


# Factors associated with mental health of graduate nursing students in China

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## Abstract

The increasing number of graduate nursing students in China has resulted in the wide concern for their mental health problems. Quantitative studies using validated questionnaires on mental health of graduate nursing students are rare. This study aimed to investigate the factors potentially involved in the level of mental health of graduate nursing students.

The sample consisted of 339 graduate nursing students from 5 universities of China. The participants were evaluated using the Symptom Checklist-90 (SCL-90) and Chinese Perceived Stress Scale (CPSS) between March and November 2020. Multivariate stepwise linear regression analysis and spearman correlation test were performed to assess the association between various factors associated with mental health.

The SCL-90 total score was 109.00 (96.00–134.00) and psychological abnormalities (total score > 160) accounted for 14.2%. The highest score in the nine dimensions was compulsion dimension. The positive detection rate of compulsion dimension was 21.5% (dimensions score > 2), and the average of compulsion score was 1.50 (1.20–2.00). Multivariable stepwise linear regression analysis showed that grade, environmental adaptation level, number of good friends were independently associated with lower SCL-90 scores (both  $P < .05$ ). SCL-90 scores were correlated with Chinese Perceived Stress Scale ( $r = .159$ ,  $P = .003$ ).

Results indicate that learning about ways to adapt to the environment, strengthening good friends support and alleviating perceived stress can help improve graduate nursing students' level of mental health. The conclusions of this study can provide a reference to improve the psychological intervention strategies for graduate nursing students.

**Abbreviations:** CPSS = Chinese Perceived Stress Scale, SCL-90 = Symptom Checklist-90.

**Keywords:** Chinese Perceived Stress Scale, graduate nursing students, mental health

## 1. Introduction

The development of higher education in China has resulted in the increasing number of graduate students in Chinese universities. Medical students in postgraduate specialty training are subject to

high workloads and heavy academic pressure, which can have significant implications for their risk for depression and poor quality of life.<sup>[1]</sup> Attention to the health and wellness of postgraduate medical trainees has increased considerably in recent years, yet the scholarly literature consistently indicates that, in many instances, the medical and mental health care needs of this population remain unmet or only partially met.<sup>[2]</sup> Mental health problems amongst medical students continue to pose a challenge.<sup>[3]</sup> Numerous studies have shown that medical students have a high prevalence of job burnout, depression, and other mental health problems.<sup>[4,5]</sup> Rates of depression and anxiety reported by postgraduate students are unacceptably high.<sup>[6]</sup> But there were relatively few studies on the mental health of graduate nursing students. This study aimed to investigate the factors potentially involved in the level of mental health of graduate nursing students. The conclusions were used to formulate and propose recommendations for psychological intervention strategies for graduate nursing students.

## 2. Methods

### 2.1. Ethics

The Ethics Committee of the Affiliated Hospital of the Inner Mongolia Medical University approved the study protocol (approval number: 2020025). All the information related to this study was presented by the researcher to the participants, and informed consent was obtained from them prior to data collection.

### 2.2. Study design

This was a cross-sectional and correlational study. Three hundred and thirty-nine male and female students filled out the questionnaire between March and November 2020.

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XL and WS equally contributed to the work.

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The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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### 2.3. Setting and participants

A random sampling method was adopted. A questionnaire survey was conducted among graduate nursing students in 5 universities of China, which were Inner Mongolia Medical University, Southern Medical University, University of South China, Jinan University, and Soochow University.

### 2.4. Outcome measurements

**2.4.1. Symptom checklist-90(SCL-90).** The SCL-90 was originally developed by Derogatis In 1984.<sup>[7]</sup> Yu et al translated it into Chinese.<sup>[8]</sup> SCL-90 is used to assess individual psychological symptoms. It comprises 90 items, and includes 9 subscales (somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism). It uses a 5-point scale (1 = “no problem” to 5 = “very serious”). Higher scores indicate profound psychological distress. When the total SCL-90 score is > 160 or a subscale score is > 2, it was judged that the participant has abnormal psychological performance. The validity coefficient of various symptoms is between 0.77 and 0.99.

**2.4.2. Chinese Perceived Stress Scale (CPSS).** The CPSS was compiled by Cohen et al<sup>[9]</sup> and Yang et al<sup>[10]</sup> first introduced the CPSS scale in China. The CPSS assesses the level of subjective stress perception. It comprises 14 items and 2 factors (the sense of tension and the sense of vulnerability). The 5-point Likert scale was used (1 = “never” to 5 = “always”). The sum of score of the sense of vulnerability and tension was the CPSS score. The CPSS score was 14 to 70. When the CPSS score is higher than 25, the respondents were experiencing unhealthy levels of stress. The higher the CPSS score, the higher the perceived stress. The cronbach alpha for the scale was 0.797.

