

Coping Abilities of Nursing Graduates Under Public Health Emergency (COVID-19): A Cross-Sectional Study

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Abstract

Background: Public health emergencies are serious social problems, threatening people's lives, causing considerable economic losses, and related to all mankind life and health and safety. Nurses are essential in the fight against the public health emergency, corona virus disease 2019 (COVID-19). Nursing graduates are considered as backup health care providers for licensed nurses, the coping abilities and crisis management of nursing students at present deserve attention all around the world.

Methods: 2035 graduating nursing graduates were invited to participate in mobile phone app-based survey from Feb 6 to 20, 2020. The demographic items, psychological and behavioral responses, and the coping abilities were conducted. Multiple linear regression was used to identify the independent factors to nursing graduates' coping abilities under COVID-19.

Results: 1992 submitted were valid. Multiple linear regression analysis showed that Confidence to overcome difficulties, Optimism, Active coping, Help seeking and Practice hospital as designated treatment unit were independently associated with the positive coping of graduates. Fear of COVID-19, Optimism, Avoidance, Help seeking and Severity of epidemic around were independently associated with the negative coping of graduates.

1. Background

The corona virus disease 2019 (COVID-19) is a new highly pathogenic infectious disease caused by the novel beta corona virus^[1]. It is reported that more than 45000 medical staff have gone to the front line to fight against the epidemic in Hubei Province, China, including 30000 nurses approximately^[2]. There is no doubt that nursing staff has played a vital role in the fight and it is not the first time their importance has been highlighted in international emergencies. However, demand for nurses is increasing in all countries and a nine million shortage estimated in 2014 is predicted to decrease by two million by 2030^[3]. nursing graduates are the most direct reserve of the professional nursing team in the coming years. Research on the psychological state of medical staff during the treatment of patients with COVID-19 showed that as non-front-line care providers, nursing graduates, like the non-front-line nurses, may suffer more psychological trauma than front-line nurses^[4]. High-stress nursing graduates may pose a clear threat to the success of clinical rotations^[5], resulting in reduced retention, which will have a negative impact on the increase of nursing staff.

As a sudden public health crisis, the COVID-19 pandemic affect all the college students around the world. Active Minds surveyed 2,086 college students regarding the impact of COVID-19 on their mental health and found that 80% of them reported that COVID-19 has negatively impacted their mental health, 1 in 5 of college students say their mental health has significantly worsened under COVID-19^[6]. In China, nursing schools require graduates to do an internship for at least 8 months at the last semester, before they graduate and take the licensure exam to become registered nurses. It prepares nursing graduates to be able of 'doing' as well as 'knowing' the clinical principles in practice^[7]. Studies show that nursing

graduates have stress in both the clinical and academic aspects^[8], and negative experiences during clinical placements may lead to their dropout from nursing education^[9]. Study showed that the abilities of clinical nursing graduates to cope with influenza outbreak is not optimistic^[10]. Therefore, the coping abilities and crisis management of nursing graduates deserve attention all around the world when facing COVID-19.

2. Purpose

This study was conducted to analysis the current status and influencing factors of coping abilities of nursing graduates under public health emergency (COVID-19) and provides theoretical basis for improving the crisis coping abilities of nursing graduates so as to help them build career confidence.

3. Methods

3.1 Settings and Participants

Due to the epidemic, this cross-sectional study was conducted in the form of Internet questionnaire via mobile phone app (<https://www.wjx.cn/wjx/design/previewmobile.aspx?activity=58349810&s=1>) from February 6, 2020 to Feb 20, 2020, in which the purpose and significance of the study were explained. The Ethics Committee of the First Affiliated Hospital of Nanjing Med[1]ical University approved the study (approval number: 2019-SR-355). Convenience sampling was used to obtain participation among Chinese nursing graduates from 18 colleges (5 undergraduate colleges and 13 junior colleges), as defined by the inclusion and exclusion criteria. They were informed and participation was voluntary. The exclusion criteria include: (1) be absent from clinical practice in the past three months; (2) experienced major personal or family events, which may affect their psychological state in the past six months, such as traffic accidents or the illness or death of a family member or close friend due to Covid-19, etc.

3.2 Instruments

1) Survey respondents were asked to provide demographic characteristics and information about their proximity and exposure to people with COVID-19 (Table 1).

