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Work stressors and Mental health among nurses – A Structural Equation Modeling (SEM)

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ABSTRACT

Background: Nursing is one of the most stressful professions worldwide. Job stressors can have a substantial impact on the mental health of nurses. This study aimed to assess how much workplace stressors can predict each component of this population's mmental health. **Methods:** 419 nurses from eight tertiary hospitals in Tehran were enrolled for this observational survey, and data was collected from a three-part questionnaire including the Depression, Anxiety, and Stress Scale - 21 Items (DASS-21, Extended Nursing Stress Scale (ENSS), and demographic questions. Multivariate regression and factor analysis were performed to build a Structural equation modeling between variables. **Results:** The Correlation between Stress, anxiety, depression, and work stressor were significant (p-value=0.01). Based on the SEM model, for each component of DASS (Stress, anxiety, depression), seven items in the questionnaire were significant and internally consistent (p-value:0.05). In the ENSS questionnaire, all nine subscales significantly predicted the total nursing stress score. **Conclusions:** Females, single, and nurses with more than six years of experience scored higher on the work stress scale. The workload is the most significant stressor in depression and, as a result, poor mental health.

Keywords: Work stressors, mental health, Nurses, Structural equation modeling

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INTRODUCTION

Work-related stress encourages excellent work, and a certain level of stress is a common occurrence encountered by humans and is part of their safety and well-being. However, excessive chronic stress may adversely affect physical and mental health(1). Work stress and coping with it are challenges for international health and safety. According to the Health and Safety Executive, one of the employers' key responsibilities is to shield workers from unnecessary stressors(2). Work stress can be defined as harmful responses to work pressures when work demands do not match their abilities(3). Healthcare professionals are the most prone to stress among all occupational categories due to the nature of their work environment(4). It has been shown that the "total health risk" of healthcare providers is 10% higher than the general population in Japan. (5). Nurses have a considerable role in the health system. Their mental health has an impact on the care they provide. (6) Nurse work stress, with a prevalence of 69% recorded in Iran (7).

Studies indicate that most nurses suffer from mild to severe symptoms of mental disorders. Moreover, it has been identified that workplace stressors among nurses and nursing students are growing and contribute to several physical and mental ailments in this population (8, 9).

This study investigates the relationship between nursing stressors and mental health. In particular, how to work stressors associated with depression and its subscales is highlighted. The specific goals of this research were:

HYPOTHESES

(a) To develop an understanding of the tertiary hospital nurses' experience of work stressors, anxiety, stress, and depression in terms of social demographic factors;

(b) Developing a research model showing the overall paths and interactions between depression, anxiety, stress, and work stressors.

(c) To identify the causal factors by analyzing each component's direct, indirect and cumulative influences.

To achieve these objectives, we used Structural Equation Modeling (SEM). SEM is a multivariate statistical analysis technique used to investigate structural relationships. Using this tool-assisted us in developing a model to describe the factors associated with mental health and work stressors and their relationship and mag-

nitude of Correlation.

MATERIAL AND METHODS

SETTING AND SAMPLE

This observational survey was based on a correlational design on 419 nurses working in eight tertiary educational hospitals of Shahid Beheshti University of medical sciences. The data was gathered from November 2019 to January 2020. The sample size was calculated using the Cochran formula with α=0.05, Z1−α/2=1.96, P=0.5, d=0.05, and an attrition rate of 10% was estimated at 420. The hospitals were randomly selected based on the city's clustering. The city was divided into four clusters, with two hospitals chosen randomly from each group. response rate was 89%.

QUESTIONNAIRES

Three Questionnaires have been used in this study are listed below:

1. Demographic questionnaire

Demographic information included sex, age, years of experience, marital status, financial situation, and working department. Each individual's financial situation was estimated based on a self-reported answer about their economic status.

