




Perceived Stress Mediating the Association Between Mindfulness and Resilience Among Registered Nurses

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Purpose: Resilience continues to be an important concept in the nursing profession due to its significant role in personal healthcare, patients' healthcare, and leadership. The present study examined the mediating role of perceived stress in the association between mindfulness and resilience among registered nurses in order to understand their importance among those in the Taiwanese nursing profession.

Materials and Methods: Between October and November 2021, a total of 816 registered nurses participated in a cross-sectional survey including psychometric measures assessing perceived stress (Chinese Perceived Stress Scale-10), mindfulness (Chinese Mindful Attention Awareness Scale), and resilience (Chinese Questionnaire of Resilience).

Results: Results indicated that perceived stress mediated the association between mindfulness and resilience (standardized coefficient = 0.251, $p < 0.001$), although there was no significant association between mindfulness and resilience (standardized coefficient = 0.042, $p = 0.16$). This suggests that perceived stress may function as both distress and eustress because mindfulness was not directly associated with resilience but indirectly via perceived stress.

Conclusion: Nurses and their administrators should focus on different ways of coping with stress so that they become more resilient in facing other stressors. Future studies may be conducted to examine the mediating role of perceived stress in the association between other coping strategies and resilience among registered nurses.

Keywords: coping, healthcare, Taiwan, cross-sectional survey, mediation analysis, mindfulness, resilience

Introduction

Resilience is an essential concept among nurses due to its significant role in personal healthcare, patients' healthcare, and leadership. Resilience involves knowledge, skills, and abilities that enable individuals (including nurses) to recuperate and/or manage challenging situations successfully.¹⁻³ There are varied definitions of resilience, but in general, it encompasses inner energy, strength, selfhood, developed insight concerning responsibilities and roles, faith, self-care and/or enhanced social connections that helps individuals to bounce back and persevere through challenging situations.¹⁻⁶ How resilience is developed and nurtured is not fully known, although factors such as hope and spirituality, optimism, self-efficacy, sense of humor, control, competence, professional identity, clinical supervision, and experience have been reported to be associated with resilience among nurses.^{3,5-7} Therefore, resilience involves personal factors (eg, age, gender, experience, spirituality), professional factors (eg, validation, colleague support, mentoring), and environmental factors (eg, culture).^{6,8-12} Consequently, a nurse who possesses such skills and capabilities may appropriately adapt to challenges in the nursing profession.

Nurses and Stress

Nurses face various kinds of stress in their profession which can limit the quality of service they provide.^{9,13} Stressors observed in the nursing profession can be service-related (eg, managing difficult patients, death and/or inadequate emotional preparation), and/or work-related (eg, nurturing growth and professional development, communication gaps, role conflict, unfavorable policies and regulation, and/or poor interpersonal relationships).^{5,6} Without appropriate adaptive coping strategies, these stressors may lead to serious biopsychosocial challenges such as fatigue, musculoskeletal disorders, burnout, depression, lack of concentration, and unhappiness which may affect the quality of service delivery and turnover among nursing staff.^{14–16} This is consistent with the diathesis-stress model which asserts that stress has the ability to trigger predisposed illnesses,¹⁷ especially without adequately effective coping strategies.^{18,19}

Stress among nurses, whether perceived or real, needs to be taken seriously because it is capable of triggering other illnesses if not well managed.^{20–23} Consequently, stress has been associated with physical and mental illnesses.^{22,24,25} Fear of contracting COVID-19 and other COVID-19-related issues appears to have been one of the leading causes of stress among healthcare professionals including nurses.^{14,26–28} Therefore, nurses need effective ways of coping with stress so as to deliver quality service to their patients.