### 2.5. Data collection

Data were collected using a questionnaire star. Participants were informed that the survey was voluntary and were assured of their right to refuse to participate or to withdraw from the study at any stage. The survey was anonymous, and the participants were assured that the confidentiality of information would be maintained. It was also emphasized that the investigation was being done only for the purpose of studying participants' subjective perceptions. A questionnaire was considered invalid if more than 10% of the items were inadequate.

The questionnaire consisted of 3 parts. Socio-demographic information such as age, gender, nationality, grade, environmental adaptation level, only child, family structure, parental rearing patterns, collective atmosphere, tutor attitude, and number of good friends. The second and third parts were the SCL-90 and CPSS questionnaires, respectively.

### 2.6. Statistical analysis

Statistical analyses were performed using SPSS 19.0 (SPSS Inc.). Categorical data were presented as frequencies. The Shapiro-Wilk test and a histogram normal curve were used to test the normal distribution of the SCL-90 and CPSS scores. The results of the Shapiro-Wilk test showed that  $P < .05$  and that the histogram normal curve was not concentrated and symmetrical. This indicated that the data did not follow a normal distribution pattern. Therefore, median(inter quartile range) M (IQR) was used to describe the data. Two independent samples were tested

using the non-parametric Mann-Whitney  $U$  test, and multiple independent samples were tested using the non-parametric Kruskal-Wallis  $H$  test. Multivariate stepwise linear regression analysis was conducted using the SCL-90 score as a dependent variable. The independent variables were those with  $P$ -values  $< .05$  in univariate analyses. Spearman correlation test was used to assess the correlations between the SCL-90 and CPSS scores. Two-sided  $P$ -values  $< .05$  were considered statistically significant.

## 3. Results

A total of 356 participants were contacted for the study. Also, 339 participants (95.2%) responded to the survey.

### 3.1. Participants' characteristics

Socio-demographic data and SCL-90 scores of the participants are presented in Table 1 and in Figure 1. As the data did not follow a normal distribution pattern, Median (Inter Quartile Range) was used to describe the data, and the Mann-Whitney  $U$  test and Kruskal-Wallis  $H$  test were used for analysis. The following factors were statistically significant ( $P < .05$ ): grade, environmental adaptation level, parental rearing patterns, collective atmosphere and number of good friends. Age, gender, ethnic group, only child, family structure, tutor attitude were not associated with SCL-90 scores.

### 3.2. SCL-90 scores and scores in the nine dimensions

The specifics of these results are provided in Table 2 and Figure 1. The data for the SCL-90 score and scores in the nine dimensions were not normally distributed and Median (Inter Quartile Range) was used to describe the data. The SCL-90 total score was 109.00 (96.00~134.00). Psychological abnormalities (total score > 160) were detected in 14.2% of total 339 graduate nursing students surveyed. On the basis of the SCL-90 dimensions scores of the respondents, an increased number of prominent psychological abnormalities emerged. The highest score in the nine dimensions was compulsion dimension, and the average of compulsion score was 1.50(1.20~2.00). It accounted for 21.5% (dimensions score > 2). Whereas those of somatization, paranoia and psychosis were relatively low.

### 3.3. Factors influencing mental health

Details are shown in Table 3. Multivariate stepwise linear regression analysis was conducted using the SCL-90 score as a dependent variable. The independent variables were those with  $p$ -values  $< 0.05$ (grade, environmental adaptation level, parental rearing patterns, collective atmosphere, number of good friends) in univariate analyses. The variables that remained in the equation were: grade, environmental adaptation level, and number of good friends. The coefficient of determination  $R^2$  was 0.130, indicating that these 3 factors can explain 13.0% of all the variance related to SCL-90.

### 3.4. Correlation between the SCL-90 and CPSS scores

Table 4 and Figures 1 and 2 present details about the correlation. SCL-90 and CPSS scores were not normally distributed. Thus, the Spearman correlation analysis was used. The results showed that SCL-90 was positively correlated with CPSS ( $r = .159, P = .003$ ).

