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Original Article

Investigating the Relationship Between Nurses' Stress and General Health: The Mediating Roles of Metacognitive Beliefs and Negative Social Problem-Solving Strategies

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Abstract

Background and aims: Nurses often experience high levels of psychological stress due to the demanding nature of their profession, which can adversely affect their mental and physical health. Understanding the psychological mechanisms that mediate this relationship is crucial for improving nurses' health outcomes. Therefore, the present study aimed to investigate the relationship between perceived stress and general health among nurses, focusing on the mediating roles of metacognitive beliefs and negative social problem-solving strategies.

Methods: This cross-sectional study was conducted among 414 nurses in Mazandaran Province who were selected based on convenience sampling. Data were collected using the Perceived Stress Scale, Metacognition Questionnaire (MCQ-30), Social Problem-Solving Questionnaire, and General Health Questionnaire-28 (GHQ-28). Structural Equation Modeling (SEM) with Path Analysis was performed.

Results: Perceived stress showed significant correlations ($P \leq 0.05$) with metacognitive beliefs ($r = 0.28$), negative problem-solving ($r = 0.38$), and general health components, including physical problems ($r = 0.35$), anxiety ($r = 0.48$), social problems ($r = -0.20$), and depression ($r = 0.37$). Bootstrap analysis confirmed significant indirect effects of perceived stress, through metacognitive beliefs, on negative social problem-solving ($\beta = 0.04$), depression ($\beta = 0.14$), social dysfunction ($\beta = -0.12$), anxiety ($\beta = 0.05$), and physical symptoms ($\beta = 0.03$) ($P < 0.05$). Additionally, metacognitive beliefs had significant indirect effects on depression ($\beta = 0.04$) and social dysfunction ($\beta = -0.05$) ($P < 0.05$).

Conclusion: The findings suggested that experiencing stress can influence various components of nurses' general health such as anxiety, depression, and physical health. These effects are mediated by both positive and negative metacognitive beliefs in interaction with various social problem-solving strategies. Furthermore, certain negative problem-solving strategies may increase social functioning under stressful situations.

Keywords: Perceived stress, General health, Metacognitive beliefs, Negative social problem solving, Nurses

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Introduction

Nurses frequently face stressful conditions due to caring for patients with complex health issues (1,2). Stress, recognized as a major public health concern in the 21st century (3-5), arises when individuals perceive themselves as unable to cope with threats to their health or overall functioning (6-8). For nurses, stress can result from a mismatche between job demands and available resources (9), patient deaths, inappropriate behavior from patients or their families, high patient loads (10), workplace conflicts, and misunderstandings by patients and their relatives regarding the triage system (6,11).

Perceived stress negatively affects health and contributes to psychological issues such as anxiety and depression (12,13), as well as physical conditions such as metabolic disorders (14,15). Elevated stress levels can worsen outcomes in diseases such as cardiovascular disorders and metabolic syndrome (16,17). Among nurses, persistent stress increases the risk of fatigue and burnout (18), highlighting its broad impact on overall health (19,20).

Public health is conceptualized from two primary perspectives: one defines health as merely the absence of disease and disability, while the other emphasizes overall well-being and positive quality of life (21,22). The World Health Organization (WHO) adopts the latter perspective, defining health as a state of complete physical, psychological, and social well-being characterized by dynamic interaction among these domains (23).

Hence, impairment in any health dimension (biological, psychological, or social) may influence the others. The relationship between stress and general health is not necessarily linear, and stress may indirectly affect nurses' health. Although individuals typically employ problem-solving strategies when confronted with stress (24), stress can disrupt effective social problem-solving (25), potentially leading to poorer public health outcomes due to the use of incompatible problem-solving strategies (26). An individual's ability to solve social problems is closely associated with their health status. For example, the manner in which a person resolves problems can influence self-care behaviors and, consequently, overall health status (27,28).

