

The Effect of Nurses' Work–Life Balance on Work Engagement: The Adjustment Effect of Affective Commitment

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ABSTRACT

Background This study aimed to examine the effects of nurses' work–life balance (WLB), job demands and resources, and organizational attachment on their work engagement (WE). The second aim was to shed light on whether the relationships among WLB, job demands, resources, and WE are modulated by organizational attachment.

Methods In total, 425 nurses working in a university hospital responded to the questionnaire. The primary statistical analysis method was hierarchical multiple regression with WE as the dependent variable.

Results In the model in which all variables were applied, affective commitment (AC) ($\beta = 0.41$), family-to-work positive spillover ($\beta = 0.25$), and number of children ($\beta = 0.13$) were found to have a significant association with WE. Family-to-work negative spillover (FWNS) and AC had significant interaction effects. The result suggests that when AC was low, WE tended to decline further due to FWNS; however, when AC was high, WE did not change due to the effect of FWNS.

Conclusion These results confirmed that to improve nurses' WE, hospital organizations should implement initiatives to facilitate WLB that considers nurses' household roles. Furthermore, high organizational attachment buffered the home's negative influence on work, thereby helping nurses work energetically.

Key words nurse; work engagement; work-life balance

Work–life balance (WLB) refers to harmony between work and non-work aspects of life, and is an important concept for workers to continue to work healthily and for the sustainability of organizations.¹ Therefore, countries around the world are taking steps to promote WLB.² For example, in Northern European countries, which have advanced WLB initiatives, national and local governments are working to improve the infrastructure for childcare and nursing care.³ In the US, it is well known that companies are actively engaged in WLB initiatives, believing that these will lead to increased worker productivity.³ Since the formulation of the WLB

Charter in 2007, Japan has made efforts to improve the WLB of working people (e.g., work style reform or the Premium Friday campaign).¹

These initiatives for promoting WLB are necessary at both regular companies and medical institutions. This is because one of the world's most serious problems in the medical and health fields is the shortage of nurses, and one of the causes of nurses leaving the workforce is the difficulty of balancing work and family life.^{4, 5} For example, women make up a large percentage of nurses, and it is conceivable that life events, such as marriage or the birth of a child, would have a significant impact on them. Furthermore, because many nurses work shifts and work both during the day and at night, balancing work and home life may be difficult. Studies of nurses indicate that difficulty balancing work and home life increases the desire to leave the job.^{6, 7} High job turnover and labour shortage due to a declining birth rate coupled with an ageing population have long been a concern for the nursing profession.⁸ Considering this, promoting WLB measures that make it easier for nurses to work is an essential task for Japan.

One important concept related to WLB is work–family conflict.⁹ This concept refers to conflict over roles when a person is unable to balance their roles at work and home, and a relationship has been demonstrated to exist between work and family conflict and decreased performance at work, the desire to leave a job, and increased instances of depression.¹⁰ Meanwhile, in recent years, the positive effects of balancing work and family life, such as work–family facilitation and work–family enrichment, have become apparent.^{11, 12} For instance, work–family enrichment occurs when experience in one role increases other experiences' quality.¹¹

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Abbreviations: AC, affective commitment; BJSQ, brief job stress questionnaire; FWNS, family-work negative spillover; FWPS, family-work positive spillover; JD-R, job demands-resources; WE, work engagement; WFNS, work-family negative spillover; WFPS, work-family positive spillover; WLB, work-life balance

Further, a relationship has been demonstrated between work and family enrichment and job satisfaction, physical health, and mental health.¹³ In other words, to study WLB comprehensively, we must understand both the adverse effects due to difficulties balancing work and family, such as work–family conflict, and the positive impact due to successful balancing of work and family life, such as work–family enrichment.