**Table 1****Socio-demographic data and SCL-90 scores of graduate nursing students in China (n=339).**

Variable	n (%)	SCL-90 scores M (IQR)	Z/H	p
Age (yr)				
≤20 y	13 (3.8)	111.00 (98.50~123.00)	1.096	.578
21–30 yr	308 (90.9)	107.50 (96.00~134.00)		
> 30 yr	18 (5.3)	115.00 (95.50~189.50)		
Gender				
Male	59 (17.4)	102.00 (91.00~136.00)	−1.496	.135
Female	280 (82.6)	109.00 (97.00~132.00)		
Ethnic Group				
Han	297 (87.6)	109.00 (96.00~134.00)	1.942	.585
Mongolian	27 (8.0)	102.00 (96.00~154.00)		
Others	15 (4.4)	112.00 (100.00~136.00)		
Grade				
First	197 (58.1)	104.00 (95.00~125.00)	17.875	.000***
Second	86 (25.4)	116.00 (96.00~149.25)		
Third	56 (16.5)	123.50 (103.00~165.50)		
Environmental adaptation level				
Yes	313 (92.3)	107.00 (96.00~132.00)	−2.581	.010*
No	26 (7.7)	126.50 (103.25~206.75)		
Only child				
Yes	145 (42.8)	111.00 (96.00~143.50)	−1.160	.246
No	194 (57.2)	107.00 (96.00~130.00)		
Family structure				
Two-parent family	304 (89.7)	107.50 (96.00~132.00)	2.298	.317
One-parent family	23 (6.8)	116.00 (99.00~177.00)		
Others	12 (3.5)	110.00 (92.50~238.50)		
Parental rearing patterns				
Controlled type	49 (14.5)	125.00 (98.00~141.50)	11.675	.009*
Negligence type	30 (8.8)	117.00 (102.00~218.25)		
Permissive type	18 (5.3)	122.50 (94.50~155.75)		
Democratic	242 (71.4)	105.00 (95.00~128.00)		
Collective atmosphere				
Harmonious	319 (94.1)	107.00 (96.00~133.00)	−2.490	.013*
Disharmonious	20 (5.9)	122.50 (108.50~191.25)		
Tutor attitude				
Concerns	301 (88.8)	107.00 (96.00~132.50)	−1.795	.073
Less concerned	38 (11.2)	122.50 (99.50~157.25)		
Number of good friends				
Three and above	251 (74.0)	105.00 (94.00~127.00)	20.579	.000***
One-two	85 (25.1)	124.00 (103.00~150.00)		
No	3 (0.9)	171.00 (138.00~)		

M (IQR) = median (Inter Quartile Range), SCL-90 = Symptom Checklist-90.

\*  $P < .05$ .

\*\*\*  $P < .001$ .

## 4. Discussion

### 4.1. SCL-90 scores and scores in the nine dimensions

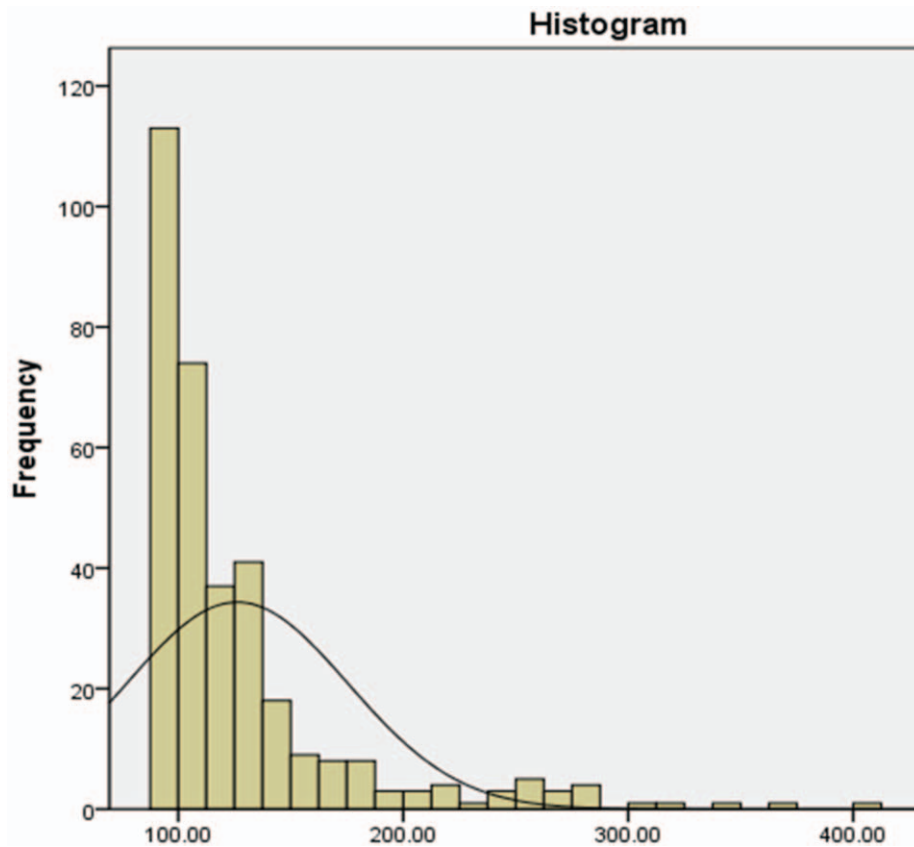
This study showed that the SCL-90 total score was 109.00(96.00–134.00) and psychological abnormalities (total score > 160) account for 14.2%. The highest score in the nine dimensions was compulsion dimension. The positive detection rate of compulsion dimension was 21.5% (dimensions score > 2), and the average of compulsion score was 1.50(1.20–2.00). Several previous studies have reported results similar to our findings.<sup>[11–12]</sup> This may be explained by the fact that the occupational stressors of training and the high prevalence of burnout play a role in the prevalence and prognosis of mental health conditions within this population. Lisa et al.<sup>[5]</sup> reported that the higher rates of anxiety in our population could be related to the rigor and pressures unique to medical education.

