

# Mediating Effect of Secondary Traumatic Stress and Compassion Satisfaction on the Association Between Stress and Burnout: the Korea Nurses' Health Study

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## Research article

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# Abstract

## Background

Nurses' burnout is a public health epidemic around the world that adversely affects nurses' quality of life as well as the patient's outcomes. In this study, we aim to test a hypothetical path model evaluating the influence of stress on nurse's burnout and to identify the mediating effects of secondary traumatic stress (STS) and compassion satisfaction (CS) among clinical nurses in South Korea.

## Methods

A quantitative, cross-sectional study evaluated the survey data from 10,305 female registered nurses who participated in the Korea Nurses' Health Study (KNHS) Module 5. The survey included a demographic questionnaire and the Professional Quality of Life version 5 (ProQOL 5). Bootstrap analyses (using the PROCESS macro) was employed to evaluate the mediating effect between variables.

## Results

Stress was significantly associated with burnout and mediated by STS and CS. In addition, the magnitude of the indirect effects of CS was significantly greater than the magnitude of the indirect effects of STS. The findings of this study showed the positive aspect (CS) of work experiences might offset the negative aspects (STS), consequently reducing the burnout level.

## Conclusions

Our study findings suggest that a multidimensional approach to assessing nurse burnout and implementing proper management will help to improve quality of life for nurses and help maintain positive attitudes and quality of patient care.

# Background

Burnout is a syndrome characterized by three dimensions: emotional exhaustion, depersonalization, and reduced personal accomplishment [1]. People who have experienced burnout are more likely to leave their jobs; in fact, some resign from their jobs without hesitation. Even if they stay in their jobs, their job performance, efficacy, and job satisfaction are significantly decreased. Moreover, burnout has an adverse effect on physical symptoms like pain as well as mental health such as depression and anxiety [2, 3]. Indeed, burnout was recently classified as an occupational phenomenon in the 11<sup>th</sup> Revision of the International Classification of Diseases (ICD-11) [4], which means that burnout has emerged as a worldwide health problem in workplaces.

Numerous studies have found an association between work related or personal stress and burnout [5-7]. Nurses perform tasks that require professional knowledge and a high level of technical skills; they are also required to cope with patients who have various health needs. Furthermore, nurses are exposed to high

stress in the course of providing continuous care for patients 24 hours a day, as well as contacting and communicating with many medical staff and families [8-10]. This results in chronic stress build-up, leading to nurse burnout [11]. A previous study reported that stress affects the incidence of burnout, and that burnout eventually affected the general health of nurses negatively [12]. In addition, higher levels of burnout are related to lower quality of nursing care, lower patient satisfaction, and higher healthcare-associated infection rates [13].

Nurses experience secondary traumatic stress (STS) in the course of caring for patients which is defined as negative behavior and emotion driven by fear and work-related trauma. STS occurs when nurses are traumatized by their work, and is usually associated with a particular event [14]. However, nurses also experience compassion satisfaction (CS) which is positive emotion that reflects the rewards of caring for others. CS occurs as a result of working with patients and families and experiencing positive emotional rewards such as fulfillment, joy, and hope [15]. As such, professional quality of life (ProQOL) encompass positive and negative aspects; thus, when discussing work related quality of life of nurses, it is necessary to consider the influential effects or interactive dynamics between burnout, secondary traumatic stress, and compassion satisfaction.

A number of studies showed that stress is related to or affects STS and CS [16-18]. In addition, positive (CS) or negative (STS) feelings experienced by nurses may affect burnout [19, 20]. However, there is a limited number of studies confirming the relationship between stress and STS and CS in nurse burnout [21-23]. Hence, we were interested in understanding how STS and CS function as mediators of burnout.

A high turnover or resignation of nursing staff results in a tremendous nursing shortage [24], and burnout has a major impact on this outcome. According to report from the National Academies of Science at the end of 2019, 35% of US nurses have substantial symptoms of burnout [10]. The situation in Korea is more serious, a systematic review of burnout confirmed that Korean nurses had higher levels of burnout than nurses in other countries [25]. In addition, the national survey of health workers in Korea reported that physical and psychological burnout was ranked third as the reason for resigning or changing jobs among nursing staff [26]. Although the Korean nurse's turnover rate is substantially high, there was no studies using national representative sampling and/or factors affecting the burnout of Korean nurses in a clinical setting.