Social problem solving encompasses emotional, behavioral, and cognitive processes that influence how a problem is defined, one's orientation toward the problem, and problem-solving style. It helps individuals identify the most appropriate solutions for real situations (29). People can be categorized by their problem orientation) positive or negative) and their dominant problem-solving styles, such as logical, impulsive-careless, and avoidant styles (30). Ineffective or inconsistent problem-solving arises when negative orientation is combined with impulsive-careless or avoidant styles (26).

Effective social problem solving requires the ability to monitor and evaluate strategies (31). Monitoring and assessing the strategies used, as well as assessing their outcomes, can be considered a form of self-regulatory skill rooted in metacognition (32). This underscores the need to apply metacognitive thinking to achieve appropriate and effective problem resolution (31). Metacognition refers to individuals' implicit or explicit knowledge of their own cognitive processes and coping strategies, as well as their capacity to regulate these strategies (33). It consists of three dimensions: knowledge, monitoring, and control (34,35), and affects cognitive functions such as arithmetic performance, memory, and perception (36).

Metacognitive beliefs are generally categorized as positive and negative. Positive metacognitive beliefs involve strategies for managing internal experiences. These include beliefs about the benefits of engaging in persistent thought processes (e.g., worry, rumination, and over-analysis), monitoring or controlling perceived threats (e.g., controlling negative thoughts and emotions), and certain coping strategies (e.g., avoiding social situations or persistently trying to suppress unwanted thoughts). In contrast, negative metacognitive beliefs refer to perceptions of the uncontrollability or dangerousness of persistent thoughts, such as worry and rumination (37).

According to metacognitive theory, such beliefs guide individuals toward specific coping strategies, including avoidance, suppression, or other maladaptive behaviors (38). When these beliefs interact with maladaptive problem-solving strategies, they may contribute to maladaptive behaviors under stress and negatively impact public health. Research indicates that metacognition plays a role in a wide range of psychological conditions (39). For example, maladaptive metacognitive beliefs_particularly negative beliefs about the uncontrollability and harmful consequences of worry_can lead to depression and anxiety among people with epilepsy (37). Similar beliefs can also cause or exacerbate depression and anxiety in the general population (40).

Overall, research suggests that perceived stress significantly increases nurses' vulnerability to psychological and physical problems. However, this relationship may be indirectly mediated by metacognitive beliefs and problem-solving styles rooted in metacognition. Although identifying the key mechanisms affecting nurses' health is crucial, the association between perceived stress and general health, considering the mediating roles of maladaptive problem-solving styles and metacognitive beliefs, has not been sufficiently examined. Therefore, the present study aimed to examine the relationship between perceived stress and nurses' general health, focusing on the mediating roles of metacognitive beliefs and maladaptive social problem-solving strategies.

Materials and Methods

Research Design

The presented study employed a cross-sectional design, conducted to evaluate the fit of a hypothetical model using real data. Structural Equation Modeling (SEM), specifically the path analysis approach, was employed to examine the proposed relationships among variables. A significance level of 0.05 was considered for all statistical analyses.

Participants and Procedure

The statistical population included male and female nurses working in hospitals in Mazandaran Province. In general, the use of SEM requires a minimum sample size of 200 participants (41), and a range of 200-400 participants is considered adequate (42). Accordingly, 414 nurses (260 females and 154 males) were selected through a convenience sampling method as the research sample. The inclusion criteria were: at least one year of clinical experience, no self-reported psychological or psychiatric disorders, and willingness to participate in the study. Participants who did not meet these criteria were excluded.

The administrative procedure was as follows: Participants were first briefed on the study's purpose and assured of confidentiality. The questionnaires were then distributed in person during work hours in hospital settings. Participants completed them independently and anonymously, without time constraints, and returned the completed forms to the researcher on-site.

To perform statistical analysis using SEM, the assumptions were initially checked. Fourteen participants were excluded due to a large amount of missing data. When the proportion of missing data was less than 2% of the total dataset, the remaining missing values for each variable were replaced with the mean of that variable (42). Outliers were identified using the Mahalanobis Distance table (42), resulting in the exclusion of five additional

participants.

