

## Mediating Effects of Workplace Learning and Self-efficacy on the Relationship between Technostress and Job Satisfaction of Convalescent Hospital Nurses

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### Abstract

*This study was tried to explore the mediating effect of workplace learning and self-efficacy on the relationship between technostress and job satisfaction in convalescent hospital nurses. Data were collected from 149 nurses working at one of 10 convalescent hospitals located in Korea's D region and between July 20 and August 12, 2019 and analyzed using SPSS 24.0. The mediating effects of workplace learning and self-efficacy in the relationship between technostress and job satisfaction were investigated by conducting hierarchical regression analysis and testing for significance based on bootstrapping p values. We found that workplace learning had a complete mediating effect, and self-efficacy a partial mediating effect, in the relationship between technostress and job satisfaction in convalescent hospital nurses. Exploring diverse factors and environmental features affecting job satisfaction in convalescent hospital nurses is highly relevant to clinicians, especially given the gradually increasing number of convalescent hospitals, changes during the era of technology fusion, and the strategic demands arising from an aging society.*

**Keywords:** Nurses, Job Satisfaction, Technostress, Self-efficacy, Workplace Learning

### 1. Introduction

The number of beds at long-term care hospitals in Korea increased 51.1 in 2012 to 60.9 in 2017 for every 1,000 elderly people aged 65 or older [1]. The changing healthcare environment has resulted in an increase in the number of convalescent hospitals. Thus, it needs to pay attention to the nurses, the major part of the human resources at such hospitals, who may want to change or quit working at the hospitals [2].

Although convalescent hospital nurses are responsible for overall patient care, low pay and heavy workloads, convalescent hospital nurses suffer from a prejudice that they work less than acute hospital nurses [3]. Recent advances in information and communications technology (ICT) are expected to increase the efficiency of hospital administration through smart work systems [4]. This may increase job efficiency, but the change can be a source of stress to the hospital nurses because adoption would require them to expend energy [5].

Technostress is to define a maladaptive psychological disorder arising when an individual is unable to adapt to learning a new computer skill [6]. However, organization members' technostress can be mitigated through training to use a new technology at the organizational level such as workplace learning [7, 8]. Nurses can

identify and solve patients' problems through learning [9]. A significant relationship exists between workplace learning and job satisfaction in convalescent hospital nurses and self-efficacy is also known to enhance job satisfaction by changing job-related activities through self-motivation and actively facing stress or failure to produce valuable outcomes [10, 11]. However, few studies have assessed the effects of workplace learning and self-efficacy between technical stress and job satisfaction.

Thus, the study investigates the mediating effects of workplace learning and self-efficacy in the relationship between technostress and job satisfaction in convalescent hospital nurses and to provide basic data in developing ways to increase job satisfaction of nurses.

## 2. Methods

### 2.1 Study Design

The study was a descriptive study to examine the mediating effects of workplace learning and self-efficacy on the relationship between technostress and job satisfaction in convalescent hospital nurses.

### 2.2 Subjects and Data Collection

This study was approved by the Institutional Review Board (IRB) of \*\* University, located in D city (Approval number: \*\*U-2019-268-01). Data were collected between July 20 and August 12, 2019. Study subjects were conducted on 160 nurses working at one of 10 convalescent hospitals. To compute an optimal sample size, we used G\*Power program 3.1, and a minimal sample size of  $n = 131$  was determined based on the assumptions of a significance level of .05, effect size of .15, a total number of 13 general characteristics and research variables, and a power of .80. In consideration of a drop-out rate of 20%, a total of 160 survey forms were distributed. Of those, 149 were submitted for the final analysis.

### 2.3 Research Tools

Technostress was investigated using the scale revised for Korean office workers [7]. The revised scale consisted of a total of 14 items across four subdomains of techno-overload, techno-complexity, techno-insecurity, and techno-uncertainty. The tool was a 7-point Likert scale (Cronbach's  $\alpha = 0.95$ ). Workplace learning scale in the study was revised for hospital workers [12]. The scale comprised items in two subdomains, formal learning and informal learning. The scale had a total of 10 items on a 5-point Likert scale (Cronbach's  $\alpha = 0.81$ ). Self-efficacy was evaluated using a scale to evaluate self-efficacy in nursing [13]. The scale consisted of seven items on a 4-point Likert scale (Cronbach's  $\alpha = 0.89$ ). Job satisfaction was assessed by using a total of four items related to job satisfaction in the Korean version of the Copenhagen Psycho-social Questionnaire (COPSOQ-K) and translated [14]. The scale had a total of 4 items on 5-point Likert scale (Cronbach's  $\alpha = 0.84$ ).