2) Psychological and Behavioral Responses to Public Health Emergency Questionair^[11] consists of three parts: **Cognitive Response Questionnaire** (10 items) including 3 factors: the fear of COVID-19 (4 items, 0-12 points), the confidence to overcome difficulties (2 items, 0-6 points) and the optimism level (4 items, 0-12 points). **Behavioral Response Questionnaire** (10 items) including 3 factors: active coping (5 items, 0-15 points), avoidance (3 items, 0-9 points) and help seeking (2 items, 0-6 points). Responses to items on the Cognitive and Behavioral response questionnaires range from "never" (0 points) to "always" (3 points). Scores for each item within a factor are summed to compute a factor score. **Simplified Psychosomatic Symptom Scale** (29 items) including 4 factors: somatization (8 items, 8-40 points), anxiety (7 items, 7-35 points), depression (9 items, 9-45 points), hostility (5 items, 5-25 points). Each item is scored using 5-point

scale ranging from "strongly disagree" (1 point) to "strongly agree" (5 points). The average score of the factor (*the sum of the scores for each item in the factor divided by the total number of items in the factor*) ≥ 2 indicates significant positive symptoms. The total score of the scale ranges from 29-145. Previous methodological research revealed Cronbach's α coefficients of 0.686, 0.721 and 0.969 for the Cognitive, Behavioral and Psychosomatic scales, respectively^[11]. In our study, the Cronbach's α are 0.693, 0.733 and 0.948.

3) The Chinese version of the Simplified Coping Style Questionnaire (SCSQ) has 20 items^[12], which comprises two dimensions: positive coping (items 1-12) and negative coping (items 13-20). Response options range from "never" (0 points) to "always" (3 points). The score was presented as the average score of positive coping dimension and negative coping dimension. The Cronbach's α coefficients of total scale, positive coping dimension and negative coping dimension reported in previous research were 0.90, 0.89 and 0.78 respectively^[13]. In our study, the Cronbach's α are 0.771, 0.811 and 0.765.

3.3. Statistical analysis

The categorical data is expressed in terms of frequency and percentage (%), and the quantitative data in accordance with the normal distribution is mean \pm standard deviation. The independent sample t-test and the one-way analysis of variance (ANOVA) was used to compare the coping styles of nurses with different demographic characteristics. The correlation between continuous variables was tested by Pearson correlation analysis, and that between categorical variables was tested by Spearman correlation analysis. Multiple linear regression (entry method) was used for multivariate analysis due to dummy variables. P -value <0.05 is considered statistically significant. All the analyses were conducted in the statistical software SPSS version 22 (IBM, Armonk, New York).

4. Results

4.1 Demographic characteristics and coping abilities of nursing graduates

Of the 2035 nursing graduates invited, 1992 submitted valid surveys, so the effective rate was 97.89%. The coping abilities of nursing graduates by demographic characteristics is shown in Table 1. The vast majority of the graduates in the survey were female (92.87%) and nearly three-quarters were junior college graduates (71.99%). Most of them (87%) studied at first-class hospital and a little more than half of the graduates (52.36%) are studying in hospitals that are designated for infected patients. 858 (43.07%) graduates live in cities and 435 (21.84%) graduates found infected patients around them. Gender, Education, Infected patients around and Practice hospital as designated treatment unit are significantly related to the dimension of positive response. Place of Residence, Infected patients around, Severity of epidemic around are significantly related to the dimension of negative response.

4.2 Correlation analysis of the psychological and behavioral responses and coping abilities of the nursing graduates under COVID-19

According to the graduates cognitive response, the 'fear of COVID-19' factor scored 2.95 ± 1.96 points, the 'confidence to overcome difficulties' scored 5.27 ± 1.2 points, and the 'optimism' scored 6.59 ± 1.95 points. According to the graduates' behavioral response, the score of 'active coping' factor was 13.15 ± 2.61 , the score of 'avoidance' factor was 2.24 ± 1.60 , the score of 'help seeking' factor was 5.16 ± 2.03 . The detection rate of the graduates who scored ≥ 2 of different factors was 4.22-8.43% according to the SCSQ. Among them, 84(4.22%) graduates had 'somatization', 117(5.87%) graduates had 'anxiety', 168 (8.43%) graduates had 'depression' and 124 (6.22%) graduates had 'hostility'. The correlation analysis results of each factor and coping status is shown in Table 2.