Univariate normality was assessed using skewness and kurtosis indices. All variables had values within the acceptable range of ± 3 (Table 1), indicating that the distribution of the variables was approximately normal (43, 44). Multivariate normality was assessed using the relative multivariate kurtosis index. According to Bentler (45), multivariate normality is considered acceptable if this index is less than three. In the present study, the value was 1.06, confirming the assumption of multivariate normality.

Table 1 presents the descriptive indices and Pearson correlation coefficients among the variables. The results indicate that perceived stress is significantly correlated with metacognitive beliefs, negative problem-solving styles, and all subscales of general health ($P \leq 0.05$).

The goodness of fit indices (GFIs), reported in Table 1, show that, except for the GFI index, all indices are within the acceptable range, indicating a desirable fit for the model.

Data analysis was conducted using SPSS-23, LISREL-8.54, and AMOS-23. The statistical procedures included confirmatory factor analysis (CFA), model fit evaluation, and path analysis. This study received ethical approval from the Research Committee of Kharazmi University.

Data Gathering Tool

Perceived Stress Scale

This scale was developed by Cohen et al (46) and has three versions: a 4-item, 10-item, and 14-item version. In the present study, a 10-item version was used. This scale is scored on a five-point Likert scale (0 = never, 4 = very high). Items 4, 5, 7, and 8 are scored reversely. A higher score indicates higher perceived stress. The Cronbach's alpha coefficient for this scale is reported to be 0.78.

In Iran, Behrouzi et al (47) reported Cronbach's alpha and split-half coefficients for this scale as 0.73 and 0.74, respectively. Additionally, the validity of this scale was confirmed based on factor, structural, and content analysis methods (48). In the present study, all 10 items were considered as perceived stress markers. However, in the CFA, four markers were removed from the analysis due to low factor loadings ($\lambda < 0.30$).

Metacognition Questionnaire

This questionnaire, developed by Wells and Cartwright-Hatton (49), consists of 30 items and five components: the positive worry, dangerous and uncontrollable thoughts, cognitive confidence, need to control thoughts, and self-consciousness. This scale is scored on a 4-point Likert scale (1 = I do not agree, 4 = I strongly agree). Higher scores indicate higher levels of metacognitive beliefs. The retest reliability for this scale is 0.75 for the entire test, with subscale reliability ranging from 0.59 to 0.87.

In an Iranian sample, Cronbach's alpha coefficient for the entire scale was found to be 0.91. The Cronbach's alpha coefficients for the subscales were as follows: dangerous and uncontrollable thoughts (0.87), positive worry (0.86), cognition self-consciousness (0.81), cognitive confidence (0.80), and the need to control thoughts (0.71) (50). In the present study, five markers were identified for metacognitive beliefs. However, one marker was excluded from the CFA due to low factor loading ($\lambda < 0.30$).

Social Problem-Solving Questionnaire

The short form of this questionnaire was developed based on the works of D'Zurilla et al (30). It contains 25 items scored on a five-point Likert scale (1 = not at all, 5 = very high), and assesses two general dimensions: positive problem solving (positive orientation to the problem and logical style) and negative problem solving (negative orientation to the problem, impulsive style, and avoidant style). A higher score in each dimension indicates more frequent use of that problem-solving style. The test-retest reliability of this questionnaire is reported between 0.68 and 0.91, and its Cronbach's alpha coefficient is reported to be between 0.69 and 0.95. Its correlation with other problem-solving scales and overlapping psychological structures is significant.

In Iran, Mokhberi et al reported its Cronbach's alpha coefficient as 0.85, and its test-retest reliability was found to be 0.88 (51). The validity of this questionnaire as a measure of social problem solving has also been confirmed. In the present study, six markers were identified for negative social problem solving. However, one marker was excluded from the CFA due to low factor loading ($\lambda < 0.30$).

General Health Questionnaire-28

This questionnaire, developed by Goldberg and Hillier (52), consists of 28 items that assess general health across four dimensions: 1) physical symptoms, 2) anxiety and sleep disorders, 3) social dysfunction, and 4) depression.

