Perceived Stress, Psychological Capital, and Psychological Distress Among Chinese Nursing Students: A Cross-Sectional Study

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Abstract

**Background:** Previous studies have investigated variables related to psychological distress among nurses; however, the relationship among psychological capital, perceived stress, and psychological stress is poorly understood. This cross-sectional study examined the relationship between psychological capital, psychological distress, and perceived stress, and examined the mediating role of psychological capital in the relationship between perceived stress and psychological distress.

**Methods:** Responses to questionnaires to assess psychological capital, psychological distress, and perceived stress were collected from 369 nursing students in a tertiary hospital in Shandong Province, China.

**Results:** There was a statistically significant difference in perceived stress among students, based on whether or not they liked the nursing profession \((P<0.01)\). Relative to college students, undergraduates experienced significantly higher levels of perceived stress \((P<0.01)\). Nevertheless, there were no significant differences in perceived stress between the variables of gender, place of residence, and being an only child. Psychological distress was positively correlated \((r=0.632, p<0.001)\), whereas psychological capital was negatively correlated, with perceived stress \((r=-0.662, p<0.001)\). Psychological capital played a potential mediating role in the relationship between psychological distress and perceived stress.

**Conclusions:** This study revealed the importance of psychological capital in reducing perceived stress to decrease psychological distress among Chinese nursing students. Managers should take meaningful steps to improve nursing students’ psychological capital and thereby reduce the negative impact of psychological distress.

1. **Background**

Stress is a complicated psychobiological process that is experienced when an individual perceives a threat or danger from the environment [1]. When individuals feel that a situation is threatening, they evaluate the resources available to them to deal with it. These assessments interact, leading to a perception of stress and the ensuing physical and emotional responses[2]. The topic of stress has gained a considerable amount of attention in the literature and continues to be the subject of much research in the nursing field [3]. Stress among nursing students is often reported to come from the pressure of practical training in education. [4] Furthermore, a lack of knowledge and skills is one of the common stressors for many students. Nursing students face additional stressors from their first experiences in clinical practice, including a fear of making mistakes and having to deal with emergencies [5]. Stress is an obstacle to concentration, problem-solving skills, and other abilities essential to student learning [6]. According to cognitive transactional stress theory [7], differences in each person’s response to potential stressors can affect individual assessment levels and problem-solving abilities. Resilience appears to be a determinant of perceived stress [8]. Research shows that people with high resilience can feel more capable of coping with stress, decrease stress from stressors, and reduce general stress; people who are
more resilient will reflect lower levels of chronic stress [9]. According to Andrea, perceived stress is negatively correlated with optimism [10]. Self-efficacy along with emotional intelligence are predictors of perceived stress by nursing professionals [11]. Studies have indicated that perceived stress levels are lower, and emotional intelligence scores are higher [12]. Low emotional intelligence scores tend to adopt inappropriate coping strategies that are positively associated with maladaptive school behaviors and negatively associated with negative life events. Further, inappropriate coping regarding perceived stress may interfere in learning, decision-making, and thinking processes, lead to drowsiness, as well as neurosis or mental breakdowns that deteriorate professional competence [13].

Positive psychology has been receiving increasing attention recently. Some scholars have proposed that there is a link between the psychological capital of nursing students and improvements in their mental health. The introduction and application of the concept of psychological capital has provided a new perspective for nursing students to effectively cope with stress [14]. Psychological capital concerns how individuals behave in the face of stress and challenges. It has four main dimensions: self-efficacy, hope, resilience, and optimism. These dimensions may be regarded as positive states of psychological development exhibited by individuals in the growth and developmental process. Studies have shown that optimism and hope are statistically negatively and substantially associated with psychological distress in the subcategory of psychological capital [15]. Previous research shows that high levels of psychological capital weaken psychological distress [16]. It has been reported that nursing students’ positive psychological capital has a significant role in helping them cope with stress and ensure strong mental health [17]. Psychological capital and distress are closely related in connotation as well as extension [18].