4.3 Multiple linear regression analysis of influencing factors of coping abilities of graduates under COVID-19

Multiple linear regression models were fitted with positive and negative coping scores as dependent variables, and statistically significant general data in correlation analysis as independent variables. The assignment of independent variables is shown in Table 3. Due to the existence of dummy variables, the independent variable selection adopts the entry method, with a p -value of 0.05 for entering and a p -value of 0.10 for removal. 'Confidence to overcome difficulties', 'optimism', 'active coping', 'help seeking', 'practice hospital is a designated treatment unit for infected patients' were independently associated with the positive coping of graduates. 'Fear of COVID-19', 'optimism', 'avoidance', 'help seeking', 'severity of epidemic around' were independently associated with the negative coping of graduates. See Table 4 and table 5 (only the independent variables with statistical significance are listed).

5. Discussion

5.1 Analysis of coping status of different characteristics of nursing graduates under public health emergency (COVID-19)

In our study, the positive coping dimension scores were higher than that of Chinese norm (2.04 ± 0.58 VS 1.78 ± 0.52 , $p=0.00$), the negative coping dimension scores was less than the Chinese norm (1.08 ± 0.52 VS 1.59 ± 0.66 , $p=0.00$)^[13], which was consistent with the research results of Lin^[14]. nursing graduates may be somewhat more medically knowledgeable and thus more able to respond to public health emergencies than the general public. From the perspective of general data, in the dimension of positive response, the score of female graduates is higher than that of male graduates. This is probably due to the expectation of gender roles. Female are a protected group, When faced with difficulties, they have less pressure and are more willing to take positive measures to achieve psychological balance in the face of difficulties^[15]. The positive response scores of graduates in the designated hospitals for infected patients are higher than the scores of other hospitals that do not treat COVID-19 infected patients, which may be related to the high attention paid to the epidemic by the designated hospitals, and also the adequate protection and comprehensive skill training. In the dimension of negative coping, the score of nursing graduates living in cities is higher than that in rural areas, which may be related to the epidemic mainly occurs in cities, and the control measures and propaganda in cities are stronger than those in rural areas.

In contrast to the results of positive coping, the graduates with severe epidemic around and with infected patients around had higher negative coping score. Due to their medical background, in the face of unknown epidemic, nursing graduates may have acute psychological reactions, such as fear, worry about being infected by the disease. The uncertain state of disaster and worries are the awakening factors of fear and anxiety^[16], leading to the higher level of their negative coping. Therefore, nursing educators and managers should take different interventions for graduates of different genders especially for male graduates. In addition, special attention should also be paid to the graduates who have infected patients around and live in the area where the epidemic is more serious, so as to relieve the group panic psychology and behavior.

5.2 Influencing factors of coping status of nursing graduates during COVID-19

Confidence and optimism in overcoming difficulties fall under the category of positive psychology, and studies have shown that people with better psychological responses tend to adopt more positive ways to cope with difficulties^[17]. Active coping means taking the initiative to take actions because of a threat to one's health. After the COVID-19 outbreak, health authorities implemented comprehensive prevention and control measures in a timely manner, and schools took active health education activities to increase graduates understanding of the epidemic, which made their response to the epidemic more obvious, and the score of active response was bound to rise. The medical level of COVID-19 designated units is relatively high, and the epidemic prevention and control publicity and measures are in place, which enhances the confidence of graduates and encourages them to adopt a more active coping style. Fear and avoidance of COVID-19, as well as the severity of the COVID-19 outbreak in the place of residence, can lead to negative response by nursing graduates. It is understandable and interventions should be taken to reduce the fear of COVID-19 so as to reduce the level of negative coping. Help-seeking entered the models of positive and negative coping, both of which had positive effects. However, the coefficient was higher in the model of positive responses, indicating that the change had a greater impact on positive responses. Therefore, it is suggested that nursing educators and managers should give timely feedback on the help-seeking behaviors of nursing graduates. Although the correlation between anxiety, depression, hostility and coping style in simplified psychosomatic symptoms is statistically significant, they are not included in the final model, which may be related to the low detection rate of psychosomatic symptoms in the graduates.