### 2.4 Analysis Methods

The data were analyzed using SPSS 24.0. Study subjects' technostress, workplace learning, self-efficacy, and job satisfaction were examined by computing means and standard deviations. Pearson's correlation coefficients were computed to examine correlations between perceived technostress, workplace learning, self-efficacy, and job satisfaction. The mediating effects of workplace learning and self-efficacy in the relationship between technostress and job satisfaction were investigated by conducting hierarchical regression analysis and testing for significance based on bootstrapping  $p$  values.

## 3. Results

### 3.1 Descriptive Statistics of Measured Variables

The overall mean scores of technostress, the domain-specific mean scores in techno-overload, techno-complexity, techno-uncertainty, and techno-insecurity are as shown in Table 1. Among the sub-domains of technostress, the highest technostress was found to be related to Techno-complexity. Also presented in Table 1 are the overall mean scores of workplace learning and domain-specific mean scores in formal workplace learning and informal workplace learning. The mean scores of self-efficacy and job satisfaction are also listed

in Table 1.

**Table 1. Descriptive statistics of measured variables**

Variables	Min	Max	M±SD
Technostress	1.00	4.88	2.87±1.05
Techno-overload	1.00	6.00	3.21±1.29
Techno-complexity	1.00	7.00	3.18±1.28
Techno-insecurity	1.00	5.50	2.43±1.06
Techno-uncertainty	1.00	5.00	2.68±1.18
Workplace learning	1.20	4.70	3.14±0.50
Informal	1.00	4.40	2.75±0.62
Formal	1.00	5.00	3.54±0.61
Self-efficacy	2.00	4.43	3.06±0.38
Job satisfaction	1.50	4.00	2.70±0.46

### 3.2 Correlation Matrix for Measured Variables

The correlations between the research variables in the study, technostress, workplace learning, self-efficacy, and job satisfaction, are as presented in Table 2. The variable showing the strongest, statistically significant correlation with job satisfaction was workplace learning ( $r = .51, p < 0.001$ ), followed by self-efficacy ( $r = .27, p = 0.001$ ) and technostress ( $r = -.21, p = 0.011$ ). In addition, technostress showed a negative correlation in the relationship between self-efficacy and workplace learning, respectively. And it was found that self-efficacy and workplace learning had a positive correlation (Table 2).

**Table 2. Correlation matrix for measured variables**

Variables	Technostress	Self-efficacy	Workplace learning
	r (p)		
Technostress	1		
Self-efficacy	-.19 (0.018)	1	
Workplace learning	-.30 (<0.001)	.40 (<0.001)	1
Job satisfaction	-.21 (0.011)	.27 (0.001)	.51 (<0.001)

### 3.3 Job Satisfaction Predictors and Mediated Effectiveness Verification

The mediating effects of workplace learning and self-efficacy in the relationship between technostress and job satisfaction were tested in three steps, as proposed in Baron and Kenny's procedures for testing mediational hypotheses. A review of residual plots confirmed that the assumption of homoskedasticity was met. To address the problems of increase in type 2 error and decrease in power, a bootstrapping procedure based on an SPSS Process macro [15] was used. The bootstrap was run for 1000 iterations, and it was found that the value "0" was not contained between the lower and upper limit confidence intervals (Boot. LLCI and Boot. ULCI).

In step 1 of the procedures for testing mediational hypotheses, the effect of the independent variable on the mediating effect was examined, and technostress was found to have a statistically significant effect on

workplace learning ( $\beta = -.30, p < 0.001$ ). In step 2, the effect of the independent variable on the dependent variable was examined, and technostress was found to have a significant effect on job satisfaction ( $\beta = -.21, p = 0.011$ ). In step 3, the effects of the independent and mediating variables on the dependent variable were examined. The results showed that workplace learning, a mediating variable, significantly influenced job satisfaction ( $\beta = .49, p < 0.001$ ), while technostress, the independent variable, did not ( $\beta = -.06, p = 0.412$ ). Regarding the effect of the independent variable on the dependent variable, the step 3 regression coefficient ( $\beta = -.06$ ) was smaller than the step 2 regression coefficient ( $\beta = -.21$ ), indicating that workplace learning had a complete mediating effect on the effect of technostress on job satisfaction. The explanatory power was 27% (Table 3).

