of student nurses under COVID-19 outbreak ( $P < 0.05$ ). **Conclusion:** During the outbreaks of COVID-19, student nurses have a certain extent of mental health problems, which may be related to the education level and perceived health status of student nurses and whether they are appointed to class leaders. Therefore, clinical nursing education should strengthen the cultivation of COVID-19-related knowledge and psychological guidance of student nurses in order to improve their mental health level.

**Keywords:** Novel coronavirus pneumonia, Student nurses, Mental health, Influencing factors.

## I. INTRODUCTION

Up to August 18, 2020, the number of confirmed cases of COVID-19 worldwide reached 21,756,357, with cumulative deaths of 771,635, and influence 216 countries and regions [1]. It has become real for COVID-19 to be pandemic. According to the National Health Commission, up to April 3, China had a total of 81639 confirmed cases, in which 3300 confirmed cases and 22 deaths were the medical staff [2]. According to data released by the Italian National Health Institutes, up to March 30, 8358 medical staff in Italy were tested positive for novel coronavirus, and 69 doctors died of COVID-19[3]. The Spanish Health Ministry said in a press conference on March 27th that nearly 14.7% of subjects with COVID-19 infections in Spain were medical staff, and the number of infected medical staff was about 9444[4]. As the epidemic spreads around the world, although governments have paid huge attention and taken a series of actions, the number of confirmed and suspected cases is still on the rise, which has a great impact on the physical and psychological health of people all over the world. While hospital is the main battlefield where we fight with COVID-19, front-line clinical nurses are receiving strong workload and work pressure[5]. For student nurses who have just come into contact with clinical work, due to their lack of clinical experience and professional knowledge, they may be more likely to have mental health problems in this period. Therefore, the mental health of student nurses, who are the reserve army of nursing team, is directly related to nursing quality, the stability of nursing team and even the development of nursing career.

## II. BACKGROUND

Researches showed that in frequent public emergencies, nurses had always been involving in all kinds of relief activities of disaster. Students nurses are the reserve army of the nursing team, and when they are faced with public emergencies, their ability of psychological adjustment will directly affect the effectiveness of future work, and even plays a vital role in employment intention after graduation [6]. When student nurses are faced with public emergencies, insufficient cognitive ability and immature judgment will often lead to various stress reactions. Moreover, if they were not guided correctly, it will have negative impact on their mental health. Without effective coping strategies, student nurses may have a higher risk of mental health problems under stressful conditions [6]. At present, there is no reported on the mental health status of student nurses under COVID-19 outbreak in China.

Symptoms checklist 90 (SCL-90, L.R. Derogatis, 1977) is one of the most famous mental health test scales in the world. Our study used SCL-90 scale to investigate the mental health status and its influencing factors of student nurses under COVID-19 outbreak.

## III. METHODS

### 3.1 Study Design

This study was a descriptive cross-sectional survey. All data were collected in March 2020.

### 3.2 Sample Groups/Participants

480 student nurses admitted to our nursing school in the year of 2019 and 2020 were selected

as participants, and they all clinically practiced in various hospitals. The study sample included 448 student nurses who filled out the data forms completely (response rate =93.3%). There were 16 males and 432 females, aged from 18-23 years, with an average of  $21.34 \pm 11.23$  years.

## IV. DATA COLLECTION

Investigators uploaded questionnaires to the WeChat group and QQ group of student nurses, and these students got a self-assessment questionnaire. All the participants were explained about the purpose, significance and method of this study before the survey, and they all agreed with the informed consent. The survey was conducted by anonymity.

### 4.1 Data Collection Tools

#### (1) Table of participant characteristics

The table of participant characteristic was designed by researchers, which mainly included gender, age, education level, perceived health status, whether they were class leaders by the end of this survey, and so on.

#### (2) Table of symptom checklist (SCL-90)

L. R. Derogatis's symptom checklist-90 (SCL-90) was used in this study. SCL-90 includes 9 subscales and 90 items, namely somatization, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, fear, paranoid thoughts, psychotic. The lower the score, the better the mental state. The total score of SCL-90 is the sum of 90 items, and the factor score is the total score of each item that makes up a factor divided by the number of items that make up the factor. When the score exceeds the norm, it indicates that there are certain mental health problems. Wang et al. have translated SCL-90 scales into Chinese [7], and in our study, the Cronbach's alpha of SCL-90 was 0.95.