Recent research on occupational stress has centred on so-called positive mental measures, which focus on identifying and further developing the individual workers and workplace groups' strengths. The psychological concept of work engagement (WE) is at the centre of these positive mental measures. WE is defined as “a positive, fulfilling, work-related state of mind characterised by vigor, dedication, and absorption.”¹⁴ A relatively large number of studies on WE among nurses have focused on the relationship between WE and work environment factors,^{15, 16} and have reported that job resources, which refer to supervisor support and rewards, are related to WE.^{17, 18} In Japan, many studies of nurses have focused on the association between WE and work environment factors,¹⁹ and the association between WE and subsequent factors such as intention to continue, intention to leave, and sense of well-being have also been examined.^{20, 21}

The importance of WLB is increasing yearly in the nursing profession in Japan,⁵ and it has been shown that nurses' WLB is related to mental health.²² However, few studies have focused on the relationship between WLB and WE for nurses. Okada et al. conducted a cross-sectional study on female nurses using the concept of work–family spillover.^{23, 24} The results show that WE is increased by family–work positive spillover (FWPS), which is when the fulfilment of roles at home has a positive effect on work roles.

Further, the results indicate that having multiple roles at work and home is vital for improving WE. Considering the shortage of nurses in Japan,⁸ every individual nurse needs to be actively engaged with their work and perform well. This study also focuses on how nurses balance roles at work and at home. Further, it uses the concept of work–family spillover to study the extent to which WE is impacted by the harmful effects of conflict between work and family roles and the positive impact of well-balanced work and family roles.²⁴ Consistent with the results from Okada et al.,²³ FWPS is also expected to be the work–family spillover element that significantly affects WE in this study.

Hypothesis 1: The positive impact of family roles on work roles (FWPS) exhibits a significant effect on WE.

One occupational stress model is the job demands-resources model (JD-R model).²⁵ This model's distinctive characteristic is that WE encompassed as a mediating variable between job resources and organizational variables in the motivational processes. A concept that is representative of organizational variables in the JD-R model is organizational commitment. Organizational commitment is defined as “emotional attachment to an organization characterised by sharing the organization's values and goals, wanting to remain at the organization, and having a desire to work hard as a representative of the organization.”²⁶ Organizational commitment is widely known as an organizational variable that predicts turnover.^{27, 28} It is also known to be directly related to other work-related outcome variables, such as organizational citizenship behaviour.^{29, 30} As has been demonstrated with the JD-R model's motivational processes, increasing WE is thought to increase organizational commitment and form an organization's attachment.^{25, 31} Furthermore, forming an attachment to an organization decreases the desire to leave a job. It improves organizational citizenship behavior, and measures that increase WE are thought to benefit individual workers and the organizations to which they belong.

Meanwhile, even before WE was proposed, some research indicated that organizational commitment affects job involvement, which affects the opposite direction to the effect in the JD-R model.^{32, 33} Recently, Yang et al. performed a cross-sectional study on healthcare workers and found that the relationship between job stress factors and work performance is mediated by affective commitment, which is the core principle of organizational commitment.³⁴ Therefore, as demonstrated with motivational processes, we can conclude that WE affects organizational commitment and conversely, organizational commitment affects WE. In other words, it is possible that when a worker forms an attachment to an organization, the worker will be able to engage with work actively. However, most recent studies follow the JD-R model and investigate the effect of WE on organizational commitment,^{31, 35} and there is a lack of research in the opposite direction, that is, on the effect of organizational commitment on WE. The present study investigates the effect of organizational commitment on WE to address this.

Hypothesis 2: Organizational commitment exhibits a significant main effect towards WE.

In addition to the direct effect of organizational commitment on WE, this study also focuses on the adjustment effect of organizational commitment. Begley and Czajka demonstrated that organizational commitment has an adjustment effect that weakens

the relationship between organizational stress and job dissatisfaction.³⁶ However, like Begley and Czajka,³⁶ existing research on the adjustment effect of organizational commitment has focused only on the relationship between stress factors and stress responses. It has not investigated whether organizational commitment affects the relationship between WE and WLB or job resources related to WE when a positive work-related variable, such as WE, is used as a dependent variable and WLB or job resources related to WE are used as independent variables.