Psychological distress is a common concern among nursing professionals [19]. It is known to be associated with a variety of factors, such as occupations and geographical settings [20]. It ranges from normal feelings of vulnerability and sadness to mental health problems, for instance depression, social isolation, and sleep disorders [21]. Psychological distress impacts not only job performance, it also impacts overall life satisfaction and happiness, and affects the team work atmosphere [15]. A survey of 622 undergraduate nursing students in Italy noted more than 70% of nursing students experienced significant levels of psychological distress [22]. Nursing students may face traumatic events during their initial educational training; such experiences may lead to adverse psychological health outcomes, such as anxiety, depression, and sleep disorders. Existing research indicates that negative mental health issues are a major cause of nursing student attrition [23].

Although a link between perceived stress and psychological stress has been evidenced [24], the mechanisms behind this link are not well understood by nursing students. Based on these facts, three assumptions were made about Chinese nursing students: (1) demographic characteristics, like age, gender, and educational level, may be significantly associated with perceived stress among nurses; (2) psychological distress, psychological capital, and perceived stress are related; and (3) psychological capital may mediate the association between psychological distress and perceived stress.
2. Methods And Measures

2.1. Study design and data collection

This was a cross-sectional study comprising a descriptive survey. During their clinical practice at Shandong Mental Health Center, nursing students were invited to complete an anonymous online survey between January and December 2020. The convenience sampling method was used to distribute the self-administered questionnaires, and 369 valid responses were obtained. We included undergraduate nursing students at the clinical internship stage who voluntarily agreed to participate in this study, and excluded the students on leave and off duty. We informed all participants of the purpose of our study and obtained their written consent. Table 1 presents the demographics of the participants.

2.2 Measures

2.2.1 Social-demographic questionnaire

This was a self-designed questionnaire comprising questions regarding age, gender, education level, marital status, place of residence, being an only child, liking the nursing profession, and wanting to pursue nursing in the future. All items were self-evaluated.

2.2.2 Psychological capital questionnaire (PCQ)

We measured psychological capital using the Chinese version of the 24-item PCQ, which has four dimensions: self-efficacy, hope, resilience, and optimism. Each of the four dimensions comprises six items, measured on a 6-point Likert scale, ranging from 1 (strongly disagree) to 6 (strongly agree). The reliability and validity of the scale are reported to be high, and it has been used in various Chinese studies[16]. In this study, the Cronbach's alpha for the scale was 0.840.

2.2.3 Kessler psychological distress scale (K10) [25]

The Chinese version of K10 comprises 10 items enquiring the frequency of non-specific psychological distress. Each item is measured with a 5-point Likert scale, with a range from 1 (no time at all) to 5 (all the time). All items were scored, and the total score was categorised as either low (score 10–15), moderate (score 16–21), high (score 22–29), or very high (score 30–50). In our research, the Cronbach's alpha for this scale was 0.851.

2.2.4 Chinese perceived stress scale (CPSS) [26]

Yang et al. modified the perceived stress scale (PSS) into the Chinese version called the CPSS[27]. The scale has high reliability (Cronbach's alpha = 0.81). It contains 14 items, each item being measured using a 5-point Likert scale ranging from 1 (never) to 5 (always). Higher scores indicate more perceived stress symptoms. The total score was categorised into normal pressure (score 0–24), high pressure (score 25–42), excessive pressure (score 43–56), and very high pressure (score 30–50). In the current study, the Cronbach's alpha for this scale was 0.839.
2.3 Data analysis

SPSS 24.0 and PROCESS macro were used to examine the internal consistency of the measures; Cronbach's alpha values were calculated at a significance level of $p < 0.05$. Descriptive statistics included mean, standard deviation (SD), number (n), and percentage. The independent variables t-test and one-way analysis of variance (ANOVA) were conducted to compare differences in perceived stress according to participants’ demographic characteristics. In addition, Pearson's correlation analysis was performed to explore correlations between the variables of psychological distress, psychological capital, and perceived stress. Further, a hierarchical multiple regression analysis was used to determine the factors associated with perceived stress. The variance inflation factor (VIF) values of all predictive variables were less than 10, indicating negligible collinearity.