### 4.2 Statistical Analysis

Characteristic qualitative data were presented as cases (%), and quantitative data were presented as mean  $\pm$ SD ( $\bar{x} \pm S$ ) and analyzed using SPSS version 24.0. Independent two-sample t-test or analysis of variance(ANOVA) was used to compare the symptom scores of subjects with different characteristics. In terms of the influencing factors of student nurses' mental health status under COVID-19 outbreak, ANOVA and stepwise multiple linear regression analysis were used, with  $\alpha=0.05$ . Statistical significance was defined as  $P < 0.05$ .

### 4.3 Ethical Considerations

Our study was approved by the College of Nursing and ethically agreed by the Xiangnan University Ethics Committee.

## V. RESULTS

### 5.1 General Condition of Student Nurses under COVID-19 Outbreak

Our study conducted a questionnaire survey among 448 student nurses under COVID-19 outbreak, in which 432 cases were female (96.43%), 248 cases (55.36%) aged from 21 to 23, 209 cases (46.65%) with undergraduate education and 250 cases (55.80%) with poorly perceived health status. 31.7% (142 cases) of the student nurses were class leaders, as shown in TABLE I.

**TABLEI. General condition of student nurses**

Items	Cases (n=448)	Percentage (%)
Sex		
Male	16	3.57
Female	432	96.43
Age (year)		
18~20	200	44.64
21~23	248	55.36
Education level		
Undergraduate	209	46.65
Junior college	81	18.08
Upgrade from junior college to university	158	35.27
Perceived health status		
Bad	250	55.80
General	50	11.16
Good	148	33.04
Whether they were class leaders		
Yes	142	31.70
No	306	68.30

## 5.2Mental Health Status of Student Nursesunder COVID-19 Outbreak

The total score of SCL-90 of student nurses was 91~172 ( $131.23 \pm 10.34$ ). Among them, the total average score of SCL-90 and the scores of somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, phobic anxiety and psychotic of student nurses were significantly higher than those of national norm ( $P < 0.05$ ), and there was no significant difference between hostility and paranoid thoughts ( $P > 0.05$ ). See TABLEII.

**TABLEII. Comparison of mental health scores of student nurses with national norm ( $\bar{x} \pm s$ )**

Items	Student nurses (n=448)	National norm (n=1388)	<i>t</i>	<i>p</i>
A total score of SCL-90	1.67±0.32	1.44±0.43	8.543	0.000
Somatization	1.58±0.36	1.37±0.48	9.684	0.000
Obsessive-compulsive	1.84±0.38	1.62±0.58	6.051	0.000
Interpersonal sensitivity	1.76±0.32	1.65±0.51	4.512	0.000
Depression	1.70±0.39	1.50±0.59	6.679	0.000
Anxiety	1.56±0.33	1.39±0.43	5.856	0.000
Hostility	1.49±0.55	1.48±0.56	0.333	0.741
Phobic anxiety	1.39±0.24	1.23±0.41	6.262	0.000
Paranoid thoughts	1.44±0.44	1.43±0.57	0.340	0.734
Psychotic	1.49±0.28	1.29±0.42	6.537	0.000

### 5.3Univariate Analysis of the Mental Health Status of Student Nursesunder COVID-19 Outbreak

The results of the ANOVA showed that there was no significant difference in the total score of SCL-90 among student nurses with different genders or ages ( $P>0.05$ ). However, there were significant differences in the total scores of SCL-90 among student nurses with different education levels, perceived health status and whether they were class leaders ( $P<0.05$ ), see TABLEIII.

**TABLEIII. Univariate analysis of the mental health status of student nurses**

Items	Cases (n=448)	Scores (points)	<i>F/t</i>	<i>p</i>
Sex				
Male	16	130.95±10.23	0.238	0.646
Female	432	131.55±10.45		
Age (year)				
18~20	200	131.02±10.49	1.325	0.156
21~23	248	131.45±10.31		
Education level				
Undergraduate	209	128.87±9.32	13.342	<0.001

Junior college	81	131.34±10.10		
Upgrade from junior college to university	158	135.32±10.22		
Perceived health status				
Bad	250	133.27±10.34	11.324	<0.001
General	50	131.34±10.20		
Good	148	128.29±9.87		
Whether they were class leaders				
Yes	142	133.37±10.52	18.573	<0.001
No	306	129.16±9.89		

## 5.4 Stepwise Multiple Linear Regression Analysis of Influencing Factors of the Mental Health Status of Student Nurses

The score of SCL-90 was set as the dependent variable, and the results of multivariate analysis showed that education level, perceived health status and whether they were class leaders were the relevant factors influencing the mental health status of student nurses under COVID-19 outbreak ( $P < 0.05$ ). As shown in TABLE IV.