### 4.2. Analysis of influencing factors of mental health

The results showed that grade influenced mental health ( $P < .05$ ). Studies have shown that at the beginning of the course, the psychological morbidity of medical students is similar to that of non-medical students and the general public; however, as they progress through the course their mental health worsens.<sup>[13]</sup>

The results showed that environmental adaptation level was influencing factors of mental health ( $P < .05$ ). Some studies reported results similar to our findings.<sup>[14–16]</sup> Therefore, improving the environmental adaptability of graduate nursing students is an important way to improve its mental health.

The results showed that parental rearing patterns influenced mental health ( $P < .05$ ). The main family factors influence sub-health symptom were family type and the health status of parents.<sup>[17]</sup> In Asian families, the pressure from the family to choose medicine as a profession is far greater which is then



**Figure 1.** Title: SCL-90 Scores normal distribution test chart. Methods: The graph of normal distribution test chart was illustrated according to SCL-90 Scores as abscissa and Frequency as ordinate.

followed by the need to live up to the family expectations regarding their academic performance.<sup>[18]</sup> The common reasons to high stress and anxiety included the pressure of passing exams, the pressure of living up to family expectations, and fear of stepping into the real world of medicine.<sup>[19]</sup>

### 4.3. Correlation between the SCL-90 and CPSS

The results showed that SCL-90 was positively correlated with CPSS scores. This is consistent with previous research results.

**Table 2**  
SCL-90 scores and scores in the 9 dimensions among graduate nursing students in China (n=339).

Items	Scores	Psychological abnormality	
		N	(%)
Somatization	1.08 (1.00–1.33)	24	(7.1)
Compulsion	1.50 (1.20–2.00)	73	(21.5)
Interpersonal sensitivity	1.22 (1.00–1.67)	45	(13.3)
Depression	1.23 (1.00–1.62)	41	(12.1)
Anxiety	1.20 (1.00–1.50)	34	(10.0)
Hostility	1.17 (1.00–1.50)	30	(8.8)
Terror	1.00 (1.00–1.43)	35	(10.3)
Paranoia	1.17 (1.00–1.50)	27	(8.0)
Psychosis	1.10 (1.00–1.40)	27	(8.0)
Total Score	109.00 (96.00~134.00)	48	(14.2)

SCL-90 = symptom checklist-90.

Perceived stress had statistically significant association with general psychopathology and depressive-anxiety component of burnout.<sup>[20–22]</sup>

Stress and burnout can furthermore affect students' emotional wellbeing and can result in psychological morbidity.<sup>[23]</sup> Psychological stress can effect the overall mental health of these medical students, such as anxiety and depression, and so on.<sup>[24,25]</sup> The negative psychological emotions included depression, worry, boredom, fear, anxiety, helplessness, loneliness, and insomnia, and these were all significantly related to the higher CPSS score in the medical students.<sup>[26]</sup> Stress is closely related to negative psychology that can lead adolescent students to avoid coping, and avoidance of coping enhances the severity of psychological

**Table 3**  
Multivariate stepwise linear regression analysis of factors influencing the SCL-90 scores among graduate nursing students in China (n=339).