To test the hypothesized moderated mediation model [28], Hayes’ (2018) PROCESS macro for SPSS was used. It may be downloaded from the website processmacro.org [29]. It was considered as significant if 95% confidence intervals (CI) did not include the value 0.

3. Results

The sociodemographic characteristics (N=369) and comparisons on perceived stress among nursing students are illustrated in Table 1. Participants’ mean age was 21.43±0.751 years. Students who did not want to pursue nursing had significantly higher perceived stress scores than those who wanted to pursue nursing upon graduation ($P<0.01$). There was a statistically significant difference in perceived stress among students based on whether they liked the nursing profession ($P<0.01$). In comparison with college students, undergraduates had significantly higher levels of perceived stress ($P<0.01$). However, there were no significant differences in perceived stress among the variables of gender, family residence, and being an only child.
| Variables                        | n (%)   | M±SD     | T/F  | P     |
|--------------------------------|---------|----------|------|-------|
| Gender                         |         |          |      |       |
| Male                           | 302 (84.1) | 2.48±0.49 | 1.690 | 0.194 |
| Female                         | 57 (15.9)   | 2.38±0.58 |      |       |
| Only child                     |         |          |      |       |
| Yes                            | 85 (23.7)   | 2.37±0.51 | 3.234 | 0.073 |
| No                             | 274 (76.3)   | 2.49±0.51 |      |       |
| Educational level              |         |          |      |       |
| Undergraduates                 | 356 (99.2)   | 2.46±0.51 | 3.953 | 0.048 |
| College students               | 3 (0.8)     | 1.88±0.79 |      |       |
| Likes nursing profession       |         |          |      |       |
| Like                           | 157 (43.7)   | 2.35±0.48 | 7.315 | 0.001 |
| Dislike                        | 20 (5.6)     | 2.54±0.52 |      |       |
| Generally like                 | 182 (50.7)   | 2.55±0.51 |      |       |
| Whether you want to pursue nursing in the future |         |          |      |       |
| Yes                            | 301 (83.8)   | 2.43±0.51 | 7.080 | 0.008 |
| No                             | 58 (16.2)     | 2.62±0.48 |      |       |
| Place of residence             |         |          |      |       |
| City                           | 108 (30.1)   | 2.43±0.51 | 0.517 | 0.473 |
| Countryside                    | 251 (69.9)   | 2.47±0.51 |      |       |

The correlations between psychological distress, psychological capital, and each positive psychological capital domain are illustrated in Table 2.
Table 2
Correlations between psychological capital, psychological distress and perceived stress

|                    | 1   | 2       | 3       |
|--------------------|-----|---------|---------|
| Psychological distress | 1   |         |         |
| Psychological capital | -.410** | 1       |         |
| Perceived stress    | .632** | -.662** | 1       |

**P<0.01

Table 3
Hierarchical linear regression analysis results

| Variables                          | Step 1 | Step 2 | Step 3 |
|------------------------------------|--------|--------|--------|
| Gender                             | -.038  | 1.138  | -.065  |
| Only child                         | .072   | 1.349  | -.032  |
| Age                                | .609   | 1.010  | .439   |
| Educational level                  | .086   | 1.109  | .048   |
| Likes nursing profession           | .116   | 1.116  | .095   |
| Whether you want to pursue nursing in the future | .030   | 1.234  | .049   |
| Residence                          | -.038  | 1.138  | .567   |
| Psychological distress             | -.065  | 1.139  | -.491  |
| Psychological capital              |        |        | -.040  |
|                                    |        |        | 1.140  |
| F                                  | 3.965**| 37.102**| 67.498**|
| R2                                 | 0.063  | 0.425  | 0.607  |
| ∆R2                                | 0.047  | 0.414  | 0.598  |

**P<0.01

Table 3 reveals the findings of the hierarchical linear regression analysis. During the first step, the direct effect of psychological distress on perceived stress (c-path) was verified, after adjusting for covariates. The purpose was to verify the direct effect of psychological distress on perceived stress (the c path) after adjusting the covariates. In step 2, the mediating effect of psychological capital was validated. Asymptotic sampling and resampling strategies were applied to verify that psychological capital plays a potential mediating role in the relationship between psychological distress and perceived stress.
Bootstrap estimation was based on 5,000 bootstrap samples. It was considered significant if 95% confidence intervals (CI) did not include the value 0.