**TABLE IV. Stepwise multiple linear regression analysis of the influencing factors of student nurses' mental health status**

Independent variable	Regression coefficient	Standard error	Standard regression coefficient	<i>t</i>	<i>P</i>
Constant	121.23	3.672	-	30.231	<0.001
Sex	0.501	0.789	0.033	0.639	0.520
Age	0.834	0.757	0.061	1.044	0.288
Perceived health status	-1.234	0.453	0.203	3.457	0.002
Education level	1.535	0.442	0.213	3.630	0.001
Class Leaders	1.363	0.351	0.337	4.874	<0.001

## VI. DISCUSSION

### 6.1 Mental Health Status of Student Nurses under COVID-19 Outbreak

Our study showed that the total score of SCL-90 of student nurses was  $131.23 \pm 10.34$ , and the scores of somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, phobic anxiety and psychotic were significantly higher than those of national norm ( $P < 0.05$ ),

which indicated that student nurses had a certain extent of mental health problems in this period. We held the view that this phenomenon was related to the strong psychological stress suffered by student nurses in a short time. This epidemic is sudden and highly contagious. At present, thousands of clinical medical staff have been infected around the world. Moreover, most student nurses have never faced such a serious epidemic before, besides, they lacked working experience and adequate ideological preparation in dealing with acute infectious diseases, as well as objective understanding of COVID-19. Therefore, they worked in a state of high vigilance, and their anxiety and terror were more prominent. Clinical nursing practice is the last link of nursing education and the key to combining professional theoretical knowledge and clinical skills. While the pressure in clinical practice will affect students' emotional state, clinical confidence and career choices. In addition, due to the global outbreak of this epidemic, many hospitals chose to suspend clinical practice of student nurses. Although this measure can ensure students' safety and protect them from the risk of hospital infection, students will undoubtedly lack clinical experience and fail to obtain sufficient learning expectations. Student nurses' pressure at this stage comes from their insufficient preparation to cope with the required knowledge and skills, and also from the conflict between professional beliefs and hospital practice. Lack of clinical experience will lead to the disconnection between theory and practice, as well as unskilled professional operation. Therefore, students cannot be well involved in nursing work, or achieve their expected outcomes, resulting in the suspicion of their own ability, and then lack of confidence. All these problems will bring excessive psychological pressure and excessive mental stress in student nurses, leading to anxiety, fear and loss of self-confidence in work.

## 6.2 Analysis of the Influencing Factors of Student Nurses' mental Health under COVID-19 Outbreak

The results of ANOVA showed that education level, perceived health status and whether they were class leaders were the relevant factors which influenced the mental health status of student nurses in this period ( $P < 0.05$ ), indicating that different education levels, perceived health status and whether they were class leaders could reflect the mental health status of student nurses. Thus, all the above can provide effective reference for the comprehensive arrangement of clinical practice. The higher the student nurses' education level is, the lower the score of SCL-90 is, and the better their mental health status is. Many previous studies have shown that perceived health status is the relevant factor of mental health status. The worse the conscious health status is, the higher the score of SCL-90 is, and the worse their mental health status is [8]. In our study, 55.80% of student nurses showed poor perceived health status, who were likely to have bad emotions, thus affecting their mental health. At the beginning of the COVID-19 outbreak, a large number of patients poured into hospital emergency and fever clinics, then medical workers encountered heavy workload which needed great responsibilities. There were also some other difficulties, including high-intensity continuous work, no rest for a long time, insufficient protective goods and materials, inadequate protective and isolation measures, messy staff in the outpatient department and so on. The results showed that student nurses who acted as class leaders had better mental health, and this may be related to that those students being class leaders are mostly

cheerful, optimistic, sociable and dare to face pressure, which is consistent with the findings of Xiao Hui [9].