2. DASS-21 questionnaire

DASS-21(10) is a valid tool (11)for screening general psychological symptoms. The internal consistency of this questionnaire is high, and this tool has been shown to have appropriate psychometric properties in health care providers (12, 13). DASS-21 consists of 21 questions categorized into three subscales consisting of 7 questions examining stress (which means general psychological stress), anxiety, and depression. Each scored from 0-42. All of the items are ranked on a 4-point Likert scale: 0:" did not apply to me at all," 1:" apply to me to some degree or to some of the time," 2: "applied to me to a considerable degree or good part of the time," 3: "applied to me very much or most of the time"..(Supplementary material Appendix 1)

3. ENSS questionnaire

ENSS questionnaire is the updated and expanded version of NSS (nursing stress subscale) and is a 6-point scale ranging from 0 (does not ever apply to me) to 6 (a huge problem) for 57 nursing situations. These situations have been identified to cause stress for nurses with minimum and maximum scores of 0 to 257. Questions are categorized into nine groups of stressors, including death and dying, Conflict with doctors, inadequate emotional preparation, Problems with peers, Problems with supervisors, Workload, Uncertainty concerning treatment, Patients and their Families, and discrimination. Scoring of ENSS in terms of severity is reported as No/Mild (0 - 57), Moderate (58 - 114), Severe (115-171), and Very severe (172 - 228) [28].

DATA ANALYSIS

Data were analyzed using statistical tests, including t-test, Chi-square, one-way ANOVA, and Correlation between variables using Software's SPSS16 and EQS6. The questionnaires were distributed via Google Forum, and completing all parts of each questionnaire required completing the form; any cases with missing data in the questionnaire were excluded from the study.

CONCEPTUAL FRAMEWORK OF RESEARCH

Regarding the effect of nursing stress on anxiety, stress, and depression, the relationship between these variables was designed in a conceptual model of study. A multivariate statistical framework called structural equation modeling (SEM) is used to simulate complex connections between directly and indirectly observed variables (latent). SEM is a generic framework that includes regression, factor analysis, route analysis, and latent growth curve modeling, in addition to simultaneously solving systems of linear equations(14).

RESULTS

The gathered data was analyzed using SPSS 13, The mean age was 28.6 (6.0) years, and most were females (67.9%). The average number of years of experience were 7.9 (7.3), and more than half of nurses had fewer than six years of experience. Based on financial status, almost half of the nurses considered themselves middle-income, a quarter classified themselves as poor, and the rest estimated themselves as high-income. Single nurses outnumbered married nurses by a small margin. Nurses who worked in non-surgical wards were 43.6 %, 28.1% in the emergency room, and the remaining nurses worked in surgical and intensive units.

Table 1 shows that females had a greater mean score for stress and anxiety than men, whereas men scored higher for job stressors and depression. Single nurses had higher mean scores for all stress, anxiety, depression, and job stressors than married nurses. Work stresses are less prevalent in nurses with a high income than those with a moderate or low income. The mean score of nursing stress was 131.34 in nurses with a total work experience of six years and more, whereas this score was 129.7 in nurses with one to five years of experience. However, the mean score of DASS variables (Anxiety, Stress, and depression) was higher in nurses with less work experience than in nurses with increased work experience.

Table 2. Demonstrate the correlation coefficient among variables. Analysis showed a significant positive correlation between all the variables. The Correlation between work stressors(ENSS) and all three components of DASS was significant yet weak. The table showed the strongest Correlation between Stress and anxiety (r= .703, P-value<0.01)

A confirmatory factor analysis was performed for each questionnaire to assess the dimensionality of the measurement items. The results of the confirmatory analysis indicate that each item of the questionnaire loaded on its respective factors and all items were significantly loaded for stress, anxiety, depression, and work stressors as our main factors. The detailed items and factors are shown in fig 1. Based on the theoretical assumptions, Model fit statics is shown in table 3. The degree of freedom was 101.

DISCUSSION

This study evaluated the Correlation between job stressors and psychosocial variables (depression, stress, anxiety) among nurses. As expected, the mean scores of stress, anxiety, and depression were higher in nurses with a higher score of ENSS (Extensive Nursing Stress Scale). The findings could be interpreted as the job

stressors for nurses can endanger their mental health.

