

Original Article

Correlation analysis of mental toughness, family social support, and anxiety of nursing staff

Xiaolu Wu^{1*}, Lu Tang^{2*}, Jing Gong³

¹Central Sterile Supply Department, The People's Hospital of Xichang, Xichang 615000, Sichuan, China; ²Central Operating Room, The Third People's Hospital of Chengdu, Chengdu 610000, Sichuan, China; ³Emergency Department, The Second Affiliated Hospital of Chongqing Medical University, Chongqing 400016, China. *Equal contributors.

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Abstract: Objective: This study aims to explore the impact of family social support affects anxiety levels and mental toughness among nursing staff, and to identify the pathways of how mental toughness develops. Methods: We selected 256 nursing staff from the Third People's Hospital of Chengdu using a convenience sampling method. Participants completed a questionnaire assessing family social support, anxiety level and mental toughness of the nursing staff. The questionnaires included the general information questionnaire, Perceived Social Support Scale (PSSS), Self-Rating Anxiety Scale (SAS), and the Connor-Davidson resilience scale (CD-RISC). Then, we analyzed the correlation between nursing staff' family social support, anxiety symptoms and mental toughness by using Pearson correlation. Finally, we analyzed the effect of family social support on mental toughness and anxiety levels by using linear regression, and analyzed the path of family social support and psychological toughness on anxiety symptoms by using structural equation modeling. Results: We finally collected 246 valid questionnaires with a valid recovery rate of 96.09%. 116 (47.15%) nursing staff reported a moderate level of family social support, with a mean PSSS score of (58.98 ± 7.64). Anxiety risk was identified in 43.39% of participants, with a mean SAS score of 50.47 ± 10.96. In terms of mental toughness, 104 (42.28%) nursing staff exhibited a low level of mental toughness, and 116 (47.15%) demonstrated moderate level of mental toughness with CD-RISC score of (58.23 ± 10.12). Correlation analyses revealed a strong negative correlation between the family social support, mental toughness and their anxiety ($r = -0.586, -0.516$, respectively), and a strong positive correlation between family social support and mental toughness ($r = 0.571$). Regression analysis showed that family social support was a significant negative predictor for anxiety ($\beta = -0.841, t = -9.488$), but a significant positive predictor for mental toughness ($\beta = 0.756, t = 11.669$). Mediation analysis indicated that mental toughness mediated 26.28% of the relationship between family social support and anxiety levels. Conclusion: Family social support can significantly reduce anxiety levels in nursing staff directly, as well as indirectly by increasing mental toughness.

Keywords: Nursing staff, family social support, anxiety, mental toughness, mediation analysis

Introduction

As part of the strategy to promote a healthy China, nursing services are facing unprecedented challenges. Nursing staff have not only to cope with an increasing workload, but also adapt to frequent night shifts, which collectively exert great psychological pressure, adversely affecting their physical and mental health. Study found that the nurse population was particularly vulnerable to anxiety and depression, especially during the COVID-19 outbreak, which was further exacerbated by work stress, physi-

cal fatigue, risk of infection, and strain on healthcare resources. Globally, the prevalence of anxiety symptoms among nursing staff reached 37% during the epidemic [1], significantly higher than the 31.4% in the general population [2]. High levels of anxiety not only affect nursing staff productivity, but also have a negative impact on patient care and public health.

Family social support, including emotional comfort, practical assistance, and information sharing, plays a crucial role in relieving nursing staff'

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stress and reducing anxiety levels. Research evidence suggests that nursing staff with stronger family social support tend to exhibit lower anxiety levels [3, 4]. Mental toughness, on the other hand, is a vital psychological trait for individuals to maintain psychological stability and adapt positively in challenging situations. Study has shown that mental toughness can help emergency department nursing staff acquire important skills in stress relief, helping nursing staff cope with adversity in the workplace and avoid negative emotions such as anxiety and depression associated with work stress [5].

This research conducted a cross-sectional survey aimed at assessing the current state of family social support, anxiety levels, and mental toughness among nursing staff, as well as the potential mediating influence of psychological resilience on this relationship. The ultimate goal was to develop evidence-based intervention strategies aimed at enhancing the well-being of nursing staff and improving the quality services they provide.