Table 1. Mean, Skewness, Kurtosis and Pearson Correlation Coefficients of Variables (**$P \leq 0.05$)

Variable	Mean	SD	Skewness	Kurtosis	2	3	4	5	6	7
Perceived Stress	9.49	4.03	.16	-.33	0.28**	0.38**	0.35**	0.48**	-0.20**	0.37**
Metacognitive Beliefs	29.09	8.56	.27	-.66	-	0.30**	0.36**	0.37**	-0.16**	0.37**
Negative Social Problem Solving	5.94	3.44	.08	-.59		-	0.21**	0.31**	-0.25**	0.38**
Physical Problem	7.99	4.30	.38	.28			-	0.54**	-0.15**	0.50**
Anxiety	6.95	2.24	-.56	.63				-	-0.23**	0.50**
Social Problem	3.34	2.81	.90	.23					-	-0.19**
Depression	28.84	9.12	.72	.20						-

Each dimension is measured using seven items. The items are scored on a four-point Likert scale (0 = very low, 3 = very high). Items 1, 15, 17, 18, 19, 20, and 21 are scored reversely. A higher score in each dimension indicates more problems in that dimension of health. Cronbach's alpha coefficient for this questionnaire was reported as 0.84.

In Iran, Cronbach's alpha was found to be 0.80 (53), with criterion validity reported at 0.78 (54). In the present study, seven markers were identified for each of the four dimensions of health. However, one marker in physical problems, three markers in social problems, and two markers in depression were excluded from the CFA due to low factor loadings ($\lambda < 0.30$).

Results

The demographic characteristics of the study participants are as follows: 250 participants (63.3%) were female, and 145 participants (36.7%) were male. Regarding education, 295 participants (74.7%) had a bachelor's degree, while 100 participants (25.3%) had a master's degree. The participants' ages ranged from 20 to 40 years, with a mean age of approximately 31 years.

The demographic profile of the study participants (N = 395) is presented in Table 2. The sample was predominantly female (63.3%), and most participants held a Bachelor's degree (74.7%), with the remainder holding a Master's degree (Table 2).

The Bootstrap test was used to investigate the mediating relationships. If the upper and lower bounds of the 95% confidence interval for the mediating path had the same sign (both positive or both negative), the path was significant at $P < 0.05$. The results show that perceived stress has significant indirect effects on negative social problem solving, depression, social problems, anxiety, and physical problems, with standardized coefficients of 0.04, 0.14, -0.12, 0.05, and 0.03, respectively. Additionally, metacognitive beliefs had a significant indirect effect on depression and social problems with standard coefficients of 0.04 and -0.05, respectively (Table 3, Figure 1).

To examine the proposed mediating pathways, a bootstrap analysis was conducted for each potential mediator. The results of these tests are presented in Table 4, illustrating the unstandardized and standardized indirect effects, along with their 95% bootstrap confidence intervals (BCIs). A mediation effect is considered statistically significant at $P < 0.05$ if the BCI does not contain zero. The table allows for comparison of effect sizes across the two proposed mediating constructs—perceived stress and metacognitive beliefs—for various outcome variables (Table 4).

Table 2. Demographic Characteristics of Participants

Variable	Number of Participants	Percentage (%)
Gender		
Female	250	63.3
Male	145	36.7
Education Level		
Bachelor's Degree	295	74.7
Master's Degree	100	25.3

Discussion

The present study aimed to investigate the relationship between perceived stress and the general health of nurses, focusing on the mediating roles of metacognitive beliefs and negative social problem-solving. The results demonstrated that perceived stress had a significant positive direct effect on anxiety, depression, and physical problems among nurses. This result is in line with the findings of previous studies by Wiegner et al (12), Eisenberg et al (13), Ashbaker et al (14), Steptoe and Kivimaki (15), and Kauser and Khan (18). One possible explanation for these findings is that perceived stress affects the health status of nurses through the physiological mechanisms, particularly by activating the Hypothalamic-Pituitary-Adrenocortical (HPA) Axis over the long

Table 3. Fit Indices of the Final Structural Model

$\chi 2 = 62.06$	df	χ^2/df	GFI	CFI	NNFI	RFI	IFI	RMSEA
1553.51	617	2.52	0.82	0.92	0.91	0.86	0.92	0.06

Note. df: Degrees of freedom; GFI: Goodness-of-fit index; CFI: Comparative fit index; NNFI: Non-normed fit index; RFI: Real fit index; IFI: Incremental fit index; RMSEA: Root mean square error of approximation.