To be applicable to real-life situations, we enrolled randomly selected nurses from 8 different tertiary hospitals located in 8 different areas of Tehran. Participants have been working in different wards. Most studies showed the relationship between occupational stress and impaired mental health in almost all jobs (15). Keon Kim et al. (2015) reported occupational stress as the only significant predictor of depressive symptoms among residents and interns in tertiary hospitals(16, 17). A cohort study in Australia confirmed that nurses develop depression, anxiety, and stress symptoms more than the average population. In that study, the binary logistic regression model showed a significant correlation between job dissatisfaction and depression and stress, but this Correlation was not significant between job dissatisfaction and anxiety (18). From the results of this study using multiple regression analysis, job stress was significantly related to all symptoms, including anxiety. However, The link between depression and work stressors was indirect.

Some explanations exist for how job stressors affect depression, one of which is "the mediating effect of social support." A recent study used a structural equation model to investigate the impact of emotional labor and occupational stress on depression in nurses. The 24-item Korean Occupational Stress Scale Short Form (KOSS-SF) was used to assess job stress in 291 nurses of the study. The Depression Scale of the Center for Epidemiologic Studies (CES-D) was used to assess job stress and investigate the depression. They concluded that while occupational stress had no direct effect on depression, it did have a significant indirect effect via social support (including supervisor support, collegial support, and organizational support)(19). In other words, social support can act as a significant solid mediator between job stress and depression –meaning that high social support can buffer the negative effects of occupational stress on depression- as also stated by Wu. in a study on Chinese nurses (20). Other investigations back up this explanation. One study of Korean clinical nurses found that the more social support they received from individuals and organizations, the less depressed they were (21).

Another explanation could be "the mediating effect of rational coping" on the relationship between job stress and depression.

Table1. Mean score of stress, anxiety, depression and ENSS among different variables

Variables	Subcategories	Stress	Anxiety	Depression	ENSS
Age	25 & lower	8.10 ±17.36	8.60 ±10.50	9.28 ± 12.06	128.87± 32.72
	26-30	9.11 ±16.33	7.15 ±8.36	9.57 ± 12.66	131.23± 39.82
	31 and more	9.50 ±14.19	6.85 ±7.23	9.83 ± 9.67	130.49± 42.42
Gender	Male	14.8±8.4	8.4± 7.5	12.0± 8.3	126.0± 3.3
	Female	16.6±8.9	9.2± 7.9	11.4± 9.9	132.9± 36.9
Years of experience	1-5	17.2±8.3	9.9± 7.9	12.2± 9.6	129.7± 36.4
	6 & more	14.9±9.5	7.8± 7.5	10.7± 9.5	131.3± 39.2
Financial situation	Poor	15.5±8.6	10.1± 8.0	12.3± 9.6	134.3± 39.3
	Middle	16.2±9.5	8.9± 8.1	12.1± 9.5	132.0± 39.8
	Good	16.3±7.7	7.9± 6.8	10.1± 9.0	124.7± 30.4
Department	Emergency room	16.2±9.9	9.2±8.3	11.3± 8.9	127.0± 38.3
	Non-surgical	16.7±8.0	8.8±7.2	11.7± 9.4	133.1± 33.4
	Surgical	15.2±8.5	9.3±8.7	12.2± 10.0	130.0± 45.6
	Intensive care	14.3±9.3	8.4±7.9	10.9± 10.2	130.1± 38.2
Marital status	Single	17.0±8.8	9.5±8.4	13.3± 9.8	132.3± 38.5
	Married	14.8±8.7	8.3±6.9	9.4± 8.4	128.3± 36.1

Note: all data are shown in Mean ± SD

Table 2. The correlation coefficient between stress, anxiety, depression and ENSS

Variables	Work stressors	Stress	Anxiety	Depression
ENSS	1			
stress	.324**	1		
Anxiety	.343**	.671**	1	
Depression	.300**	.703**	.592**	1

**. Correlation is significant at the 0.01 level (2-tailed).
Abbreviation: ENSS: Extended Nursing Stress Scale

Table 3. Fit indices of the models tested for the instrument to assess mental health and job stress among nurses