Materials and methods

Patient characteristics

We conducted a study using a convenience sampling method and selected 256 nursing staff from the Third People's Hospital of Chengdu between December 2022 and June 2023.

Inclusion Criteria: (1) Registered nursing staff currently employed; (2) Nursing personnel engaged in nursing work, who provided informed consent and voluntarily agreed to participate. Exclusion Criteria: (1) Nursing staff not directly employed by this hospital, including those on assignment, in training, or interns; (2) Those not on duty due to illness, personal matters, maternity leave, or further education; (3) Those unwilling to participate in this survey.

The research team coordinated with departmental head nurses to distribute the questionnaire through the Wenjuanxing mini-program, which was then shared in the WeChat groups of each department. Before completing the questionnaire, the purpose, significance, precautions, and confidentiality of the survey were explained. 246 questionnaires were successfully collected, achieving a valid response rate

of 96.09%. This study was approved by the Medical Ethics Committee of the Third People's Hospital of Chengdu.

Specific method

(1) General Information Survey: This questionnaire collects data on age, gender, professional title, years of work experience, number of night shifts worked per month, labor relationship (e.g., full-time, contract, etc.), and average monthly income, etc.

(2) Perceived Social Support Scale (PSSS) [6]: The PSSS measures social support across three dimensions - family support, friend support, and others. It includes 12 self-assessment items, such as "When I need it, I can get emotional help and support from my family", "My family can provide me with tangible help", "When I am in trouble, some people (leaders, relatives, colleagues) are the true sources of comfort for me", and "I can discuss my problems with friends". Responses are scored on a 7-point scale, with total scores ranging from 12 to 84. The interpretations are as follows: 12-36 suggest a low degree of perceived social support, 37-60 indicates moderate support, and 61-84 suggests high social support. The Cronbach's α coefficient for the PSSS was 0.943 [7].

(3) Self-rating Anxiety Scale (SAS) [8]: The SAS consists of 20 self-assessment items, such as "I was scared for no reason", "I easily become mentally disturbed or feel frightened", and "I feel like I might go crazy". Responses are scored from 1 to 4, with the total score multiplied by 1.25 to standardize. A standard score exceeding 50 suggests potential anxiety concerns. The Cronbach's α coefficient for the SAS was 0.884 [7].

(4) Connor-Davidson Resilience Scale (CD-RISC) [9]: The CD-RISC measures mental toughness across three dimensions: perseverance, self-reliance, and optimism. It includes 25 self-assessment items, such as "I can adapt to change", "Dealing with stress makes me feel strong", and "When things seem hopeless, I don't give up easily". Responses are scored from 0 to 4, totaling up to 100. The interpretation of the total score is as follows: 0-56 suggests low mental toughness, 57-70 indicates moderate mental toughness, and 71-100

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Table 1. Results of general demographic data of nursing staff

Items	Groups	Frequency	%
Age (years)	20~	90	36.59%
	30~	137	55.69%
	40~	19	7.72%
Sex	Male	17	6.91%
	Female	229	93.09%
Highest level of education achieved	College and below	88	35.77%
	Bachelor degree or above	158	64.23%
Marital status	Spinsterhood	77	31.30%
	Married	169	68.70%
Professional title	Nurse	70	28.46%
	Nurse practitioner	120	48.78%
	Supervisor or above	56	22.76%
Years of work experience (years)	< 5	52	21.14%
	5~	100	40.65%
	10~	57	23.17%
	15~	37	15.04%
Labor relationship	Officially	65	26.42%
	Contract	181	73.58%
Number of night shifts worked per month	3 times or less	22	8.94%
	5-10 times	165	67.07%
	More than 10 times	59	23.98%
Average monthly income (RNB)	< 3000	24	9.76%
	3000~5000	130	52.85%
	> 5000	92	37.40%

suggests high mental toughness. The Cronbach's α coefficient for the CD-RISC was 0.910 [10].

Statistical analysis

The data for this study were entered by two individuals after verifying accuracy to ensure no errors were present. Statistical analysis was primarily conducted using SPSS 23.0 (IBM Corporation, New York, NY) and the PROCESS plugin, with a significance level of $\alpha = 0.05$. Differences were considered statistically significant if $P < 0.05$.

