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# Association between Personality Traits, Work-Family Conflict, Job Stress and Nurses' Cognitive Failures: A Cross-Sectional Study

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**Abstract**

**Background:** Cognitive failures are one of the most important causes of patients' unsafe events. Hence, it is necessary to consider individual and cognitive, as well as extra-organizational characteristics. The present study was conducted to investigate the association between personality traits, job stress, work-family conflict and nurses' cognitive failures.

**Materials and Methods:** This descriptive cross-sectional study was conducted among 250 nurses working in three public hospitals in Sari city, Iran, in 2021. The subjects were selected using Stratified Random Sampling. NEO Five-Factor Inventory, Health and Safety Executive (HSE) tool, Work-Family Conflict Scale (WFCS), and Occupational Cognitive Failure Questionnaire (OCFQ) were used to measure personality traits, job stress, work-family conflict, and cognitive Failures, respectively. The data were analyzed in SPSS (ve. 23) and regression analysis with the sequential method was applied.

**Results:** Among 13 studied predictor variables, only extraversion, agreeableness, demand, and role were predictors of cognitive failures. These variables explain 44.1% of the variance of cognitive failure. The β values of neuroticism and conscientiousness to predict cognitive failures were 0.34 and -0.29, respectively ($P < 0.001$). Although role ($\beta = 0.15$, $p < 0.001$) and demand ($\beta = 0.14$, $p < 0.001$) significantly predict cognitive failure; however, their effect is limited. The results of the study did not provide confirmation for the moderating effect of neuroticism, extraversion, agreeableness, and conscientiousness on the association between work-family conflict, job stress, and cognitive failures.

**Conclusions:** Along with environmental and organizational stress factors, evaluating nurses' personality traits is necessary to control cognitive failures.

**Keywords:** Nurses, Work-Family Conflict, Job Stress, Cognitive, Personality

## Introduction

Nurses, as the largest occupational group in the hospitals are always exposed to various stressors in the workplace [1], such that a study in the UK found nurses have the second most stressful job [2]. Job stress in the healthcare sectors relates to the multiple intrinsic

characteristics of the work environment, such as high mental workload, and high physical effort along with phenomena, such as observing the suffering and death of patients, stressful associations with colleagues, and insufficient supervisors support [3, 4]. The well-being of nurses, encompassing psychological, physical, behavioral, and cognitive aspects, can be adversely affected by these stressors, culminating in substandard health outcomes [5]. Cognitive failures (CFs) experienced by nurses are critical and indispensable for the protection of patients [6]. Cognitive failures is defined as errors in the mental criteria; for instance, memory, perception, decision-making, attention [7, 8]. Cognitive failures in daily tasks of nurses involving examining patients' vital signs, prescribing medications, and caring for possible side effects, as well as reporting to physicians have a high sensitivity [6, 9].

The association between job stress and cognitive function, and its effect on human behavior was studied in several studies [10-12]. Park and Kim reported that a lack of job autonomy and job instability have a significant effect on reducing cognitive functions, such as memory and attention [6]. Souza-Talarico et al. in a longitudinal study indicated that job stress could be associated with low cognitive performance [10].

From a psychological perspective, job stress occupies the brain's memory capacity, and reduces people's focus on their tasks, thereby increasing the likelihood of unsafe events [12]. Stress can make it difficult to interpret responses to emotional events [11]. In the scientific literature, these defects are referred to as cognitive failures, which result from errors in mental functions. Cognitive function is diminished by the high levels of occupational stress, although it can be difficult to identify the main stressors and exposure times. Memory-related cognitive impairment caused by acute and short-term stress is reversible, whereas the effect of chronic stress is irreversible [13].Although job stressors are significant, the role of non-work stress should not be ignored. Numerous studies examined the destructive effects of work-family conflict as an important side stressor in the study of job stress [14-16]. Work-family conflict refers to a situation in which an imbalance among work and family needs causes psychological stress on individuals [17]. Role theory is used to describe the work-family conflict. This theory states that increased work-family conflict is accompanied by the excessive pressures on the individual that reduce individual resources [18, 19]. The work-family association imposes an additional workload on individuals, which results in increased pressure on employees' productivity. This implies that focusing exclusively on occupational stressors is insufficient; additional stressors external to the organization must also be taken into account. A synergistic association exists between work-family conflict and job stress in this context, highlighting the cognitive failings that result from job stress [20]. In fact, there is a balance between job needs and individual capacities. Work-family conflict alone can be considered a factor affecting cognitive performance, which indicates a direct impact on cognitive failures [21].