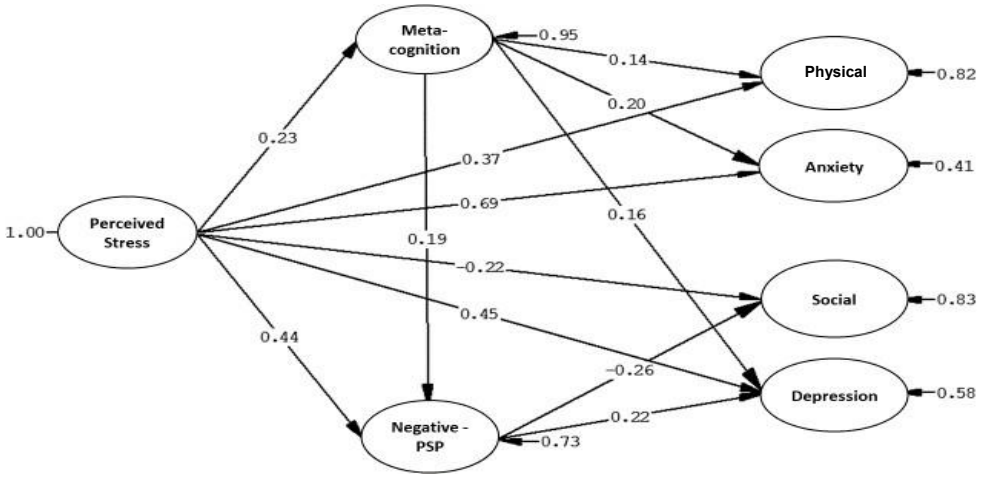

Figure 1. Final Structural Model of the Research

Table 4. Bootstrap Test Results

Mediating Variables		Perceived Stress	Perceived Stress	Perceived Stress	Perceived Stress	Perceived Stress	Metacognitive Beliefs	Metacognitive Beliefs
		Negative Social Problem Solving	Depression	Social Problem	Anxiety	Physical Problem	Depression	Social Problem
Unstandardized Effects		0.09	0.09	-0.06	0.04	0.02	0.03	-0.02
Standardized Effects		0.04	0.14	-0.12	0.05	0.03	0.04	-0.05
Bootstrap Bounds	Lower	0.016	0.07	-0.23	0.02	0.01	0.01	-0.11
	Upper	0.08	0.23	-0.05	0.08	0.07	0.10	-0.01
Standardized Errors		0.02	0.04	0.05	0.02	0.02	0.02	0.03

term. In this regard, the results revealed that stress can stimulate cortisol secretion through the activation of this system (55,56). Increased secretion of this hormone as a result of stress impairment may disrupt the metabolism over the long term and is associated with cardiovascular diseases (57,58) and diabetes (59). Perceived stress can also indirectly contribute to health problems through maladaptive health- related behaviors, such as smoking or poor dietary habits (5).

Furthermore, nurses who frequently experience stress may allocate part of their cognitive abilities, such as their attention, to controlling and mentally suppressing their stress. However, attempts to eliminate or suppress stress-related thoughts, images, and emotions may increase their salience. This heightened focus can weaken individuals' belief in their ability to control mental processes, thereby contributing to anxiety and depression.