Coping Strategies Among Nurses

Coping strategies remain one of the best ways of mitigating the effects of stress and are defined as an individual's cognitive and behavioral skills needed to manage and adjust the internal and external demands of challenging and/or stressful situations.^{17,29} Coping strategies and resilience are closely related because resilience enables or energizes individuals to manage challenges, and helps maintain positivity and stable equilibrium while coping strategies involve the various means that are used to manage these challenges.^{3,29} Therefore, a nurse with higher levels of resilience is likely to have better adaptive and efficient coping strategies that may be used to deal with challenging and stressful situations.^{1,3,6,30} There are several types of coping strategies^{31–33} but the present study focused on mindfulness because it uses a unique approach (ie, awareness and non-judgmental acceptance of an individual's moment-to-moment experience) in tackling stress.^{34–36} Therefore, the use of mindfulness by nurses may positively enhance their emotions, reduce their stress, and consequently improve their well-being and resilience.^{3,37–40}

Theoretical Framework

The diathesis-stress model and the transactional model of stress and coping are used as the theoretical frameworks underlying the present study. The diathesis-stress model asserts that stress, especially distress, has the ability to trigger underlying illnesses.¹⁷ Therefore, if a nurse is predisposed to any kind of illness/health condition (eg, depression and hypertension), stress may trigger this illness/condition, especially without the use of appropriate adaptive coping strategies. The transactional model of stress and coping asserts that an individual's ability to cope and adjust to problems/challenges is a result of interactions (transactions) between the individual and their environment.^{18,19} Therefore, nurses who think they do not have enough experience or ability to deal with work challenges/problems may face more stress than those who think otherwise.

Problem Statement

The aforementioned literature has examined the association between coping strategies, stress, and resilience among different populations.^{3,8–12,14–16,22,24,25,29,30,37–40} However, associations can be affected by other intervening variables which may weaken or strengthen these associations. Consequently, the present study examined the mediating role of perceived stress in the association between mindfulness and resilience among registered nurses.

Study Purpose and Research Questions

The aim of the present study was to examine the mediating role of perceived stress in the association between mindfulness and resilience among registered nurses. More specifically, the study examined (i) the association between perceived stress, mindfulness, and resilience among registered nurses, and (ii) the mediating role of perceived stress in the association between mindfulness and resilience among registered nurses. Therefore, the study had two major research questions: (i) Are

there significant associations between perceived stress, mindfulness, and resilience among registered nurses? and (ii) Can perceived stress mediate the association between mindfulness and resilience among registered nurses?

Materials and Methods

Study Design, Participants, and Recruitment Procedure

Utilizing a cross-sectional survey study design, registered nurses were invited to participate in the study from October to November 2021, a period in which there was a minor COVID-19 outbreak in Taiwan.^{41,42} All the registered nurses were working in a hospital located in Taichung, a central city in Taiwan, during the survey period. Apart from being a registered nurse, the eligibility criteria included (i) being an adult aged at least 20 years and (ii) providing written informed consent clearly showing the willingness to participate in the study. The only exclusion criterion was if the nurse did not have to work shifts because shift-work can be an important factor affecting nurses' psychosocial health.

The authors visited each unit to distribute the survey with study information. The participants were therefore fully aware of the study's purpose and their participant rights. The surveys were then left in each unit for the registered nurses who were interested in participating. Participants could complete the survey in their own time and then post them back to the first author using pre-paid envelopes. Participants were assured that their data would be anonymous and confidential. The research team distributed 830 surveys and received 816 without any missing information (response rate: 98.3%). Some of the data from the study have been published previously.¹² The study was approved by the Institutional Review Board of the Chung Shan Medical University Hospital (approval number CS2-21048). Also, the study was conducted in accordance with the guidelines outlined in the Declaration of Helsinki including obtaining written informed consent, protection of privacy and confidentiality of personal information.

Measures

Background Information

The participants' characteristics were collected using a background information sheet. Here, questions were asked concerning the participants' age (in years), sex (male or female), working experience (in months), level of education (eg, bachelor's degree, or master/doctoral degree), working department (ie, internal medicine, intensive care unit, gynaecology and paediatrics, surgery and operation room, or other), marital status (ie, single, currently married, or divorced), and the number of children (0, 1, or 2 or above).

Mindfulness

The participants' mindfulness was assessed using the Chinese translation of the Mindful Attention Awareness Scale (CMAAS).⁴³ The CMAAS is a short 15-item scale with all of its items rated on a six-point Likert scale. A summed score using the CMAAS items is generated with higher scores indicating higher levels of mindfulness.⁴⁴⁻⁴⁸ In the present study sample, the internal consistency of the CMAAS was excellent ($\omega = 0.93$).