The impact of individual characteristics - known as personality - on stress and coping strategies were studied in several studies [22, 23]. Personality expresses the relatively stable and continuous state of each person based on feelings, thoughts, and behaviors. Five-Factor-Model is a widely used approach to classify different personality types [24]. Neuroticism (N), extraversion (E), openness to experience (O), agreeableness (A), and conscientiousness (C) are the personality traits that are utilized by this model to categorize each individual. Elevated vulnerability is associated with neuroticism, which is the propensity to perceive psychological emotions. The disposition to be overly effusive, extroverted, and gregarious is reflected in extraversion. Openness indicates the individual's willingness to be creative and curious. Agreeableness reflects the tendency to be trustful, merciful, and accommodating. Conscientiousness shows the willingness to responsibility and discipline [25, 26]. In general, the coping strategies were more targeted at people with E and N characteristics; For example, the results showed that people in the group N took inappropriate approaches to improve stressors, such as ignoring or avoiding [27-30].

Despite the fact that our understanding acknowledges numerous studies studying the effect of personality traits on job stress, there was no examination of the impact of job stress, work-family conflict, and personality traits on nurses' cognitive failures within an integrated model. The purpose of this research is to determine whether work-family conflict, occupational stress, and personality traits can predict cognitive failures among Iranian nurses.

## Materials and Methods

This cross-sectional study was conducted from June to November 2021 in Sari city, Iran. Participants included 250 nurses, selected using stratified random sampling from three public hospitals: Imam Khomeini (with 491 nurses), Fatemeh Zahra (294 nurses), and Bou Ali (182 nurses). Statistical analysis was conducted on 208 questionnaires subsequent to the exclusion of the incomplete questionnaires. Operating in various departments, the nurses possessed a minimum of one year of professional experience. Due to the synchronization of the data collection phase with the Covid-19 pandemic, the authors did not have access to the participants' identities when they dispatched online questionnaires. Nurses with a permanent employment, shift-work schedule, and at least one year of work experience were included in the study. Furthermore,

participants were excluded from the study if any mental problems were confirmed or if they were consuming psychiatric drugs.

**Health and safety executive (HSE):** Tool was used to evaluate job-related stressors. HSE introduced this questionnaire as a set of management standards. This questionnaire contains 35 items which are classified into 7 dimensions including demands, control, supervisor support, peer support, associations, role, and changes [31]. The scoring system of tools was a five-option Likert scale (never, seldom, sometimes, often, or always). The reliability and validity of Persian version were approved by Azad Marzabadi and Gholami Fesharaki (r = 0.22-0.92, Cronbach's alpha = 0.65-0.78) [32].

**Work-Family Conflict Scale (WFCS):** The questionnaire, designed by Carlson et al. in 2000, is well recognized as a prominent tool for examining the dynamics between the job and home for workers [33, 34]. This questionnaire consists of 18 items, and six dimensions consist of time-based work interference with family, time-based family interference with work, strain-based work interference with family, strain-based family interference with work, behavior-based work interference with family, and behavior-based family interference with work (Internal consistency, $\alpha > .80$) [35]. The questionnaire elicited answers ranging from 1 (indicating complete disagreement) to 5 (indicating complete agreement). The Persian version of the instrument was validated by Mozafari et al. [36]. The component loadings obtained from confirmatory factor analysis varied from 0.52 to 0.92 ($p < 0.001$).The values of the internal consistency (Cronbach's α) ranged from 0.78 to 0.83.

**NEO Five-Factor Inventory (Neo-FFI):** This instrument was developed by McCrae and Costa (1985) to determine the types of personality traits (neuroticism, extraversion, openness, agreeableness, and conscientiousness) [37, 38]. This questionnaire has 60 items and the scoring system a Likert system from 1 = strongly agree to 5 = strongly disagree. The reliability and validity of Persian version were verified by Akbari-Roshan Chesli et al.[39]. The internal consistency coefficients exhibited a range of values between 0.68 and 0.85, while the Cronbach's alpha was computed to fall within the range of 0.61 to 0.82. Furthermore, the concurrent validity of the Symptom Checklist-90-Revised and NEO-FFI demonstrated a noteworthy connection ($r= -0.29$-$0.63$, $p < 0.001$).