In this study, we used the national cohort data from the Korean Nurses' Health Study to explore the current status, levels, and associated factors of burnout. In addition, we examined the mediation effects of STS and CS on burnout. The detailed mediation analysis tested the following five hypotheses:

- 1) High stress is associated with high burnout.
- 2) High stress is associated with high STS.
- 3) High stress is associated with lower burnout.
- 4) The association between stress and burnout is mediated through STS.

5) The association between stress and burnout is mediated through CS.

## Methods

### Study Design and Sample

The Korea Nurses' Health Study (KNHS) was a prospective cohort study of Korean female registered nurses that examined the effects of occupational, environmental, and lifestyle risk factors on the health of Korean women [27]. The Nurses' Health Study (NHS) was a cohort study of United States nurses that began in 1976 [28]. The KNHS is a Korean version of the NHS and is based on the study protocol and questions used in the NHS3. The participants of the KNHS were selected from among those who were living in Korea, were between 20 and 45 years of age, and who had at least one year of nursing experience. Among the 157,569 women who were registered with the Korean Nurses Association (KNA), 20,000 were the target sample size. Module 1 (the baseline survey) was implemented in 2013 and subsequent follow-up surveys were conducted every 6-8 months. Module 5 was conducted in 2016. Nurses have been involved in research through several channels, including social media and print advertising, and surveys were conducted through the KNHS website. In this study, among 11,526 nurses who completed KNHS Module 5, we excluded 1,206 who did not work at a hospital and 15 with incomplete data. The final sample available for analysis included 10,305 nurses.

### Measurement

#### Demographic characteristics

Eligible registered nurses completed a web-based self-reported questionnaire including age, education level in nursing, marital status (never married or married), hospital size, department (inpatient, intensive care unit (ICU)/emergency room (ER), operating room, outpatient, management, or others), clinical nursing experience (under 3 years, 3-5 years, 6-10 years or, more than 11 years), work overtime (yes or no), employment (full time or part time), rotational night shift (yes or no) and annual income converted to US dollar per year.

#### Burnout, Secondary Traumatic Stress, and Compassion Satisfaction

The Professional Quality of life Scale (ProQOL) version 5 was used to evaluate the positive and negative aspects of professionals who work to help others. The ProQOL5 is composed of three subscales: CS, STS, and burnout. Each subscale measures separate aspects and cannot be combined [14], has 10 questions rated on a 5-point Likert scale, and has a score range of 10 to 50 points. Scores are considered "low" if less than 22 points, "moderate" for 23 to 41 points, and "high" if above 42 points; the higher the score, the higher the CS, STS, and burnout [21-23]. The reliability and validity of the ProQOL5 have been validated in Korean nurses [29]. The internal consistency (Cronbach's  $\alpha$ ) was previously reported as 0.89 for the CS subscale, 0.72 for the STS subscale, and 0.73 for the burnout subscale [29], and Cronbach's  $\alpha$  coefficients of our study were 0.89, 0.72, and 0.73, respectively.

## Stress

Stress was measured by the perceived stress scale (PSS) developed by Cohen and Williamson [30]. It consists of a total of 10 items rated on a 5-point Likert scale ranging from 4 (fairly frequent) to 0 (none). Scores range from 0 to 40, with higher scores indicating higher levels of stress. Recently, this measure has shown evidence of good psychometric properties in nurse populations [31, 32]. The Cronbach's  $\alpha$  coefficient of the original study was 0.78 and for this study 0.7.

## Statistical Analysis

Descriptive statistics, such as percentages and averages of demographic characteristics were calculated. To identify factors associated with burnout prior to the regression analysis, independent t-tests and ANOVAs were performed according to the characteristics of the variables. To identify the correlation between STS, CS, and burnout, Pearson correlations were performed.