Perceived Stress

The participants' perceived stress was assessed using the Chinese version of Perceived Stress Scale-10 (PSS-10).⁴⁹ The PSS-10 is a 10-item version of the original 14-item Perceived Stress Scale and all items are rated using a five-point Likert scale. After recoding the negatively worded items (ie, Items 4, 5, 7, and 8), a summed score using the PSS-10 items is generated with higher scores indicating higher levels of perceived stress.⁵⁰⁻⁵² In the present study sample, the internal consistency of the PSS-10 was very good ($\omega = 0.89$).

Resilience

The participants' resilience was assessed using the Chinese version of the Questionnaire of Resilience (QR).⁵³ The QR is a short 10-item scale and all items in the QR are rated using a five-point Likert scale. A summed score using the QR items is generated with higher scores indicating higher levels of resilience.⁵³ In the present study sample, the internal consistency of the QR was excellent ($\omega = 0.93$).

Data Analysis

Frequencies and percentages were used to analyse participants' demographic characteristics. Then, the proposed mediation model was tested using structural equation modelling (SEM) with the diagonally weighted least-squares estimator. In the proposed mediation model, three latent constructs were estimated using the study measures: resilience (ie, the dependent variable) using the QR, perceived stress (ie, the mediator) using the PSS-10, and mindfulness (ie, the independent variable) using the CMAAS. Sobel's⁵⁴ test was used to examine the significance of mediated effect of perceived stress in the association between mindfulness and resilience. The following fit statistics were used to evaluate if the mediated model was acceptable: a Tucker-Lewis index (TLI) >0.9, a comparative fit index (CFI) >0.9, a standardized root mean square residual (SRMR) <0.08, and a root mean square error of approximation (RMSEA) <0.08.^{55,56} All the statistical analyses were performed using R software, with the SEM conducted using the lavaan package.⁵⁷

Results

Among the 816 participants (777 females [95.2%]), most were young adults (388 aged between 20 and 29 years [47.5%]; 195 aged between 30 and 39 years [23.9%]). Over half of the participants (56.7%) had working experience of five years or more ($n = 463$) and over half of the participants (65.3%) were single ($n=533$). The majority of the participants (82.2%) had a bachelor's degree ($n=672$) and almost three-quarters (71.8%) did not have any children ($n=586$). The departments where the participants worked are listed in Table 1.

The factor loadings of the items in the three measures (ie, PSS-10, CMAAS, and QR) were moderate to strong. More specifically, factor loadings ranged between 0.403 and 0.799 for CMAAS; between 0.385 and 0.797 for PSS-10; and between 0.638 and 0.834 for QR (Table 2). The factor-loading information supplemented the psychometric evidence of the three measures used in the present study. Therefore, the results of the SEM were further investigated. Utilizing SEM, the model fit was satisfactory: CFI = 0.950, TLI = 0.947, RMSEA = 0.061, and SRMR = 0.075. Moreover, significantly direct negative associations were observed between perceived stress and mindfulness (standardized coefficient = -0.665 ; $p < 0.001$); and between resilience and perceived stress (standardized coefficient = -0.378 ; $p < 0.001$). A significantly mediated association was observed for perceived stress in the association of mindfulness to resilience (standardized

Table 1 Characteristics of the Present Sample (N = 816)

	n (%)
Age (in years)	
20–29	388 (47.5)
30–39	195 (23.9)
40–49	201 (24.6)
50–69	32 (3.9)
Work experience (in years)	
Below one year	85 (10.4)
1–4.99 years	268 (32.8)
5–9.99 years	167 (20.5)
10–14.99 years	83 (10.2)
15–19.99 years	75 (9.2)
20 years or more	138 (16.9)
Sex	
Female	777 (95.2)
Male	39 (4.8)
Educational level	
Associate's degree	65 (8.0)
Bachelor's degree	671 (82.2)
Master's or doctoral degree	80 (9.8)

(Continued)

Table 1 (Continued).

	n (%)
Department	
Internal medicine	148 (18.1)
Intensive care unit	170 (20.8)
Gynaecology and paediatrics	84 (10.3)
Surgery and operation room	119 (14.6)
Other	295 (36.2)
Marital status	
Single	533 (65.3)
Married	276 (33.8)
Divorced	7 (0.9)
Number of children	
None	586 (71.8)
One	84 (10.3)
Two or more	146 (17.9)