**Occupational cognitive failure questionnaire (OCFQ):** This questionnaire was developed by Hassanzadeh Rangi et al. – introduced to the Iranian population in 2012. This 30-item and single-dimension tool assesses cognitive failures related to perception, memory, and attention in the workplace. The Content Validity Index (CVI), and the internal consistency (Cronbach's alpha) of the Perian versions were 0.7 and 0.96, respectively [40]. A simple scoring method was used to range the responses (1 = always to 5 = never).

Descriptive statistics were used to describe the characteristics of participants and the study variables, for instance age, job tenure, gender, marriage status, and educational level. Three types of statistical tests were used to examine the association among the study variables: (1) Pearson correlation test was used to examine the association between job stress, personality traits, work-family conflict, and cognitive failures; (2) Multivariate regression analysis with the stepwise method and hierarchical regression analysis (modulator regression analysis) were used to examine effects of personality traits, work-family conflict, and job stress on cognitive failures. After examining the multi-collinearity of the variables, the equal variance of the residuals, and the normal distribution of the dependent variable, a multivariate regression test was used. (3) Hierarchical regression analysis (modulator regression analysis) was used to study the moderating effects of personality traits on the association between work-family conflict and job stress with cognitive failures. All statistical tests were performed using IBM SPSS Statistics version 23 (IBM Corp., Armonk, NY, USA). The significance level was set at the conventional $p < 0.05$.

## Results

The nurses involved varied in age between 22 and 54 years (mean= 34.6, SD=8.0) and job tenure ranging from 1 to 35 years (mean= 9.6, SD=7.1). The other descriptive analysis is reported in table 1.

**Table 1.** Demographic and job-related characteristics of the study participants

| Characteristics | | n | % |
|---|---|---|---|
| **Age** | ≤ 30 | 73 | 35.1 |
| | 30-35 | 52 | 25.0 |
| | 36-40 | 29 | 13.9 |
| | 41 | 54 | 26.0 |
| **Job tenure** | ≤ 5 | 82 | 39.4 |
| | 6-10 | 44 | 21.2 |
| | 11-15 | 42 | 20.2 |
| | 16 ≤ | 40 | 19.2 |
| **Gender** | Male | 60 | 28.8 |
| | Female | 148 | 71.2 |

| | | | |
|---|---|---|---|
| **Marriage status** | Single | 59 | 28.4 |
| | Married | 149 | 71.6 |
| **Education level** | B.Sc. | 168 | 80.8 |
| | M.Sc. | 28 | 13.4 |
| | Ph.D. | 12 | 5.8 |

Table 2 displays the bivariate correlations between the research variables. The results showed that cognitive failures were substantially linked ($p < 0.01$) with all factors, including work-family conflicts, personality (excluding openness to experiences), and job stress. The strongest relation was among cognitive failures with neuroticism ($r= 0.54$, $p < 0.05$), and conscientiousness ($r= -0.53$, $p < 0.05$).

**Table 2.** Correlation coefficients between the study variables

| Variables | Mean | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Job stress** | 2.57 | 0.44 | - | | | | | | | |
| **Work-family conflict** | 3.28 | 0.58 | 0.49** | - | | | | | | |
| **Neuroticism** | 2.17 | 0.57 | 0.33** | 0.52** | - | | | | | |
| **Extraversion** | 1.63 | 0.49 | -0.40** | -0.42** | -0.60** | - | | | | |
| **Openness to experiences** | 1.93 | 0.35 | -0.03 | -0.08 | -0.08 | -0.07 | - | | | |
| **Agreeableness** | 1.48 | 0.42 | -0.31** | -0.43** | -0.51** | 0.50** | 0.004 | - | | |
| **Conscientiousness** | 1.12 | 0.52 | -0.41** | -0.39** | -0.45** | 0.55** | 0.02 | 0.47** | - | |
| **Cognitive failures** | 2.3 | 0.48 | 0.43** | 0.42** | 0.54** | -0.42** | -0.008 | -0.43** | -0.53** | - |

** Correlations are significant at the 0.01 level.

Table 3 shows the results of regression analysis to predict cognitive e failures based on job stress (demands, control, supervisor support, peer support, associations, role, and changes), work-family conflict, and personality traits (neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness). The results indicated that among the 13 predictor factors examined, only four variables, namely neuroticism, conscientiousness, demand, and role, met the criteria for inclusion in the regression model. The aforementioned factors account for 44.1% of the variability seen in cognitive failures. F-ratio was equal to 39.98 which was significant at $p < 0.0001$, and the regression model had a good fit with the predictor variables. The value of β for the variable of neuroticism indicates that if other conditions are constant, an increase of one unit in this variable will lead to an increase of 0.34 units in the variable of cognitive failures; also, an increase of one unit in the conscientiousness leads to decrease of 0.28 units in the cognitive failures. The coefficient of determination (β) for the demand variable suggests that, holding all other factors equal, a one-unit increase in this variable is associated with a 0.15-unit rise in cognitive failures. Besides, the value of β for role-induced stress indicates that if other conditions are constant, an increase of one unit in this variable will increase to 0.14 units in the variable of cognitive failures.