The associations between the study variables were analyzed using linear regression analyses and the mediating role of stress and STS, and stress and CS were tested using bootstrap analyses with a PROCESS macro developed by Hayes [33]. In the parallel multiple mediator model, there are three pathways by which the independent variable can be associated with the dependent variable: the direct pathway ( $c'$ ) leads directly from the independent to the dependent variable, while the indirect pathway ( $(a_1 \times b_1)$  and  $(a_2 \times b_2)$ ) incorporates a mediating variable (Figure 1). The indirect effects were considered statistically significant if the 95% confidence interval of the bootstrap estimate does not include zero. The bootstrap method is preferred in mediation analysis because it uses resampling with replacement, and it can be used without the assumption of normality. Therefore, an accurate inferential test is possible and power is high [33]. All analyses were adjusted for marital status, final education, clinical nursing experience, hospital size, department, overtime work, and rotational night shifts. All statistical analyses were performed using R, version 4.4.0 (R Foundation for Statistical Computing).

## Results

### General Demographics and Characteristics

The demographic and work-related characteristics of nurses are presented in Table 1. This study included 10,305 female nurses with an average age of 32.8 (6.06) years (range = 23-51), 59.9% of respondents held a bachelor's degree, and 52.7% of nurses were never married. In terms of work-related characteristics, the largest percentage of nurses worked in hospitals with 600 to 999 beds (35.9%) and inpatient department (40%). With regard to the clinical nursing experience, 11 or more years was most common (42.8%). Most (88.4%) nurses were working overtime, a substantial majority (93.3%) were full time workers, 56% worked rotational shifts, and 73% received a salary of USD 36,900 or less per year.

### Burnout according to General Characteristics

Burnout levels, according to general characteristics of the participants is presented in Table 1. In terms of demographic characteristics, there were significant differences in education level ( $F = 64.89, df = 2, p < .001$ ) and marital status ( $t = 21.13, p < .001$ ). The group of nurses with diploma degrees had higher burnout than nurses with a bachelor's, or master's or higher degree. Never married nurses experience higher burnout, with a score of 27.9 (5.0).

For work-related characteristics, nurses working in a hospital with 600-999 beds had the highest burnout score of 27.0 (5.2) than nurses working in a hospital with 30-299 beds ( $F = 6.83, df = 3, p < .001$ ), and working in inpatient or ICU/ER department had the highest scores of 27.5 (5.2), and 27.3 (5.1), respectively ( $F = 70.75, df = 5, p < .001$ ). In addition, for nurses of less than 6 years of working experience ( $F = 116.5, df = 3, p < .001$ ), overtime work ( $t = -11.17, p < .001$ ), rotational night shifts ( $t = -16.66, p < .001$ ), and lower annual income ( $t = 10.58, p < .001$ ), burnout scores were relatively higher.

### Level and Relationship among Stress, Secondary Traumatic Stress, and Compassion Satisfaction

The average stress score of 10,305 nurses was 17.7 (4.5), the mean STS score was 24.2 (5.8), the average CS score was 30.9 (7.1), and the mean burnout score was 26.7 (5.3). There was a positive relationship between stress and burnout as well as stress and STS ( $r = 0.60, p < .001$ ;  $r = 0.40, p < .001$ , respectively). Stress and CS were negatively correlated ( $r = -0.35, p < .001$ ). Burnout and STS were positively correlated ( $r = 0.47, p < .001$ ) while burnout and CS was negatively correlated ( $r = -0.67, p < .001$ ) (Table 2).

### The Parallel Multiple Mediator Model

Descriptive statistics for stress, STS, and CS for the multiple linear regression analysis are shown in Table 3. For the first regression analyses, we used stress as the predictor variable. A higher stress level was associated with a higher burnout level ( $\beta = 0.256, p < .001$ ) (Hypothesis 1). A higher stress level was associated with higher STS ( $\beta = 0.506, p < .001$ ) and lower CS levels ( $\beta = -0.505, p < .001$ ) (Hypotheses 2 and 3, respectively). Table 4 presents the results of the bootstrap analyses for the mediation analysis. STS and CS explained 61% of the association between stress and higher burnout levels ( $\beta_{\text{indirect 1}} = 0.185$ , Bootstrap confidence interval (BS CI) [0.175, 0.194];  $\beta_{\text{indirect 2}} = 0.226$ , BS CI [0.212, 0.241], respectively) (Hypothesis 4 and 5, respectively) (Figure 1). The indirect effect of stress on burnout with CS as the mediator is greater than the indirect effect of stress on burnout with STS as the mediator ( $\beta_{\text{indirect 1}} - \beta_{\text{indirect 2}} = -0.042$ , BS CI [-0.058, -0.026]).