## VII. CONCLUSION

To sum up, student nurses have a certain degree of mental health problems under COVID-19 outbreak, which may be related to their education level, perceived health status and whether they were class leaders or not. Therefore, clinical nursing education should strengthen the cultivation of COVID-19-related knowledge and psychological guidance of student nurses, so as to reduce the anxiety and tension of student nurses and ensure their mental health. In the future, school, government and even the society need to work together to ensure the stable development of nursing team and establish the correct view of employment and career planning of student nurses. As for schools, we can rely on school psychological hotline and network platform to provide accurate psychological assistance services for student nurses and strive to do a good job in psychological counseling for students in special periods. Meanwhile, by means of various channels (such university's official WeChat official account, WeChat group, QQ group and so on), the university can organize instructors to timely share authoritative articles related to epidemic prevention and control, as well as information about psychological counseling. Besides, we can also carry out online psychological counseling, give correct guidance to students about facing bad emotions actively, help students make reasonable arrangements for study and life during the epidemic, and improve the awareness of psychological prevention and control. On the other hand, emergency preparedness and disaster modelling need to be used in undergraduate nursing education to acquire relevant skills through repeated practice and emergency management, so as to improve their confidence in both their ability to act effectively in chaotic disaster environment and their team to work effectively. In addition, we should combine ideological and political education with vocational diathesis education to help student nurses build up their fighting will to meet the challenges, and help them have healthy and positive mentality and establish the ability to cope with setbacks, more than that, cultivate them to obtain responsibility sense and the courage to undertake. Our article took student nurses as investigation objects and discussed the relevant measures which could be accepted by school, hospital and government, in order to improve the mental health of student nurses, so this article has certain reference significance.

## FUNDING SOURCES

Project was supported by the National College Students' Innovation and Entrepreneurship Training Program in 2018, China(201810545003), the National College Students' Innovation and Entrepreneurship Training Program in 2019, China(201910545014), University-Level Scientific Research Project Numbered 2015XC10 in Xiangnan University and University-Level Educational Reform Research Project of Xiangnan University in 2020, named of the construction of network education mode for nursing majors under the background of new medical Science.

## CONFLICT OF INTEREST

None of the authors have any conflicts of interest in the study.

## ACKNOWLEDGMENTS

The authors thank all the students who participated in the study. This research received support from School of Nursing, Xiangnan University, and the Xiangya Hospital, Central South University.

## REFERENCES

- [1] World Health Organization(2020)WHO Director-General's opening remarks at the media briefing on COVID-19. Retrieved from: [https:// www.who.int/emergencies/diseases/novel-coronavirus-2019](https://www.who.int/emergencies/diseases/novel-coronavirus-2019).
- [2] Chinese National Health Commission(2020)Update on new coronavirus pneumonia epidemic as of 24:00 on April 3. Retrieved from: [http://www.gov.cn/xinwen/2020-04/04/content\\_5491265.htm](http://www.gov.cn/xinwen/2020-04/04/content_5491265.htm).
- [3] China News(2020)Italy's 69 doctors died of COVID-19 and 10,000 or so medical workers were infected. Retrieved from: <http://www.chinanews.com/gj/2020/04-02/9145939.shtml>
- [4] China Daily(2020)A number of 5,400 medical workers in Spain were infected with Novel-Coronavirus. Retrieved from: [http://paper.people.com.cn/rmrb/html/2020-03/24/nbs.D110000renmrb\\_04.htm](http://paper.people.com.cn/rmrb/html/2020-03/24/nbs.D110000renmrb_04.htm).
- [5] L K, Y L, S H, M C, C Y, B X Y, Z L(2020)The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. The lancet. Psychiatry7(3): 14.
- [6] Cao Y, Fang H, Liu Y, Yang H, Wang D (2015)Survey of cognition of practice nursing students on the emergency rescue of sudden public events.Chinese Nursing Research29(23): 2840-2843.
- [7] Wang X, Wang X, Ma H (1999) Handbook of mental health scale (revised and expanded edition). Beijing: Chinese Mental Health Journal 1999
- [8] A H W, C T L, S E (2019) Undergraduate nursing students' experiences of anxiety-producing situations in clinical practicums: a descriptive survey study. Nurse education today76: 103-108.
- [9] Xiao H (2018) Study on the correlation between professional values of student nurses and clinical learning environment. Nanchang University