The hierarchical multiple regression analyses were performed to explore the influential and mediating factors correlated with perceived stress. VIFs of all the independent variables were less than 10, which means that collinearity is not misleading. After age, gender, educational level, being an only child, liking nursing as a profession, wanting to pursue nursing after graduation, family residence, and shift patterns were adjusted for, psychological distress was negatively associated with perceived stress ($\beta = -0.065, P < 0.01$). Psychological distress accounted for 41.4% of the variance. Psychological capital was negatively associated with perceived stress ($\beta = -0.040, P < 0.01$), and psychological capital accounted for 59.8% of the variance in step 2. In step 3, the standardised regression coefficient ($\beta$) of psychological distress was reduced; therefore, psychological capital may have mediated the association between psychological distress and perceived stress.

| Psychological distress | Effect | se  | $T$    | $P$   | 95%CI LL–UL       |
|------------------------|--------|-----|--------|-------|-------------------|
| Psychological capital   | Total effect | 0.5652 | 0.0377 | 14.9771 | .0000 | 0.4910–0.6394     |
|                        | Direct effect | 0.3954 | 0.0340 | 11.6378 | .0000 | 0.3285–0.4622     |
|                        | Indirect effect | 0.1699 | 0.0250 | 0.1216–0.2202 |

*LLCI: Lower level for 95% confidence interval. ULCI: Upper level for 95% confidence interval.*

The total effect of psychological distress on psychological capital (coeff=0.5652, $p=0.000$) and the direct effect (coeff=0.3954, $p=0.000$) were significant (Table 4). The indirect effect of psychological distress on perceived stress, mediated by psychological capital, was significant (95% confidence interval [CI]=0.1216–0.2202).

### 4. Discussion

This study examined the mediating effect of psychological capital on the relationship between psychological distress and perceived stress among nursing students. It demonstrated that psychological distress and psychological capital are directly related to perceived stress, and psychological capital is negatively correlated with perceived stress. The mediating effect analysis results showed that psychological capital is a partial mediator between psychological distress and perceived stress (95%CI=0.1216–0.2202). This is consistent with previous findings that reported that psychological distress is significantly associated with perceived stress[30]

The results of the study have implications both theoretically and clinically. We observed that the nursing students’ pursuit of nursing profession was closely related to perceived stress. Nursing students who liked the nursing profession had significantly less perceived pressure than those who do not like the
industry, which aligns with existing research results. When students learn about the potential for growth in nursing, or in different career specialties, they are more determined to pursue their chosen profession[31]. In addition, the perceived stress level of nursing students who wanted to pursue nursing was significantly lower than that of nursing students who did not want to pursue the profession after their graduation. This may be because nursing students feel that the profession aligns with their personal ambitions and skill set. They may identify with their field of study and have the necessary competencies to succeed[32].

The results demonstrated that psychological distress is positively correlated with perceived stress among nursing students; the results of this study are in line with those of previous studies [33]. Some studies have revealed that mental health conditions, such as depression, anxiety, and substance use disorders, influence the level of perceived stress [34]. Nursing students who struggle to come to terms with their emotions have poor emotional awareness, lack appropriate coping strategies, and can experience higher levels of psychological distress [35]. As China's healthcare reform continues to progress, growing numbers of Chinese nurses are concerned about their job stability, job rewards, and career prospects. This can subconsciously affect nursing students and their future career choices, resulting in higher levels of psychological stress [36].

Our research suggested that psychological capital is negatively associated with perceived stress among nursing students. This aligns with previous studies, which indicated that psychological factors have the greatest impact on stress levels[37]. One possible explanation for this finding is the role of psychological characteristics of nursing students. People with positive psychological states perceive different levels of stress and therefore adopt different coping strategies. The high level of professional self-efficacy of nursing students may create an optimistic view of their personal future, enhance their sense of hope, and sharpen some of their positive coping strategies, reducing the application of some poor coping methods [38]. An intervention on perceived stress in informal cancer caregivers demonstrated that perceived stress was negatively associated with resilience and self-esteem. It is suggested by research that stress can be diminished by increasing the levels of resilience and self-esteem in caregivers [39].