**Table 3.** Regression analysis of variables predicting cognitive failures between cognitive failures and personality traits

| Dependent variable | Predictor variable | $R^2$ | F | β | t | P-value |
|---|---|---|---|---|---|---|
| Cognitive failures | Neuroticism | 0.297 | 87.02 | 0.545 | 9.32 | <0.001 |
| | Neuroticism | 0.401 | 68.47 | 0.382 | 6.30 | <0.001 |
| | Conscientiousness | | | -0.361 | -5.95 | <0.001 |
| | Neuroticism | 0.426 | 50.39 | 0.361 | 6.03 | <0.001 |
| | Conscientiousness | | | -0.347 | -5.81 | <0.001 |
| | Demand | | | 0.161 | 2.99 | 0.003 |
| | Neuroticism | 0.441 | 39.98 | 0.344 | 5.75 | <0.001 |
| | Conscientiousness | | | -0.288 | -4.48 | <0.001 |
| | Demand | | | 0.154 | 2.87 | 0.004 |
| | Role | | | 0.141 | 2.33 | 0.021 |

The results of hierarchical regression analysis are presented in Table 4. The moderation impact of neuroticism, extraversion, agreeableness, and conscientiousness on the link between work-family conflict, job stress, and cognitive failures was evaluated after the computation of interaction factors. As can be seen, the moderating role of different types of personality in the association between work-family conflict and job stress was not confirmed.

**Table 4.** Analysis of moderating role of personality traits using hierarchical regression

| Effect/variable | $R^2$ | $\Delta R^2$ | P-value | Result |
|---|---|---|---|---|
| Interaction effect (work-family conflict × neuroticism) on cognitive failures | 0.569 | 0.0001 | 0.862 | Reject |
| Interaction effect (work-family conflict × extraversion) on cognitive failures | 0.503 | 0.002 | 0.468 | Reject |
| Interaction effect (work-family conflict × agreeableness) on cognitive failures | 0.506 | 0.0001 | 0.849 | Reject |
| Interaction effect (work-family conflict × conscientiousness) on cognitive failures | 0.581 | 0.002 | 0.487 | Reject |
| Interaction effect (job stress × neuroticism) on cognitive failures | 0.604 | 0.0001 | 0.829 | Reject |
| Interaction effect (job stress × extraversion) on cognitive failures | 0.506 | 0.0001 | 0.905 | Reject |
| Interaction effect (job stress × agreeableness) on cognitive failures | 0.530 | 0.001 | 0.658 | Reject |
| Interaction effect (job stress × conscientiousness) on cognitive failures | 0.577 | 0.002 | 0.441 | Reject |

## Discussion

This study aimed to investigate the moderating role of personality traits among work-family conflict, job stress, and cognitive failures among nurses. The results of our research indicate a notable correlation between the variables under investigation. However, we did not discover evidence to support the notion that personality characteristics have a moderating function. The results indicated that personality traits significantly associated with the study variables are significantly correlated except openness to experience. These findings were align with Singh-Manoux et al. s' study that reported the significant association between big five personality traits and cognitive impairment [41]. Thus, the associations among certain cognitive failures (e.g., lapses in memory and attention) among nurses and personality traits align extensively with the findings of Kakemam, Kalhor and Könen and Karbach [12, 42]. In fact, these significant correlations can be explained using various theories. Personality traits and health outcomes, such as longevity, are hypothesized using lifespan models that determine the communication mechanisms between personality and cognition [17]. Although the primary purpose of these models is to elucidate the correlation between personality qualities and cognitive performance, it seems that they may also be extended to include instances of cognitive failures. Using regression analysis, we examined the effect of job stress factors (role and demand), and personality traits (neuroticism, conscientiousness) on predicting cognitive failures. Although retrospective studies certainly considered the linkage between cognitive failures and negative biases, some evidence proposes that this bias towards neuroticism is not the only determinant variable. An illustration of this phenomenon may be found in a research study that examined the correlation between neuroticism and the ongoing examination of cognitive failures over a span of one week [43]. Rumination can interrupt the ability of self-regulation in the people with higher neuroticism, which causes more cognitive failures. In model 2, higher conscientiousness could be observed in responsible and organized people, which results in fewer mistakes. Along with these findings, cross-sectional and meta-analysis studies showed that memory deficiencies were detected in the individuals with higher neuroticism and lower conscientiousness [8, 44]. Therefore, the findings implied that when people tend to be disciplined in their daily tasks, it can play a deterrent role in the occurrence of cognitive failures in terms of aggressive behavior. The data pointed towards the fact that demand and role were considered predictive variables of personality traits. Cox and Sharples stated that cognition-related activities are not only affected by individual mental activities but also workplace factors play a substantial role [45].