Conceptual model fitness indicators	Indexes values	Reference value*
Chi-Square($\chi 2$)	383.753*	Ratio of $\chi 2/df<4$
Degrees of Freedom (df)	101	
Root Mean Square Error of Approximation (RMSEA)	0.07	≤0.08
Adjusted Goodness of Fit Index (AGFI)	0.90	>0.9
Goodness of Fit Index (GFI)	0.94	>0.9
Root Mean-square Residual (RMR)	0.05	
Comparative Fit Index (CFI)	0.92	>0.9

Note: *reference values defined by tucker and lewis.[14]

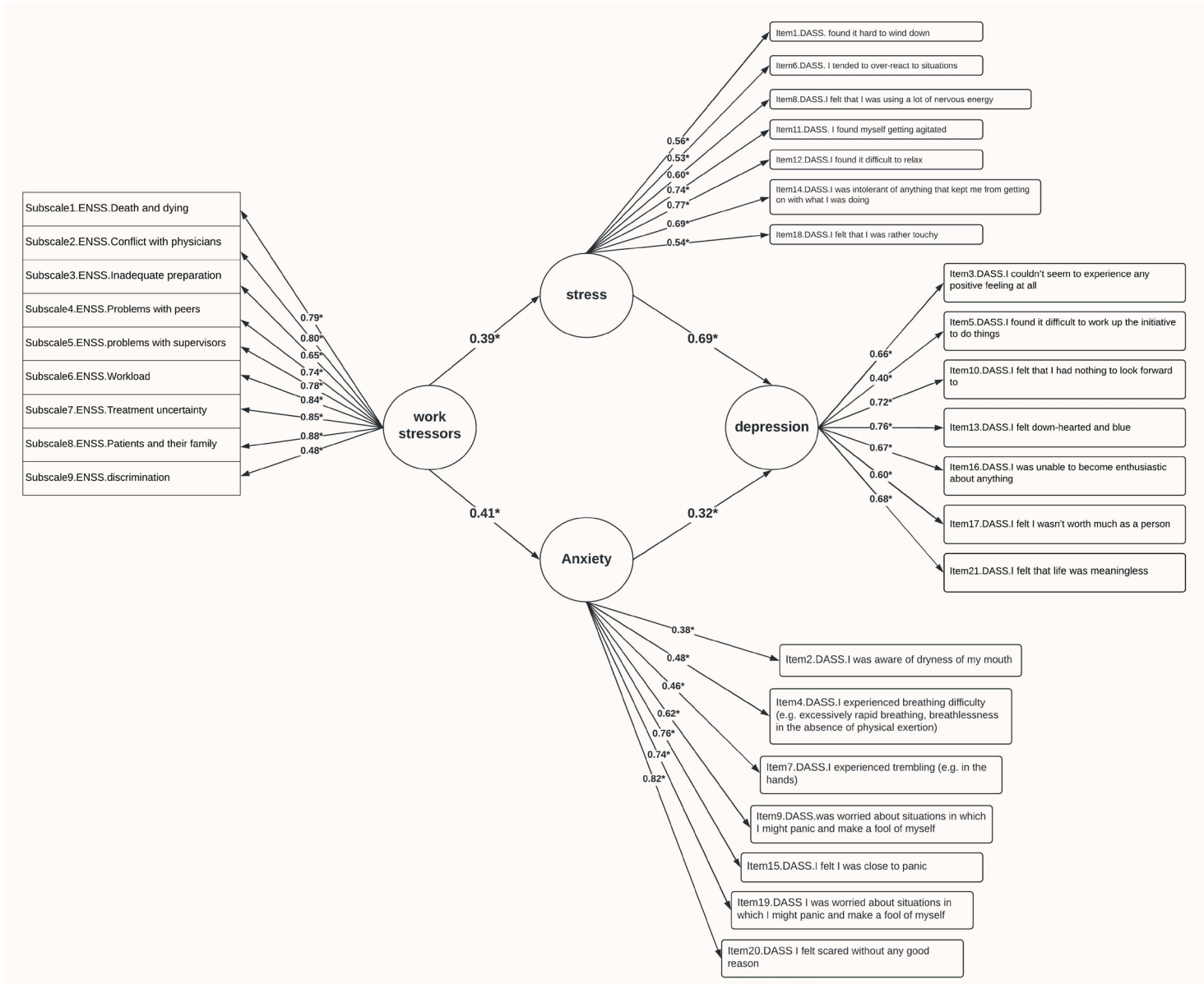

Fig 1. Structural equation modeling (SEM) was used to represent and evaluate the relationship between nursing stress index and anxiety, stress, and depression (as indexes for mental health. According to the model, work stressors affected anxiety and stress with 41% and 39% rates. Besides, anxiety and stress directly predict depression with 32% and 69% individually. To put it another way, one unit change in total work stressors explains 39% change in stress (general psychological stress) and 41% change in anxiety. Betas of each related question of each questionnaire are demonstrated in the model.

Coping is any cognitive or behavioral effort to manage, minimize, or tolerate events that individuals perceive as potentially threatening their well-being (either thriving or maladaptive)(22). Social support and rational coping mediate the effects of job stress on depression, according to a study conducted on female nurses in China using the CES-D scale for measuring depressive symptoms and The Chinese version of the Occupational Stress Inventory-revised edition (OSI-R) for measuring occupational Stress (20). Therefore, social support and rational coping can significantly alleviate depressive symptoms. One interesting finding in the study was that role overload (equivalent to workload in ENSS) was the strongest predictor of depressive symptoms for female Chinese nurses (20).

The present study detected that single nurses dealt with mild depression, whereas the mean score for married nurses' depression was normal. However, another study in Bandar-Abbas, Iran, revealed that married nurses are exposed to higher mental health problems than single nurses(23). Many studies showed a higher rate of stress, depression, and anxiety among Intensive care units (ICU) (24, 25). Surprisingly, the mean score of all stress, anxiety and depression was lower in our ICU nurses compared with medical ward and emergency room nurses.

Many studies evaluated the association between demographic factors and job stress among nurses, nurses with increased age and more years worked were more exposed to job stress and reduced