5.3 Strategies to improve coping abilities of graduates under COVID-19.

(1) Establish the emergency management mechanism for nursing graduates

Relevant administrative departments shall formulate and promulgate perfect rules and regulations of 'contingency plan for nursing graduates in case of public health emergencies'. The administrators should take the initiative to learn new policies, regulations and measures on public health emergencies in time, and strengthen their communication with not only the frontline nurses but also the nursing graduates. Only by providing relevant information and medical treatments in time can we guarantee the stability of

nursing graduates under public health emergencies, so as to avoid or reduce the panic psychology and behavior of groups.

(2) Strengthen the cognitive training and provide coping skills

Some studies have shown that cognitive training can improve the public's understanding of the unknown, reduce their uncertainty, and provide self relaxation coping skills can also effectively improve the stress state and relieve the psychological pressure^[18]. Therefore, in the face of this sudden unknown epidemic, nursing educators and managers should strengthen the training of graduates on the knowledge of public health emergencies and response, and advocate initiative response.

(3) Take targeted psychological intervention measures in time

For the group with poor coping style, nursing faculties should identify and give positive psychological interventions in time. Schools and teaching hospitals can set up special psychological intervention teams, and provide convenient psychological support for graduates through group psychology to help improve their confidence and abilities to actively respond to the epidemic, so as to successfully pass the clinical practice.

6. Conclusion

We can see that public health emergencies are a serious social problem threatening people's lives, causing considerable economic losses, and related to the overall health level and quality of life of the whole population. Nurses are always fighting in the forefront to fight against public health crisis. Before becoming a registered nurse, the way nursing graduates respond to public health emergencies and its influencing factors deserve attention. This study was a descriptive cross-sectional one, we need more work on how to improve graduates' coping styles in the future.

7. Declarations

Ethics approval and consent to participate

All participants signed informed consent via Internet Questionnaire. The Ethics Committee of the First Affiliated Hospital of Nanjing Medical University approved the study (approval number: 2019-SR-355)

Consent for publication

All authors read and approved the final manuscript to be published.

Availability of data and material

All data, models, and code generated or used in the submitted article were available.

Competing interests

No conflict of interest has been declared by the authors.

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Authors' contributions

BX, JY were major contributors in writing the manuscript. BX, SYL, and ZL contributed to the conception and design of the study, acquisition of data, data analysis and drafting of manuscript. LC participated in collecting data, BX and SYL, contributed to the acquisition of data and data analysis. All authors read and approved the final manuscript.

Abbreviations

Corona virus disease 2019 (COVID-19)

Reference

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Tables

Table 1 Demographic characteristics and single factor analysis of coping abilities of nursing graduates (N = 1992)

Demographic characteristics	n(%)	Scores of positive coping dimension (Mean±SD)	Scores of negative coping dimension (Mean±SD)	Pairwise comparison
Gender				—
male	142(7.13)	1.92±0.47**	1.11±0.57	
female	1850(92.87)	2.15±0.59	1.08±0.51	
Education				—
Junior college	1434(71.99)	2.15±0.59*	1.09±0.53	
Undergraduate	558(28.01)	2.00±0.56	1.05±0.47	
Place of Residence				There were statistically significant differences between the "city" and "rural" groups
City	858(43.07)	2.06±0.61	1.11±0.52*	
Township	567(28.46)	2.03±0.57	1.08±0.53	
Rural	567(28.46)	2.01±0.55	1.04±0.49	
Infected patients around				—
With	1557(78.16)	2.05±0.57*	1.07±0.52*	
Without	435(21.84)	1.89±0.62	1.12±0.50	
Severity of epidemic around				
No epidemic	308(15.46)	2.08±0.60	1.06±0.59*	There were statistically significant differences between the "very serious" and other groups
Not serious	613(30.77)	2.05±0.55	1.07±0.52	
Not very serious	736(36.95)	2.01±0.59	1.06±0.50	
Serious	283(14.21)	2.05±0.59	1.12±0.46	
Very serious	52(2.61)	1.93±0.66	1.30±0.54	
Hospital grade				—
Class Ⅲ	156(7.83)	1.99±0.57	1.13±0.52	
Class Ⅱ	103(5.17)	1.97±0.65	1.13±0.56	
Class Ⅰ	1733(87.00)	2.05±0.58	1.07±0.51	
Practice hospital as designated				There were statistically significant differences

treatment unit				between the "yes" and the other groups
YES	1043(52.36)	2.28±0.59**	1.09±0.54	
NO	512(25.70)	2.00±0.56	1.06±0.47	
Not clear	437(21.94)	1.97±0.59	1.08±0.52	
Total	—	2.04±0.58	1.08±0.52	