The specific statistical methods used were as follows: (1) Frequency counts and percentages were employed to characterize the demographic characteristics of the study participants, while the mean \pm standard deviation was used to describe the scores of PSSS, SAS, and CD-RISC. (2) Pearson correlation analysis was employed to investigate the relationship among family social support, anxiety symp-

toms, and mental toughness among nursing staff. (3) Linear regression analysis was used to assess the impact of social support and mental toughness on anxiety among nursing staff. (4) Path analysis was utilized to analyze the pathways through which social support and mental toughness affect anxiety among nursing staff.

Results

Clinical characteristics

Table 1 summarizes the demographic and professional details of 246 nursing staffs. Educationally, 64.23% of the nursing staff hold a bachelor's degree or higher. Professionally, 48.78% are registered nurses, 28.46% are staff nurses, and 22.76% hold the title of head nurse or higher. In terms of frequency of night shifts, 67.07% of the nursing staff work 5-10 night shifts per month. In terms of monthly salary, 52.85% of the nursing staff earn 3,000-5,000 yuan per month.

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Table 2. Family social support, anxiety and mental toughness of nursing staff

Scales	Number of self-rated projects	Scoring range	Score
PSSS			
Family support	4	4-28	20.70 ± 3.04
Friends support	4	4-28	19.32 ± 3.98
Other support	4	4-28	18.94 ± 4.16
PSSS-Total score	12	1-84	58.98 ± 7.64
SAS-Total score	20	25-100	50.47 ± 10.96
CD-RISC			
Perseverance	13	0-52	29.20 ± 7.33
Self-reliance	8	0-32	19.80 ± 3.98
Optimism	4	0-16	9.24 ± 2.56
CD-RISC-Total score	25	0-100	58.23 ± 10.12

Note: PSSS, Perceived Social Support Scale; SAS, Self-Rating Anxiety Scale; CD-RISC, Connor-Davidson Resilience Scale.

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In terms of family social support, 1 nurse exhibited low levels of support, 116 reported moderate support, and 108 reported high levels of support. In terms of anxiety level, 108 scored ≥ 50 points, indicating that 43.39% of the nursing staff may be at risk of anxiety. Regarding mental toughness, 104 nursing staff members displayed low levels of resilience, 116 were at a moderate level, and only 26 exhibited high levels of resilience.

Table 2 provides the detailed results for family social support, anxiety levels, and mental toughness. The family social support score was (58.98 ± 7.64), indicating a general receipt of support in their family and social life. However, a considerable portion of the nursing staff exhibited relatively high levels of anxiety, with an average score of (50.47 ± 10.96), which could negatively impact their mental health and job performance. In terms of mental toughness, the average score was (58.23 ± 10.12), indicating a moderate level.

Correlation analysis

The correlation analysis results provided in **Figure 1** show a strong negative correlation between family social support and anxiety levels ($r = -0.586$). There was also a strong negative correlation between anxiety levels and mental toughness ($r = -0.516$), suggesting that nursing staff with higher levels of anxiety tended to have lower mental toughness. Conversely, there was a strong positive correlation between

family social support and mental toughness ($r = 0.571$), indicating that nursing staff who receive more family social support tended to have higher mental toughness.

Mediation effect analysis

The regression analysis results provided in **Tables 3** and **4** show that family social support was a significant negative predictor for anxiety ($\beta = -0.841$, $t = -9.488$, $P < 0.001$), indicating that nursing staff with higher family social support experienced lower anxiety levels; conversely, family social support was a significant positive predictor for mental toughness ($\beta = 0.756$, $t = 11.669$, $P < 0.001$), indicating that nursing staff with higher family social support equipped with higher mental toughness.

As for the mediation analysis, it was found that mental toughness acted as a partial mediator in the relationship between family social support and anxiety among others, explaining 26.28% of the effect (**Figure 2**).