## Discussion

In this study, we evaluated the influence of stress on burnout among Korean nurses and examined the mediating effects of STS and CS. Based on the results from the mediation model, we found that stress not only had a direct effect on burnout in Korean nurses, but it also had an indirect effect on burnout via STS and CS. In addition, we found that the magnitude of the indirect effects of CS was significantly greater than STS.

Based on a nationwide representative sample, the average burnout score of Korean nurses was 26.7 (5.2) indicating moderate burnout. In previous studies—that used the same measurement tool as this study—the average burnout score for American nurses was 23.66–25.63 which was lower than in Korea [21–23], while the average burnout score of Chinese nurses was 26, similar to that of Korea [34]. In this study there were 56% of nurses who were rotational shift workers and 88% who did overtime; however, they received a substantially lower annual salary and the results were similar to other Asian countries [20, 35]. In addition to reporting similar reasons of burnout as nurses in Western countries, Asian nurses are more overwhelmed by their working conditions.

Our study results showed that stress and burnout have a strong positive correlation, consistent with previous research. In particular, a number of studies showed that work-related stress was a major concern because the burnout symptoms were associated with stress due to job demands and lack of organizational support [6, 7].

The prevalence rate of overtime work in Korean nurses was 88%, which was considerably higher than the rates found in China (55%) [36] and Europe (27%) [37]. Moreover, the number of patients per nurse was higher than Thailand, China, the US, and European countries; a higher nurse to patient ratio (12.3) is associated with lower quality care and poor patient safety [38]. In fact, the RN-to-population (per 1,000 people) is 3.5, which is less than half of the average (7.2) of Organization for Economic Cooperation and Development (OECD) countries [26].

Although nurses primarily treat patients' illnesses and enhance their well-being, they also need to assist with patient's circumstances such as family dynamics and social support systems. In this process, burnt out nurses who provide 24-hour care experience difficulty with additional tasks such as handling unexpected systemic problems or role conflicts with other medical staff [9]. Conflicts between the patient's circumstance, institutional system/support, and professional responsibilities of nurses often result in increasing overtime work and burnout [8, 25, 38].

On the other hand, Khamisa et al. [5] reported that personal stress rather than work-related stress was a better predictor of burnout and general health. Indeed, it has been reported that when there was a problem with their family, nurses were less able to concentrate on work, which increased burnout [39]. However, the regression analysis of our study found that married nurses had lower levels of burnout after accounting for other variables (Table 2). This result support the findings that work-related stress or compassion fatigue were alleviated by supportive networks from family and community [40, 41]. There are also gender effects on the prevalence of burnout. Most Korean nurses (95.2%) are female [26] and are responsible not only for work, but also for family obligations such as childcare at home. Consequently, they may have to endure stressful situations both inside and outside the workplace [42]. Therefore, we should consider family-work conflict (e.g., how personal stress affects burnout) or how much job stress is buffered by personal situations when individuals perceive situations as stressful. However, since this study is a cross-sectional study, it is difficult to be sure whether perceived stress affects burnout or

whether burnout affects perceived stress. Therefore, further large scale longitudinal study is needed to determine the effect on burnout according to the stress.

Taken together, the results of these studies suggest that stress assessment and management will be an essential approach to prevent burnout. A recent meta-analysis supported the notion that stress management was one of the major effective interventions to prevent and reduce burnout of physicians [43]. However, it is also necessary to look at the relationship between burnout and stress as a whole given the difficulty in dividing stress into uniquely “job” or “individual” dimensions [41]. In efforts to address nurses’ stress management, it is necessary to develop a comprehensive plan that encompasses several characteristics rather than dividing stress into dimensions and presenting partial solutions.