Psychological capital assumed a significant mediating role in the current study. According to Siarava et al. [40], symptoms of psychological distress, in particular depression and anxiety, are associated with a lower quality of life. This can be explained by the fact that the performance of coping with emotional failure is motivated by actual or potential losses and failures. Such emotion regulation strategies and maladaptive coping mechanisms may occur over time, increase the intensity of anxiety concerning adverse life events or tensions[41]. Since there is a link between psychological distress and the perception of negative events, the higher the individuals' level of perception of negative events, the lower the level of their emotion regulation strategies [42] and the more their self-efficacy and self-esteem levels are challenged, affecting their resilience and increasing psychological distress. Likewise, the tendency to experience depression and negativity may be associated with a lower level of confidence in the resources available to them. This finding is significant considering the association between psychological capital and psychological distress. Alternatively, individuals with low levels of self-efficacy may have difficulty
recognising their emotional experiences, such as narrative affective disorder, which may further lead to lower levels of self-reported psychological distress[43]. The current findings support the role of psychological capital as a key mediating process that influences the degree of psychological distress in nursing students. Given the enormous importance of perceived stress on psychological distress – not to mention fluctuations in psychological capital – it seems that strengthening psychological capital at the individual level through interventions would be of great benefit.

5. Conclusions

This study found the importance of psychological capital in reducing perceived stress to decrease psychological distress among Chinese nursing students. It is imperative that nursing administrators take effective measures to improve the psychological capital of nursing students to reduce the negative impact of their psychological distress.

The psychological capital intervention (PCI) model[44] provides guidelines to develop self-efficacy, hope, resilience, and optimism. Through PCI training, self-efficacy in nursing students may be ameliorated, further allowing them to experience success and to realise their personal targets through partner encouragement. Resilience may be enhanced by encouraging nursing students to exercise the ability to forecast and manage setbacks related to personal goal setting or other work events. Positive meditation can be offered to reduce stress and increase positive thinking in nursing students who are experiencing stress. Accordingly, our findings provide important insights that can be applied to future research on mental health resources for nursing students [45].

There are several limitations to this study. First, since the study had a cross-sectional design, it could only examine the causal relationships between variables. Further longitudinal studies are needed to infer causality. Second, the sample size of this study was small; this limits the applicability of the results and weakens the statistical power. Longitudinal empirical studies with large samples are required to determine causal relationships and the differences between variables.

6. List Of Abbreviations

- PCQ: Psychological capital questionnaire
- K10: Kessler psychological distress scale
- CPSS: Chinese perceived stress scale
- PCI: Psychological capital intervention
- VIF: Variance inflation factor

7. Declarations
7.1 Ethics approval and consent to participate

All procedures of this study were approved by the Ethics Committee of Shandong Mental Health Center (2018R23) and conducted in accordance with the ethical standards of the 1964 Declaration of Helsinki. All participants were informed of the purpose and procedures of the study and signed written informed consent prior to participation. Since no identifying information, such as the name and address of any participant, was collected, the privacy and anonymity of the participants were fully protected, and the data were aggregated and reported in summary form only. Written permission was obtained from the researchers who developed the scales for psychological distress (K10), psychological capital (PCQ), and perceived stress (CPSS).

7.2 Consent for publication

Not applicable

7.3 Availability of data and materials

Due to IRB protocols, the datasets generated and analyzed for the current study are not publicly available, but are available from the first author upon reasonable request.

7.4 Competing interests

The authors declare that they have no competing interests.

7.5 Funding

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7.6 Authors' contributions

SFF, XCP: was in charge of the data analysis and writing.

XJM, SJ, LQH: was in charge of the data collection and analysis.

WB: was in charge of study design and essential help. All authors (SFF, XCP, XJM, SJ, LQH and WB) reviewed the manuscript.

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