The results of bootstrapping performed to test the significance of the mediating effect of workplace learning on the effect of technostress on job satisfaction showed the following. The indirect effect of technostress, that is, the effect of technostress on job satisfaction with workplace learning as a mediator, was -0.06. In any of the path coefficients, the 95% interval between Boot. LLCI and Boot. ULCI did not contain the value of 0, confirming that the mediating effect of workplace learning was statistically significant.

In step 1 to test the effect of the independent variable on the mediating effect, technostress had a statistically significant effect on self-efficacy ( $\beta = -.19, p = 0.018$ ). In step 2, testing the effect of the independent variable on the dependent variable, technostress significantly influenced job satisfaction ( $\beta = -.21, p = 0.011$ ). In step 3, the final step to test the effect of the independent and mediating variables on the dependent variable, it was found that both technostress ( $\beta = -.16, p = 0.045$ ) and self-efficacy ( $\beta = .24, p = 0.004$ ) significantly influenced job satisfaction. Regarding the effect of the independent variable on the dependent variable, step 3 regression coefficient ( $\beta = -.16$ ) was smaller than step 2 regression coefficient ( $\beta = -.21$ ). Thus, self-efficacy had a partial mediating effect on the effect of technostress on job satisfaction. The explanatory power was 10% (Table 3).

The results of the bootstrapping performed to test for the significance of the mediating effect of self-efficacy on the effect of technostress on job satisfaction were as follows. The indirect effect of technostress on job satisfaction via self-efficacy as a mediator was -0.02. None of the path coefficients, the 95% interval between Boot. LLCI and Boot. ULCI, contained the value of 0, confirming that the mediating effect of self-efficacy was statistically significant.

**Table 3. Multiple regression analysis for job satisfaction predictors**

Stage	Model	B	SE	$\beta$	t	p	Adj R <sup>2</sup>	R <sup>2</sup>	F	p
1	T.s→S.e	-.07	.03	-.19	-2.39	0.018	.03	.04	5.68	0.018
2	T.s→J.s	-.09	.04	-.21	-2.57	0.011	.04	.04	6.62	0.011
3	T.s→J.s	-.07	.04	-.16	-2.02	0.045	.09	.10	7.85	0.001
	S.e→J.s	.29	.10	.24	2.96	0.004				
1	T.s→W.l	-.14	.04	-.30	-3.76	<0.001	.08	.09	14.15	<0.001
2	T.s→J.s	-.09	.04	-.21	-2.57	0.011	.04	.04	6.62	0.011
3	T.s→J.s	-.03	.03	-.06	-0.82	0.412	.26	.27	26.45	<0.001
	W.l→J.s	.46	.07	.49	6.66	<0.001				

- **Independent variable: Technostress (T.s), Dependent variable: Job satisfaction (J.s)**
- **Mediating variables: Self-efficacy (S.e), Workplace learning (W. l)**

#### 4. Discussion

The mean score for technostress among the study subjects was  $2.87 \pm 1.05$  out of 7 points. This level is lower than that of the general population or individuals in other occupations [16-18]. Based on a previous finding that individuals who had already graduated from college had lower technostress than college students [16], it can be inferred that compared with nursing students studying in various IT-based educational environments, nurses are relatively more accustomed to an IT-based healthcare environment, since they get to spend more time using the technologies before working in clinical practice. In the current study, convalescent hospital nurses had approximately 13 years of clinical experience and thereby experienced technostress at a below-average level.

Regarding workplace learning, the mean score was  $3.14 \pm 0.50$  out of 5 points. This level is higher than the mean scores reported in studies using the same instrument, including a study conducted with all types of hospital employees, including medical staff, to investigate the effect of workplace learning on hospital outcomes [19] and a study on the mediating effect of workplace learning in the relationship between learning organization and hospital outcome [12]. It is difficult to compare different occupations directly, but apparently differences exist across different occupation types even within the medical field, given the findings of a previous study on general hospital nurses that workplace experience varied depending on nurses' general characteristics such as gender, education level, and work experience at the current department [20]. To make a more expansive comparison, we reviewed studies that examined workplace learning using a different instrument. Our review showed that the level of workplace learning was similar to that reported in a study with convalescent hospital nurses [10], and c) slightly lower than that reported in a study with general hospital nurses [20]. Thus, the perception of convalescent hospital nurses (that is, the subjects) of the importance of workplace learning seems to be higher in comparison to general workers, but lower in comparison to general hospital nurses. Therefore, research should be replicated to examine the extent of workplace learning in hospitals of different sizes and considering other environmental features.

However, the mean score was lower than that reported in four other studies [21-23]. Therefore, we need to explore why self-efficacy is low in convalescent hospital nurses and discuss strategies to increase it. In addition, studies should be conducted to compare the same in different regions and different hospital sizes.