Table 2 Factor Loadings of the Items for Chinese Translation of Mindful Attention Awareness Scale (CMAAS), Perceived Stress Scale-10 (PSS-10), and Questionnaire of Resilience (QR) using Structural Equation Modelling

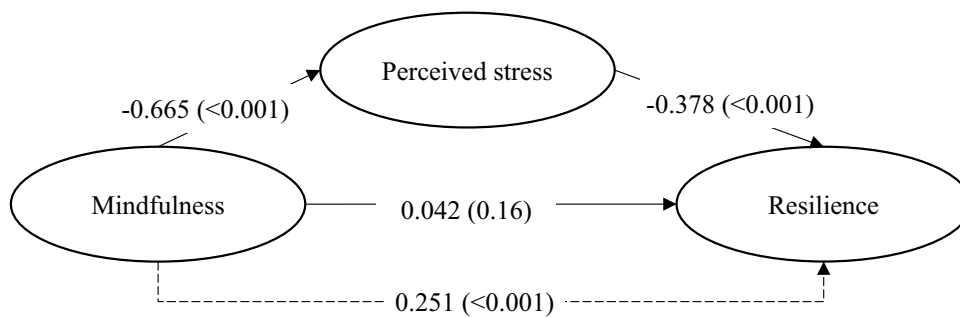
Item no.	Factor Loading		
	CMAAS ($\omega=0.93$)	PSS-10 ($\omega=0.89$)	QR ($\omega=0.93$)
1	0.541	0.676	0.547
2	0.599	0.797	0.575
3	0.698	0.727	0.638
4	0.623	0.386	0.702
5	0.607	0.463	0.731
6	0.586	0.498	0.671
7	0.760	0.408	0.834
8	0.799	0.385	0.806
9	0.776	0.589	0.689
10	0.781	0.683	0.663
11	0.403	–	–
12	0.544	–	–
13	0.707	–	–
14	0.775	–	–
15	0.476	–	–

Notes: CMAAS comprises 15 items; PSS-10 comprises 10 items; QR comprises 10 items. All factor loadings were significant with p -values < 0.001.

coefficient = 0.251; $p < 0.001$). However, the direct association between mindfulness and resilience was not significant (standardized coefficient = 0.042; $p = 0.16$) (Figure 1).

Discussion

The present cross-sectional survey study reported here comprised 816 registered nurses with varied working experience to examine (i) the association between perceived stress, mindfulness, and resilience among registered nurses, and (ii) the mediating role of perceived stress in the association between mindfulness and resilience among registered nurses. The

**Fit statistics:**

χ^2 (df)/p-value = 2264.25 (557) / < 0.001

Comparative fit index = 0.950

Tucker-Lewis index = 0.947

Root mean square error of approximation = 0.061

Standardized root mean square residual = 0.075

Figure 1 Structural equation modeling assessing mediated effects of perceived stress in the association between mindfulness and resilience.

Notes: Solid lines indicate direct effects; dashed line indicates mediated effect; values are presented using standardized coefficients (p-values).

results concerning the associations showed that there were significant negative direct associations between perceived stress and mindfulness, and between resilience and perceived stress but not between mindfulness and resilience.

More specifically, the significant negative association between perceived stress and mindfulness indicated that the higher the level of nurses' perceived stress, the lower the level of mindfulness and vice versa. Consequently, when nurses have higher levels of stress or face more stressful situations their sense of awareness and non-judgmental acceptance of moment-to-moment experiences decreases. On the other hand, when they have a higher level of mindfulness, their level of perceived stress likely decreases. Therefore, it may be beneficial for nurses to continually practice mindfulness meditation in order to boost their capacity for handling adverse situations. This assertion is similar to other studies which examined the association between mindfulness and perceived stress.^{58,59} However, there was no significant direct association between mindfulness and resilience in the present study. This suggests that other factors may be responsible for enhancing the resilience of registered nurses in Taiwan apart from mindfulness.