In this study, we confirmed that STS has an indirect effect the relationship between stress and burnout. Higher stress levels resulted in higher burnout levels and the additional STS further increased burnout. This finding is consistent with those of a previous study where nurses who had insufficient time to care for patients due to work load experienced high STS [18]. STS progresses rapidly [14] while burnout progresses gradually due to high workload or an unsupportive work environment [25]. Because STS can be prevented and ameliorated [44], medical institutions need to address STS appropriately and prevent it early before burnout is exacerbated.

We also confirmed that CS has a partial mediating effect in the relationship between stress and burnout. This was consistent with the results of a previous study investigating the negative correlation between burnout and CS [19]. CS is a positive outcome of working as a nurse, however, its effects are reduced when experiencing significant stressful situations and consequently burnout will occur. Conversely, even if there is a stressful situation, a nurse experiencing CS can counterbalance the relationship between stress and burnout. In particular, the indirect effect of CS was greater than the indirect effect by STS (Table 3) resulting in reducing burnout of nurses. Moreover, high empathy reduces a nurse's burnout [34], which can be interpreted as more positive effects experienced by nurses who feel rewarded by helping others even in difficult situations. Therefore, it would be effective to establish a management strategy to reduce the burnout of nurses in a way that reduces stress and increases CS. Chen et al. (2018) reported that CS was reinforced by effective communication or personality traits such as affability and conscientiousness. In addition, an emotional regulation training program that includes psychoeducation, progressive muscle relaxation, and nonjudgmental awareness has been shown to help increase CS [45]. Therefore, improved organizational approach that encourages a dynamic environment such as group support or coaching could help nurses engage with CS.

## **Limitations and Strengths**

We used the nationwide cohort study data of female nurses who have been participating in the KNHS since 2013. This cohort study represents the first analysis of Korean working nurses’ health and established the baseline data of occupational, environmental, and lifestyle factors of Korean nurses [27]. In this study, we adjusted the work-related factors such as hospital size and hospital units when confirming the influence of stress on burnout of Korean nurses to test the mediating effects of STS and



CS. However, there are several limitations in this study. First, psychological characteristics are also influential factors that affect burnout [25], but these were not included in the survey. Second, the hospital or manager's support and relationships with colleagues could not be investigated. Third, PSS is a tool that measures an individual's cognitive assessment in the stress-related processing, it could not be clearly determined whether the PSS was the appropriate scale for assessing occupational or personal related stress, or if it measured a combination of both. Fourth, the KNHS is a prospective cohort study of female nurses focusing on the effects of occupational, environmental, and lifestyle risk factors on the health of Korean women [27]; thus, male nurses are not represented in the analysis. Although the proportion of male nurses in Korea is significantly low (4.8%) [26] their burnout also need to be addressed. Fifth, This is a cross-sectional and secondary analysis study, so the results have limited use for making conclusions about causal relationships. These limitations should be addressed in further studies to confirm factors influencing burnout of nurses.

## Conclusion

This study was the first investigation of the relationship between stress, STS, CS, and burnout among Korean nurses using a nationwide representative sample. We found that stress predicted nurses' STS, CS, and burnout. Further, STS and CS may exert partial mediating effects on the relationship between stress and burnout. The burnout of nurses is a serious problem that has been studied for decades, worsening not only nurses' health and efficacy of the work but also the patient's health-related outcomes [46]. Reducing workload and changing the job environment are essential to manage nurse burnout and will decrease further if accompanied by a multidimensional approach leading to reduced STS and increased CS.

## Abbreviations

CS: Compassion Satisfaction; ER: Emergency Room; ICD-11: 11<sup>th</sup> Revision of the International Classification of Diseases; ICU: Intensive Care Unit; KNA: Korean Nurses Association; NHS: Nurses' Health Study; KNHS: Korea Nurses' Health Study (KNHS); OECD: Organization for Economic Cooperation and Development; ProQOL 5: Professional Quality of Life Version 5; PSS: Perceived Stress Scale, STS: Secondary Traumatic Stress

## Declarations

### Ethics approval and consent to participate

The study design was approved by the Institutional Review Board of Ewha Woman's University (No. 117–4). Anonymity and confidentiality were assured, and the participants' informed consent was obtained as part of the online survey.