health(26). Our findings were also in line with this study. The mean job stress score was higher in aged and more experienced nurses. It was also shown that aged females and single people are more exposed to job stress.

SEM is a powerful analysis technique that integrates many multivariate techniques. Both questionnaires (DASS and ENSS) had different questions and subscales. SEM as a comprehensive framework, enables us to test a set of regression equations simultaneously. SEM aims to give a quantitative test for an expected hypothetical model by a researcher to evaluate the connections between variables. Our SEM framework showed the Correlation of each subgroup of the questionnaire, which itself represented a group of nursing job stressors, with a total ENSS score so it can be concluded that adjusting each of the nursing stressors will not only reduce job stress, but also reduce stress (general psychological stress), anxiety and depression in nurses and improve their mental health. Positive coefficients in regression showed a positive correlation of ENSS and DASS parameters, so that increase in one of them will increase in another one.

LIMITATION

The main limitation of this research is that the sample size was limited to Tehran city and tertiary hospital nurses. This led to the non-consideration of nurses in more deprived areas and non-hospital and home nurses. Furthermore, to better screen mental health, we could examine more psychosocial risks, such as sleep disorders and loneliness.

CONCLUSION

Females, singles, and nurses with more than six years of experience have higher work stress scores. This study demonstrates that job stress affects nurses' mental health. The workload is the strongest predictor of job stress scale and work stressors are significantly correlated with each component of psychological well-being. Given the rising prevalence of mental disorders and the increasing burden of these diseases, it is reasonable to direct our resources toward identifying methods for reducing workplace stressors in high-stress occupations, such as nursing, to prevent mental illness and reduce the long-term burden and costs of these diseases on the health system.

ETHICAL CONSIDERATIONS

The Ethical Committee approved this study.

CONFLICT OF INTERESTS

The authors declare no conflict of interest.

ABBREVIATIONS

SEM; Structural Equation Modeling, DASS-21; Depression; Anxiety, and Stress Scale - 21 Items, ENSS; Extended Nursing Stress Scale, KOSS-SF; Korean Occupational Stress Scale Short Form, CES-D; Center for Epidemiologic Studies, ICU; Intensive care units.

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