Also, in relation to the significant negative association between perceived stress and resilience, the higher the level of nurses' perceived stress, the lower the level of their resilience and vice versa. This further indicates that more resilient nurses may perceive fewer situations as stressful (ie, resilience may have a positive impact on events that are deemed stressful by nurses). This finding is similar to previous studies that used different populations.⁶⁰⁻⁶² Based on the findings here, Taiwanese health authorities and other relevant stakeholders should implement programs to improve registered nurses' resilience and reduce their perceived stress simultaneously. This would likely lead to registered nurses having improved health via this positive feedback loop (ie, improved resilience would help nurses cope with perceived stress and reduced perceived stress would increase nurses' resilience levels).

The association between mindfulness and resilience was mediated by perceived stress. This is particularly interesting because no significant direct association between mindfulness and resilience was found. This implies that although mindfulness may not have been directly associated with resilience, it has an indirect role via perceived stress. This suggests that perceived stress may function as both distress and eustress. Therefore, more focus may be put on learning different ways of coping with stress among nurses so that they will be more resilient to face other stressors. This chain of activities may ultimately lead to healthy, satisfied, and experienced nurses³⁷⁻⁴⁰ as well as quality service delivery.¹⁵

Limitations

The present study has some limitations. First, a cross-sectional study design was used which inhibits drawing causal inferences from the findings of this study. Therefore, there is a need for longitudinal study designs or randomised control

studies to be conducted to delineate the causal associations between the study variables. Second, the data comprised self-report measures which make the data susceptible to known biases (eg, social desirability bias). Nonetheless, adequate measures were taken to assuage these potential biases (eg, anonymity and confidentiality). Third, closely related to the use of self-report measures or scales is the use of a quantitative research method which has limited ability to examine issues deeply and (in the present study) to know the personal feelings, thinking, and behavior of the nurses who participated. In order to understand the nurses' personalized views on perceived stress, resilience, and mindfulness/coping strategies, qualitative research methods or mixed-method research is needed. One of the newest qualitative research methods, photovoice (either offline or online), has been reported to provide effective and rich data by reaching a wide range of participants.⁶³⁻⁶⁵ Therefore, the online photovoice could be used to explore registered nurses' work experiences, perceived stress, coping strategies, and resilience.

Implications

The present study's findings have several implications. First, nurses and/or nursing management need to be aware that stress has the ability to trigger predisposed illnesses. Therefore, they must invest adequate resources to lessen the severity of stress and to implement different coping strategies at both an organizational and personal level. Based on the present study's findings, mindfulness appears to be efficient in mitigating the stress of nurses and so it can be integrated into the coping strategies used by nurses. Given that the effect of stress was negatively associated with resilience, nurses should have regular seminars, meetings, and peer-education sessions, so they could learn from each other in successfully dealing with work-related stress. Second, clinicians can use these findings to help educate and treat nurses (as well as healthcare workers more generally) with stress-related issues to improve their resilience, health, and wellbeing more generally. Third, given the small number of variables examined in the present study, researchers may further explore other variables that mediate the association between mindfulness and resilience. Also, there may be a need for a more personalized view of the association between these variables using mixed-methods or qualitative research. This would help deepen the understanding of these associations from personalized viewpoints.

Conclusion

The present cross-sectional study demonstrated that perceived stress mediated the association between mindfulness and resilience among registered nurses, although there was no significant association between mindfulness and resilience. This indicates that mindfulness may only be indirectly associated with resilience via perceived stress. This also suggests that perceived stress may function as both distress and eustress. Therefore, more focus should be put on ways of coping with stress among nurses so that they will be more resilient to face other stressors. The present investigation is unique because it is the only known study to have ever examined the mediating role of perceived stress in the association between mindfulness and resilience among registered nurses. Therefore, further studies are needed to understand the mediating role of perceived stress in the association between other coping strategies and resilience among registered nurses.

Ethics Approval Statement

This study was approved by the Institutional Review Board of the Chung Shan Medical University Hospital (approval number CS2-21048). Also, the study was conducted in accordance with the guidelines outlined in the Declaration of Helsinki including obtaining written informed consent, protection of privacy and confidentiality of personal information.

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Disclosure

The authors declare that they have no competing interests.

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