### Consent for publication

Not applicable.

### **Availability of data and materials**

The participants of the KNHS were selected from among those who were living in Korea, were between 20 and 45 years of age. Individual data were collected were conducted through the KNHS website. Data were collected anonymously and on a voluntary basis. However, data are not publicly accessible and freely available since the use and analysis of the pooled data and the publication of any research findings and study results out of it are restricted by contract with the KCDC.

### **Competing interesting**

The authors declare that they have no actual or potential conflicts of interests.

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### **Author's contributions**

HL, WB, AL, YP, and OK designed this study. Literature search was performed by HL, WB, AL, and DL. Data analysis was carried out by HL and WB. HL, WB, and OK contributed to data interpretation. HL, WB, AL, YP, OK and DL contributed to writing and approval of the manuscript. Critical revisions for important intellectual content were carried out by HL, WB, YP, and OK.

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### **Conflict of Interests Statement**

The authors declare no actual or potential conflicts of interests.

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## Tables

**TABLE 1 *Burnout according to nurse demographics and characteristics (N= 10,305).***

Burnout						
	<i>N</i>	%	<i>Mean</i>	<i>SD</i>	<i>F or t</i>	<i>p</i>
Education					64.89	<.001
Diploma (3-yr course) <sup>a</sup>	2,706	26.2	27.2	5.3		b,c<a \$
Bachelor's <sup>b</sup>	6,168	59.9	26.9	5.2		c<b \$
Master's or higher <sup>c</sup>	1,431	13.9	25.3	5.1		
Marital status					21.13	<.001
Never married	4,873	47.3	27.9	5.3		
Married	5,432	52.7	25.7	5.0		
Hospital size (number of beds)					6.83	<.001
30-299 <sup>a</sup>	2,390	23.2	26.4	5.2		a<b \$
300-599	2,187	21.2	26.7	5.3		
600-999 <sup>b</sup>	3,698	35.9	27.0	5.2		
1,000 or more	2,030	19.7	26.8	5.3		
Department					70.75	<.001
Inpatient <sup>a</sup>	4,123	40.0	27.5	5.2		c,d,e,f<a \$
ICU/ER <sup>b</sup>	1,629	15.8	27.3	5.1		c,d,e,f<b \$
Operating room <sup>c</sup>	996	9.7	26.5	5.0		d<c \$
Outpatient <sup>d</sup>	1,723	16.7	26.2	5.3		e<f \$
Management <sup>e</sup>	1,046	10.2	24.7	5.0		
Others <sup>f</sup>	788	7.6	25.6	5.2		
Clinical nursing experience (yrs)					116.50	<.001
under 3 <sup>a</sup>	460	4.5	28.3	5.3		c,d<a \$
3-5 <sup>b</sup>	1,724	16.7	27.9	5.1		c,d<b \$
6-10 <sup>c</sup>	3,714	36.0	27.3	5.3		d<c \$
11 or more <sup>d</sup>	4,407	42.8	25.7	5.0		
Work overtime					-11.17	<.001

No	1,196	11.6	25.2	5.2	
Yes	9,109	88.4	27.0	5.2	
Employment					-1.36 .174
Full-time	9,611	93.3	26.7	5.2	
Part-time	694	6.7	27.0	5.4	
Rotational night shift					-16.66 <.001
No	4,538	44.0	25.8	5.1	
Yes	5,767	56.0	27.5	5.2	
Income (1,000 USD)/year					10.58 <.001
36.9 or less	7,543	73.2	27.1	5.2	
37 or more	2,762	26.8	25.8	5.2	

ER = emergency room; h = hours; ICU = intensive care unit; *SD* = standard deviation; yrs = years; \$ = Tukey post hoc test

**TABLE 2** *Level and relation among stress, secondary traumatic stress, compassion satisfaction, and burnout.*

Variable	<i>Mean</i>	<i>SD</i>	Pearson correlation coefficients			
			Stress	STS	CS	Burnout
Stress	17.7	4.5	1.00			
Secondary traumatic stress	24.2	5.8	0.40	1.00		
Compassion satisfaction	30.9	7.1	-0.35	0.04	1.00	
Burnout	26.7	5.3	0.60	0.47	-0.67	1.00

*SD* = standard deviation; STS = secondary traumatic stress; CS = compassion satisfaction.