The findings also indicated a negative and significant relationship between perceived stress and social problems among nurses. This result contrasts with the findings of Barzilai et al (60) regarding the relationship between stress and social cognition. One possible explanation for this discrepancy is that perceived stress in nurses may increase their tendency to plan their tasks more effectively to prevent stress caused by a heavy workload. Additionally, they may focus on strengthening social relationships to gain insights from others about how they manage stress and use their experiences. Therefore, planning for tasks and improving social relationships can facilitate coping mechanisms, helping to alleviate stress and reduce the unpleasant emotions associated with it. The results also revealed that metacognitive beliefs mediate the relationship between perceived stress and the general health of nurses. This can be explained through the individual's Cognitive Attentional Syndrome (CAS). For example, nurses with positive metacognitive beliefs tend to view mental involvement with stress-related thoughts, such as those triggered by overwork or a patient's death, as adaptive and manageable. They believe such thoughts can prevent such experiences in the future, thereby enhancing attentional bias in these individuals to prevent stressful situations. However, searching for threat-related symptoms can place a person in a state of heightened alertness, which can result in anxiety (61,62). Furthermore, nurses with negative metacognitive beliefs— who perceive thoughts related to stress as dangerous or uncontrollable — may passively avoid them when such thoughts arise. However, based on the Reinforcement Sensitivity Theory (RST) (63), passive avoidance is a characteristic of the behavioral inhibition system, which causes anxiety in individuals (64). In fact, perceived stress can negatively affect nurses' general health by activating maladaptive metacognitive beliefs that predispose individuals to anxiety.

The results also revealed that negative social problem-solving strategies mediate the relationship between perceived stress and depression in nurses. This finding is consistent with the study by Arnsten (25), which examined the effect of stress on social problem-solving strategies. It is also in line with the results of studies conducted by Sorsdahl et al (26), Graven et al (27), and Li and Shun (28), which explored the relationships between these maladaptive strategies and the individual's health status. One possible explanation for this result is that negative problem-solving strategies, such as a tendency to focus on the problem negatively or avoid confronting stress, may temporarily help individuals cope with unpleasant stress-related emotions in the short term. However, in the long term, these strategies prevent them from facing stressful situations or the thoughts associated with them, thereby leading to unresolved problems. This avoidance impedes the ability to effectively adapt to stress and manage it, fostering a belief that they cannot properly solve problems and manage their stress. Such a negative view of one's abilities can contribute to depression.

The findings further suggested that using negative problem-solving strategies during stressful situations can enhance people's social functioning. In explaining this result, it can be stated that, although perceived stress may disrupt the adaptive problem-solving process (25), the adverse consequences of such strategies, such as the formation of negative beliefs about one's ability to manage stress and depression, can be an incentive to exert more effort and focus on improving future coping strategies to prevent stress in the future.

From the author's perspective, the experiences nurses face in the workplace involve a combination of psychological pressure, cognitive demands, and ongoing emotional challenges. In these conditions, perceived stress, as the nurses' subjective interpretation of environmental pressures, may increase mental load, complicate cognitive regulation processes, and lead to the

formation of specific cognitive and behavioral patterns. This mental experience of stress may be accompanied by particular cognitive processing styles, the development of dysfunctional metacognitive beliefs, and the use of negative problem-solving strategies. Understanding these patterns is essential for explaining the psychological and physical health status of nurses.

Conclusion

The study indicates that due to high levels of perceived stress and dysfunctional metacognitive beliefs, individuals may resort to negative problem-solving strategies to address social and task-related issues, seeking social approval in the process. This can lead to an optimistic but potentially biased reporting of social functioning, shaped by the desire for approval. The study found that perceived stress is directly associated with nurses' general health, with metacognitive beliefs (cognitive level) and negative problem-solving strategies (behavioral level) mediating this relationship. These findings highlight the potential for metacognition-based training and the use of adaptive problem-solving strategies to improve nurses' well-being. However, due to the use of convenience sampling and reliance on self-report questionnaires, generalization should be made cautiously. Future research should consider employing alternative designs and behavioral assessment tools to strengthen the findings.

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Authors' Contribution

Conceptualization: Mahnaz Shahgholian, Mojtaba Dehghan.
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Competing Interests

The authors declare that they have no conflict of interests.

Ethical Approval

This manuscript is original, has not been published before, and is not currently being considered for publication elsewhere. The research protocol was carried out in accordance with the Helsinki Declaration. Permission to conduct the study was obtained from Kharazmi University. Since the study was non-clinical in nature, no direct medical or therapeutic intervention was involved during the study.

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Informed Consent

Informed consent was obtained from all individual participants included in the study.

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