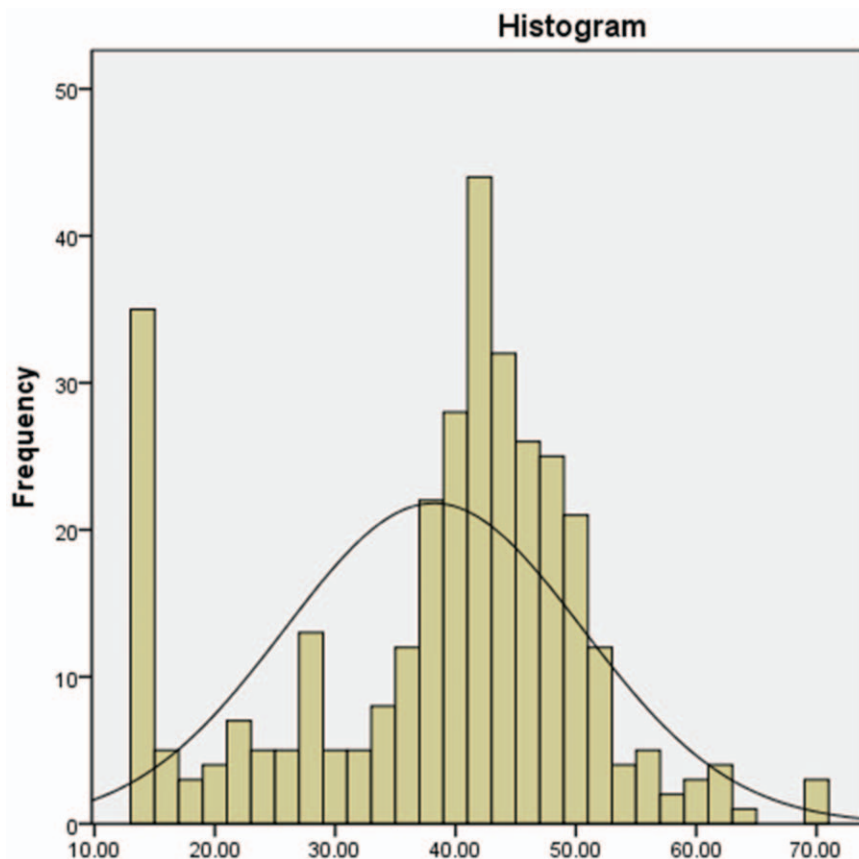
Influential factor	B	SE	β	t value	P value
Constant	41.780	13.077	—	3.195	.002*
Grade	15.438	3.314	.238	4.659	.000***
Environmental adaptation level	33.840	9.438	.183	3.586	.000***
Number of good friends	18.585	5.437	.175	3.418	.001*

Note: F=16.677, P<.001, R=0.360, R<sup>2</sup>=0.130.

β=standard regression coefficient, B=partial regression coefficient, SE=standard error.

\*P<.05.

\*\*\*P<.001.



**Figure 2.** Title: CPSS Scores normal distribution test chart. Methods: The graph of normal distribution test chart was illustrated according to CPSS scores as abscissa and Frequency as ordinate.

stress.<sup>[27]</sup> Alleviating perceived stress can help improve students level of mental health.

### 5. Conclusion

The innovations of this study can be summarized as the factors potentially involved in the level of SCL-90 of graduate nursing students. The incidence rate of compulsion of the SCL-90 is relatively high. Whereas those of somatization, paranoia and psychosis were relatively low. Grade, environmental adaptation level, and number of good friends were independently associated with SCL-90 scores. The alleviating perceived stress improve the level of graduate nursing students mental health and alleviate abnormal psychological symptoms. The conclusions of this study

can provide a reference to improve the psychological intervention strategies for graduate nursing students.

### 6. Research limitations and future research ideas

The self-assessment method may limit the generalization of the findings. The mental health problems were reported by students themselves and may be biased by social desirability and thus future studies are warranted to use diagnostic methods to assess graduate nursing students’ mental health problems.

### Author contributions

- Data curation: Wennv Hao.
- Formal analysis: Xing Li, Wen Song, Wennv Hao.
- Funding acquisition: Wennv Hao.
- Investigation: Ya-Xi Wang, Yan-Xue Zheng, Jia-Yi Zhang.
- Methodology: Wennv Hao.
- Project administration: Xing Li, Wen Song, Wennv Hao.
- Resources: Wennv Hao.
- Software: Chang Lu, Jia-Yi Zhang.
- Supervision: Wennv Hao.
- Validation: Wennv Hao.
- Visualization: Xing Li, Wen Song Wennv Hao.
- Writing – original draft: Xing Li, Wen Song, Wennv Hao.
- Writing – review and editing: Xing Li, Wen Song Wennv Hao.

**Table 4**

**Associations between SCL-90 and CPSS scores in graduate nursing students in China (n=339).**

Variables	CPSS
SCL-90	
r	.159
P	.003*

CPSS = Chinese Perceived Stress Scale, M (IQR) = median (Inter Quartile Range), SCL-90 = Symptom Checklist-90.  
\* P < .05.



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