**TABLE 3** *Model estimates for stress, secondary traumatic stress, and compassion satisfaction by multiple linear regression analysis.*

Variable	Consequent								
	M1: STS			M2: CS			Y: Burnout		
Antecedent	Coef	s.e	p	Coef	s.e	p	Coef	s.e	p
Stress	0.506	0.012	<.001	-0.505	0.014	<.001	0.256	0.007	<.001
<i>Mediator</i>									
Mediator 1: STS	-	-	-	-	-	-	0.364	0.005	<.001
Mediator 2: CS	-	-	-	-	-	-	-0.449	0.004	<.001
<i>Covariates</i>									
Marital									
Married	Ref(0)			Ref(0)			Ref(0)		
Never married	-0.471	0.121	<.001	-1.785	0.147	<.001	0.412	0.063	<.001
Education									
Over master	Ref(0)			Ref(0)			Ref(0)		
Diploma	-0.427	0.192	0.026	-1.423	0.234	<.001	-0.017	0.100	0.865
Bachelor	-0.206	0.166	0.216	-1.126	0.203	<.001	-0.069	0.087	0.428
Hospital size									
30-299	Ref(0)			Ref(0)					
300-599	0.295	0.157	0.060	-0.074	0.192	0.699	0.204	0.082	0.013
600-999	0.517	0.146	<.001	0.058	0.178	0.746	0.313	0.076	<.001
1,000 or more	0.445	0.166	0.007	0.039	0.203	0.847	0.219	0.087	0.012
Department									
Inpatient	Ref(0)			Ref(0)			Ref(0)		
ICU/ER	0.028	0.154	0.858	0.052	0.188	0.006	-0.065	0.080	0.417
Operating R.	-1.412	0.188	<.001	-0.219	0.223	0.341	0.009	0.098	0.928
Outpatient	-1.118	0.181	<.001	0.040	0.221	0.856	-0.115	0.094	0.223
Management	-1.506	0.216	<.001	1.860	0.264	<.001	0.122	0.113	0.282
Others	-1.080	0.221	<.001	0.991	0.270	<.001	-0.116	0.116	0.318
Clinical nursing experience									
Under 3 yr	Ref(0)			Ref(0)			Ref(0)		



3-5yr	-0.548	0.275	0.046	0.200	0.336	0.550	-0.330	0.143	0.021
6-10yr	-0.133	0.260	0.609	0.718	0.318	0.024	-0.182	0.136	0.181
11 or more	0.097	0.271	0.722	2.336	0.331	<.001	0.048	0.142	0.736
Work overtime									
No	Ref(0)			Ref(0)			Ref(0)		
Yes	1.107	0.166	<.001	0.247	0.203	0.224	0.416	0.087	<.001
Rotational night shift									
No	Ref(0)			Ref(0)			Ref(0)		
Yes	0.348	0.143	0.015	-0.017	0.174	0.924	-0.065	0.745	0.381
$R^2$	0.19			0.20			0.73		
Adjusted $R^2$	0.19			0.20			0.73		
Residual $SE$	5.21 ( $df= 10,287$ )			6.36 ( $df= 10,287$ )			2.72 ( $df= 10,285$ )		
$F$	139.2 ( $p <.001$ )			153.8 ( $p <.001$ )			1,482 ( $p <.001$ )		