The moderating effects of personality traits between the study variables were examined and all hypotheses were ultimately rejected. Various studies confirmed the simultaneous effect of personality, stress, and cognitive characteristics, whereas limited research investigated the moderating role of personality traits (especially the Big Five factors) between organizational or work-related variables [46]. Nevertheless, it is essential to acknowledge that not every study is in accordance with these conclusions, and there exist several scientific works that provide compelling arguments against this perspective. Conscientiousness and neuroticism were shown to be the only significant predictors, accounting for distinct variation in cognitive failures in comparison to extraversion and agreeableness [46]. It can be stated that while personality traits were significantly associated with job stress, the moderating role was not confirmed, which could lead to the conclusion that other psychological variables might be considered moderators, especially among nurses. Along with this

study, Steinberg et al. highlighted the association between subjective memory complaints and personality traits in adults, noting an inverse association with conscientiousness and a direct association with neuroticism. Besides, high scores for stressors were related to high perceived stress and ineffective coping style [47]. The research conducted by Elfering et al. [48] showed that work-related stresses and conscientiousness may be regarded as predictors in a regression model. Furthermore, it is crucial to acknowledge that the absence of confirmed moderating effects may be ascribed to other variables. Firstly, the data collected might not have been robust or comprehensive enough to establish a clear association among the variables. Secondly, the personality traits considered may not have been the most relevant or influential for the variables being examined. Lastly, there could be other unknown factors or variables that were not accounted for in the study, which could have affected the results [49, 50].

The commencement of this study coincided with the onset of the pandemic, posing significant challenges in accessing nurses for participation. Despite the inherent biases that are often associated with research conducted using questionnaires, the investigators made efforts to minimize these effects by explicitly defining the goals of the study and ensuring that participants were given the time to complete the questionnaires. Nevertheless, the surveys' multi-item format could have dissuaded individuals from fully completing them. This study was performed in a healthcare organization, thus generalizing the results to other contexts should be done with caution. The majority of nurses, including those in this study, are women, resulting in a homogenous sample. The sample size and data collection using a self-reported questionnaire can be another limitation that has caused bias in the data.

## Conclusion

The findings of this study showed that the incidence of cognitive failures was higher among nurses with personality traits of neuroticism and conscientiousness. Although two stressors of demand and role had a limited effect, they can be considered in reducing cognitive failures. Furthermore, the investigation did not validate the moderating effect of personality traits on the association between work-family conflict and job stress. This suggests that additional organizational, environmental, or psychological variables could potentially moderate the association. This study showed that in planning to improve occupational stress and cognitive failures in healthcare environments, not only organizational and intra-organizational factors are of great importance, but also the psychological characteristics of each person should be considered.

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**Conflict of interest:** None declared.

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## Ethical Considerations

All steps of this study were approved by Committee of Medical Ethics of Mazandaran University of Medical Sciences. The participants were free to opt in or out of the study at any point in time. Besides, the subjects knew the purpose, benefits, risks, and funding behind the study before they agree or decline to join.

## Code of Ethics

This study was approved by the Ethics Committee of Mazandaran University of Medical Sciences with code IR.MAZUMS.REC.1399.6278.

## Authors' Contributions

Conceptualization: Siavash Etemadinezhad, Hajiomid Kalteh; Data collection: Azimeh Kalteh, Aghigh Salarian; Statistical analysis: Tayebe Rahimi Pordanjani, Jamshid Yazdani Cherati; Writing - Original Draft: Siavash Etemadinezhad, Hajiomid Kalteh; Writing - Review & Editing: Hamidreza Mokarami, Aref Shahi.

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