Discussion

Nursing staff, as frontline healthcare workers, have to manage patients with various conditions and undertake a range of treatment tasks, often working under significant stress. Without effective management, this stress can lead to anxiety and other emotional issues. A meta-analysis conducted by Chinese scholars showed that the incidence of anxiety and depression among Chinese nursing staff was 44.1% and 34.1% respectively, which is higher than that in the general population (31.6% and

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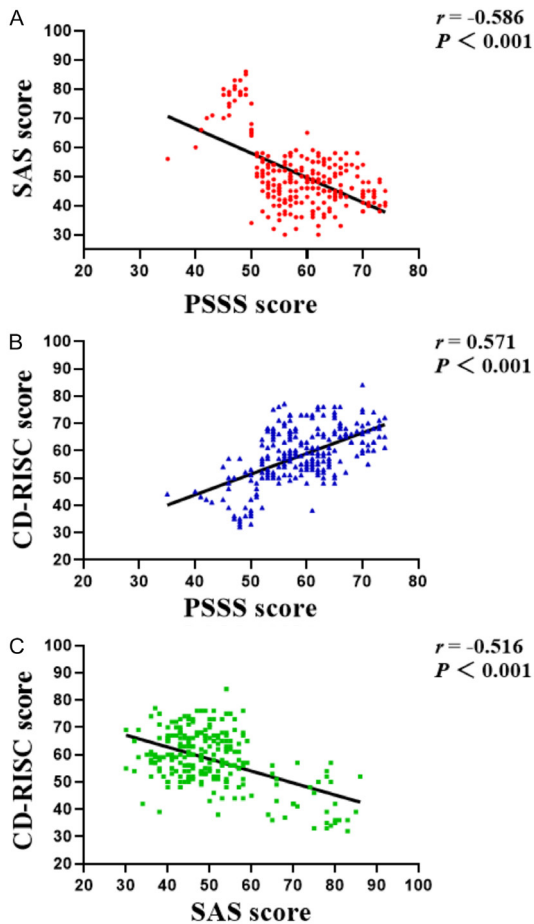


Figure 1. Correlation analysis among family social support, anxiety and mental toughness. A. The correlation between family social support and anxiety. B. The correlation between family social support and mental toughness. C. The correlation between anxiety and mental toughness.

27.9%) [11, 12]. Another meta-analysis involving 93,112 nursing staff reported an overall anxiety prevalence of 37% [13], indicating that about one-third of nursing staff are troubled by psychological symptoms. A longitudinal study revealed ongoing mental health changes among healthcare workers, with 36.6% experiencing anxiety symptoms initially and 42.4% still showing signs of anxiety two years later [14]. Our survey research also found that a considerable proportion of nursing staff had high levels of anxiety (43.39%). These data highlight the need for enhanced mental health support and intervention measures for nursing staff.

We observed a significant negative correlation between family social support and anxiety level of nursing staff through correlation analysis ($r =$

-0.586). This is consistent with the findings of Zhang H et al. [15], which suggests that nursing staff who receive greater family social support are more likely to experience lower anxiety. This underscores the importance of family social support in alleviating anxiety related to nursing responsibilities. Our study also showed a significant positive correlation between family social support and psychological toughness ($r = 0.571$). This is consistent with the findings of Bao H et al. [16], which indicates that strong family social support can improve individual psychological toughness. Family support manifests as mutual care among family members, emotional communicate, and shared handling of stressful life events [17]. It provides emotional comfort, reduces psychological stress, and helps nursing staff better cope with anxiety and depression. Social support, including understanding and assistance from colleagues, friends, and the community, can also provide essential resources and encouragement for nursing staff, enhancing mental toughness and helping them maintain professional stability and personal well-being [18]. These findings suggest that family social support is a crucial element in enhancing the mental toughness of nursing staff, as high levels of family social support can increase mental toughness and positively impact outcomes.

We also observed a significant negative correlation between nursing staff's mental toughness and anxiety ($r = -0.516$, $P < 0.001$), indicating that nursing staff with higher mental toughness exhibit lower anxiety levels. This is in line with the research by Wilson E et al. [19], which views mental toughness as the ability of individuals to adapt well to stress and adversity. Strong mental toughness helps individuals develop a positive, optimistic attitude, thereby reducing anxiety [20]. Enhancing psychological resilience can mitigate the impact of work stress and anxiety to certain degree. Nurses with higher psychological resilience can face the workplace pressures and anxieties more calmly, actively cope with stress and its sources, and quickly recover from stressful events, experiencing in fewer anxiety emotions.