* $P \leq 0.05$ ** $P \leq 0.01$;

Table 2 Correlation analysis of psychological response and coping style of nursing graduates under emergency

Factors	Mean±SD/n(%)	Positive coping	Negative coping
Cognitive responseΔ			
Fear of COVID-19	2.95±1.96	-0.261**	0.173**
Confidence to overcome difficulties	5.27±1.20	0.372**	-0.081
Optimism	6.59±1.95	0.337**	-0.585**
Behavioral Response Questionnaire Δ			
Active coping	13.15 ± 2.61	0.373**	0.013
Avoidance	2.24±1.60	-0.232	0.429**
Help seeking	5.16±2.03	0.205**	0.163**
Simplified Psychosomatic Symptom Scale #			
Somatization [positive symptoms]	84(4.22)	0.220	-0.323
Anxiety [positive symptoms]	117(5.87)	-0.108**	0.283**
Depression [positive symptoms]	168(8.43)	-0.241**	0.192**
Hostility [positive symptoms]	124(6.22)	-0.233**	0.192**

Δ [Pearson correlation analysis] # [Spearman correlation analysis] ** $p \leq 0.01$

Table 3 Table of independent variable assignment

Independent variable	Assignment(<i>Dummy coded</i>)
Gender	Male = 1; Female = 2
Education	Junior college = 1; Undergraduate = 2
Place of residence	Urban ($Z1 = 0, Z2 = 0$), Township ($Z1 = 1, Z2 = 0$), Rural ($Z1 = 0, Z2 = 1$)
Infected patients around	With = 1, Without = 2
Severity of epidemic around	No epidemic ($Z1 = 0, Z2 = 0, Z3 = 0, Z4 = 0$), less serious ($Z1 = 1, Z2 = 0, Z3 = 0, Z4 = 0$); medium serious ($Z1 = 0, Z2 = 1, Z3 = 0, Z4 = 0$); more serious ($Z1 = 0, Z2 = 0, Z3 = 1, Z4 = 0$); very serious ($Z1 = 0, Z2 = 0, Z3 = 0, Z4 = 1$)
Practice hospital as designated treatment uni	Unclear ($Z1 = 0, Z2 = 0$), Yes ($Z1 = 1, Z2 = 0$), No ($Z1 = 0, Z2 = 1$)
Scores of cognitive response and behavioral response factors	Bring in the original scores
Simplify psychosomatic symptoms	Negative = 1; Positive = 2

Table 4 Multiple linear regression analysis of the influencing factors of the positive coping of nursing graduates

Item	B	SE	β	t	P
Constant	0.799	0.142		5.634	<0.001
confidence to overcome difficulties	0.224	0.012	0.049	2.054	0.040
optimism	0.159	0.007	0.197	8.499	<0.001
active coping	0.149	0.005	0.221	9.173	<0.001
help seeking	0.037	0.006	0.227	6.011	<0.001
Practice hospital as designated treatment uni	0.080	0.03	0.169	2.672	0.008

$R=0.450, R^2=0.209, \text{ Adjusted } R^2=0.204, F=40.315, P<0.001.$

Table 5 Multiple linear regression analysis on the influencing factors of negative coping of nursing graduates

Item	B	SE	β	t	P
Constant	0.360	0.087		4.161	<0.001
fear of COVID-19	0.033	0.006	0.125	5.403	<0.001
optimism	-0.028	0.006	-0.205	4.729	<0.001
avoidance	0.051	0.007	0.157	6.811	<0.001
help seeking	0.021	0.006	0.082	3.625	<0.001
Severity of epidemic around	0.182	0.076	0.356	2.392	0.017

R=0.475, R2=0.226, Adjusted R2=0.221 F=14.724 P<0.001