The mean score of job satisfaction was at a level similar to previous findings of a study conducted with 1,858 Danish workers aged between 20 and 59 [24], and a study conducted with 1,345 workers at public dental organizations in four regions in Sweden [25]. However, the current study finding differs from a previous finding [14], a study conducted with researchers and office workers in Korea. In that study, Perceived job satisfaction may widely vary depending on factors such as country, occupation type, and work environment, and thus, replication studies should be conducted.

In this study, workplace learning, self-efficacy, and technostress were all significantly positively correlated with job satisfaction. This finding is consistent with previous findings that the higher the workplace learning, the higher the job satisfaction in general hospital nurses [26] and in convalescent hospital nurses [10]. Higher level of workplace learning contributes not only to personal benefits such as job satisfaction and organizational involvement [20, 27], but also to organizational management like business performance [28] and perceived hospital performance [19]. Therefore, it is necessary to establish aggressive strategies toward workplace learning, such as expanding training for personal development and recognizing time spent in training as work hours. A study conducted with 179 employees at various companies found that as technostress increased, job satisfaction decreased [29]. These findings can be extrapolated to suggest that job satisfaction decreases with increasing technostress, given the previous finding that the higher the job stress, the lower the job satisfaction [14] and in consideration that technostress is a part of job stress. On the other hand, it was reported that emotional exhaustion increased with increasing techno-overload and techno-invasion with newer technology development [30]. Therefore, it is necessary to provide immediate as well as repeat training on technology changes to alleviate techno-overload (including techno-invasion), techno-complexity, techno-uncertainty, and techno-insecurity. Self-efficacy and job satisfaction in convalescent hospital nurses has been insufficiently studied, making it difficult to conduct between-study comparisons. However, the current study result is supported by the previous finding that as self-efficacy increases, job satisfaction increases, as reported in

studies [21, 23, 31]. Confidence and positive experiences in techno-utilization can enhance job satisfaction. Hospitals should proactively provide sufficient training to employees with low self-efficacy when assigning tasks involving complex devices.

In this study, workplace learning showed a complete mediating effect in the relationship between technostress and job satisfaction, with an explanatory power of 27%. This finding demonstrates that technostress alone does not impact job satisfaction, and the former influences the latter via workplace learning. Workplace learning is crucial. The finding is supported by previous study findings that although technostress did not directly affect job satisfaction, it did so indirectly if work-life conflict was included as a mediator [7] and that technostress influenced teaching efficacy through the moderating effect of peer relationships, which could be regarded as informal workplace learning [17]. This finding is also in line with previous findings that workplace learning is a significant factor influencing organizational involvement and career satisfaction and that job satisfaction is significantly influenced by learning orientation, a concept similar to workplace learning [22]. Regardless of the level of technostress, job satisfaction can be increased if organizational involvement is encouraged and appropriate technological support systems are in place [29]. Likewise, regardless of the level of technostress, job satisfaction can be increased if appropriate workplace learning occurs. Accordingly, to improve low job satisfaction due to technostress, formal and informal workplace learning should be facilitated.

Self-efficacy showed an explanatory power of 10% as a partial mediating variable in the effect of technostress on job satisfaction. This is consistent with findings from several other studies [11, 17, 18]. Therefore, as a strategy to enhance job satisfaction based on the relationship between technostress and job satisfaction, it would be useful to develop and implement various programs to promote nurses' self-efficacy in techno-utilization.

Our study investigated the mediating effects of workplace learning and self-efficacy in the relationship between technostress and job satisfaction of convalescent hospital nurses in the rapidly changing IT-based healthcare environment. The findings are useful as basic data to develop training programs to reduce technostress and enhance job satisfaction among nurses.

## 5. Conclusion

We tried to explore the mediating effects of workplace learning and self-efficacy in the relationship between technostress and job satisfaction of convalescent hospital nurses. We confirmed that workplace learning had a complete mediating effect and self-efficacy a partial mediating effect. Thus, educational programs to increase convalescent hospital nurses' job satisfaction should seek to enhance workplace learning and self-efficacy. We also suggest the following. First, research should be conducted to explore diverse factors and environmental features affecting job satisfaction in convalescent hospital nurses, considering the rapid increase in the number of convalescent hospitals, the changes in the era of technology fusion, and the strategic demands arising from an aging society. Second, research should develop programs promoting workplace learning, since this has been confirmed to explain a variety of outcome variables in other disciplines. Workplace learning can be a core strategy for nurses, particularly to resolve problems at the individual and organizational levels.

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