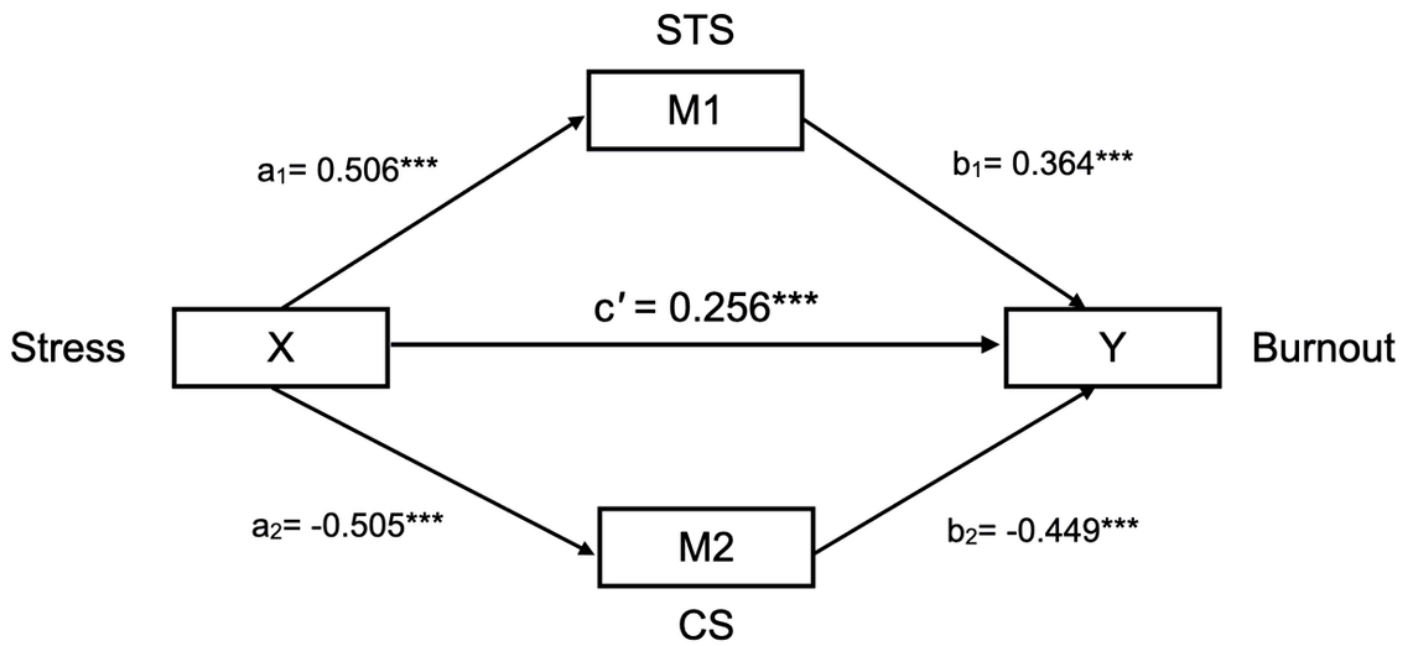
STS = secondary trauma stress; CS = compassion satisfaction; Y = dependent; Coef = coefficient; s.e or  $SE$  = standard error; Operating R = Operating room;  $df$  = degrees of freedom.

**TABLE 4** *Mediation analyses of secondary traumatic stress and compassion satisfaction in the association between stress and burnout.*

Effect	Equation	Estimate	95% Bootstrap $CI$
Indirect 1	$(a_1) * (b_1)$	0.185	0.175 to 0.194
Indirect 2	$(a_2) * (b_2)$	0.226	0.212 to 0.241
Direct	$c'$	0.256	0.240 to 0.272
Contrast	Indirect1 - Indirect 2	-0.042	-0.058 to -0.026
Indirect	Indirect1 + Indirect 2	0.411	0.395 to 0.429
Total	Indirect + Direct	0.667	0.648 to 0.690
Prop.mediated	Indirect / Total	0.616	0.596 to 0.636

$CI$  = confidence interval; Prop.mediated = proportion of indirect effect to total effect.

## Figures



**Figure 1**

Path diagram for the model. Path coefficients were non-standardized estimates. STS= secondary stress trauma; CS= compassion satisfaction; \*\*\* $p < .001$ .