Our structural equation model analysis revealed a positive association between family social support and mental toughness. Concurrently, there was an inverse relationship between mental toughness and anxiety. Furthermore,

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Table 3. Regression analysis of family social support, anxiety, and mental toughness among nursing staff

Dependent variable	Independent variable	R	R ²	F	P	β	t	P
Anxiety	Family social support	0.586	0.343	90.031	< 0.001	-0.841	-9.488	< 0.001
Mental toughness	Family social support	0.571	0.326	136.167	< 0.001	0.756	11.669	< 0.001
Anxiety	Family social support	0.626	0.392	51.031	< 0.001	-0.292	-4.111	< 0.001
	Mental toughness					-0.621	-7.747	< 0.001

Table 4. Bootstrap test on the mediating effect of mental resilience on family social support and anxiety among nursing staff

Effects	Effect	Boot SE	Boot LLCI	Boot ULCI	Effect ratio
Total effect	-0.841	0.089	-1.016	-0.667	--
Direct effect	-0.620	0.080	-0.778	-0.463	73.72%
Indirect effect	-0.221	0.060	-0.342	-0.108	26.28%

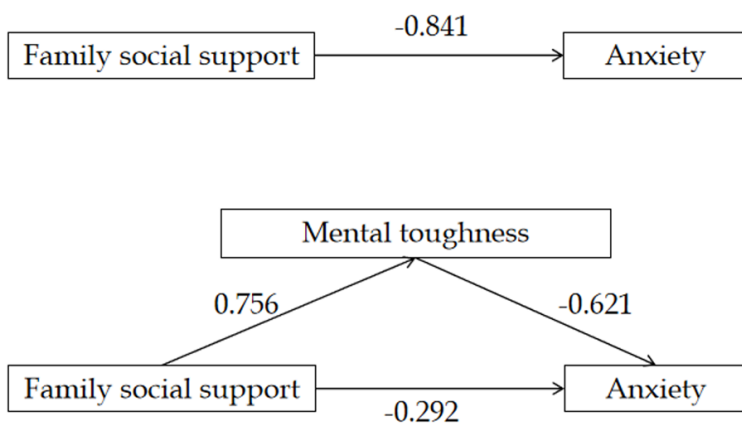


Figure 2. Analysis of the mediating effect of mental toughness on family social support and anxiety.

mental toughness acted as a partial mediator in the relationship between family social support and anxiety, suggesting that family social support indirectly reduces anxiety levels by enhancing mental toughness, with the mediating effect accounting for 26.28%. One plausible explanation for this dynamic is the understanding and encouragement from family members and friends, which provides emotional security, enhancing nursing staff's mental toughness. This strengthened resilience enables them to better cope with adversity, maintain a positive mindset in challenging situations, and mitigate work-related anxiety [21]. Additionally, practical assistance provided by family and society in the face of difficulties, such as financial support, daily care, or professional advice, can alleviate the burden on nursing staff, enabling them to better focus on overcoming challenges

and enhancing their mental toughness [22]. Mental toughness may help nursing staff better cope with stress, alleviate anxiety through positive psychological adjustment and coping strategies. Nursing staff with higher mental toughness may be more effective in dealing with uncertainties and pressures, thus reducing anxiety [20].

While our analysis has highlighted the mediating role of psychological resilience, further research is warranted to delve deeper into how different types of family social support influence psychological resilience and to design more effective interventions to enhance the psychological resilience of healthcare providers.

Conclusion

Anxiety symptoms among nursing staff impose a significant economic burden on society. Addressing anxiety and depressive symptoms in nursing staff is crucial for reducing nurse turnover, improving their work conditions, and ensuring patient safety. Family and social support can directly and significantly reduce the anxiety levels of nursing staff, and it can also indirectly lower anxiety by strengthening mental toughness. Therefore, strengthening the family and social support system and providing comprehensive psychological support to nursing staff is not only an investment in their personal well-being but also a safeguard for the stability of the entire healthcare system and the quality of patient care.

Healthcare institutions and policymakers should consider incorporating strategies that

enhance mental toughness into mental health intervention programs, such as resilience training and supportive social activities. Moreover, there should be a concentrated effort to encourage and facilitate family and society support for healthcare workers, especially when they encounter occupational stress and challenges.

Disclosure of conflict of interest

None.

Address correspondence to: Jing Gong, Emergency Department, The Second Affiliated Hospital of Chongqing Medical University, No. 76, Linjiang Road, Yuzhong District, Chongqing 400016, China. Tel: +86-023-63693400; E-mail: gongjing@cqmu.edu.cn

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