Mottaz indicated that organizational commitment is more strongly affected by intrinsic rewards, such as happiness derived from work itself, than extrinsic rewards, such as salary.³⁷ A study on nurses that examined the relationship between organizational commitment and work-related behavior demonstrated a relationship between a nurse's organizational commitment and self-development behavior. The nurse strives to work at a high level as a specialist.³⁸ These findings indicate that the sense of belonging in an organization can vary based on differences in workers' values regarding their work. In other words, nurses with strong organizational commitment derive powerful intrinsic rewards, such as happiness, from performing their work, and these nurses actively engage in their work. Thus, compared to nurses with low organizational commitment, nurses with high organizational commitment may place more value on the job resources they need to engage in their work and the positive effect of their family roles on their work roles. Based on the above, this study uses job resources and WLB as independent variables and WE as the dependent variable to investigate the adjustment effect of organizational commitment on the relationship between those factors.

Hypothesis 3: Organizational commitment strengthens the relationship between job resources and WE.

Hypothesis 4: Organizational commitment strengthens the relationship between FWPS in WLB and WE.

SUBJECTS AND METHODS

Participants

An anonymous cross-sectional questionnaire survey was administered to nurses working at a university hospital in Japan's Chugoku region. The participants were provided with envelopes containing explanatory documents and questionnaires describing the study's purpose, personal information protection, and data management methods. The survey period was from December 2019 to January 2020. Of the 757 people who

received the survey, 533 responded (70.4% response rate). Of these, missing values and data with entry errors were excluded. Data on nurses working in departments with five or more employees were used in the analysis to consider the influence of workplace group units, and data on nurses working in smaller numbers were excluded from the analysis. The final data used in the analysis were from 425 participants (37 men and 388 women). The mean age of the participants was 32.8 years (standard deviation 8.9).

The Ethical Review Committee of the Tottori University School of Medicine approved this study (Reference number: 19A147).

Measures

Demographic characteristics

The following items were included: age, gender, education, marital status, number of children, care recipients (living together or apart), occupation, a career in the current job, employment status, managerial position, night shift in a recent month, and overtime work in a recent week.

Work-life balance

The Japanese version of the work-life balance scale was used.³⁹ This scale was developed using the concept of work-family spillover, which refers to the fact that situations and experiences in one role of work/family also influence situations and experiences in the other function of work/family.²⁴ This scale also focuses on positive emotions and the negative emotions of burden and conflict experienced by employing multiple roles. This scale, similar to work-family conflict, allows the examination of the direction of work-to-family and family-to-work influences and consists of four subscales: work-family negative spillover (WFNS), family-work negative spillover (FWNS), work-family positive spillover (WFPS), and family-work positive spillover (FWPS). The work-life balance scale consists of 22 items: 8 for WFNS, 5 for WFPS, 4 for FWNS, and 5 for FWPS. These items were evaluated on a 4-item scale (from 0 "never" to 3 "always").

Job demands

Six items from the Brief Job Stress Questionnaire (BJSQ) were used to evaluate the quantitative and qualitative work burden.⁴⁰ These items were evaluated on a 4-point scale where the higher the work burden, the higher the score.

Job resources

We used job control, supervisor support, and co-worker

support, as well as job demands from the BJSQ.⁴⁰ Extrinsic rewards from the Japanese short version of the effort–reward imbalance model questionnaire were also used.⁴¹ Job control, supervisor support, and co-worker support consisted of three items, and extrinsic rewards consisted of seven items. All items were rated on a 4-item scale, and the higher the job control, support of supervisors and co-workers, and extrinsic rewards, the higher the score.

Work engagement

A shortened version of the Japanese version of the Utrecht work engagement scale was used.⁴² This scale consists of nine items in three subscales: vigor, dedication, and absorption. Responses were requested on a 7-point scale (0 to 6), ranging from “Never” to “Always/Every day.”

Affective commitment

The three-dimensional organizational commitment scale consists of three subscales: affective commitment, continuance commitment, and normative commitment.⁴³ In this study, we used six items of the affective commitment scale,⁴³ which indicates emotional attachment to the organization, and asked participants to rate their responses on a 5-point scale (from 1 point “not applicable” to 5 points “fairly applicable”).

Statistical analyses

First, after calculating the fundamental statistics for each variable, differences in each variable by marital status were examined using *t*-test and chi-square test.

Second, Pearson’s correlation coefficients between each variable were calculated. Additionally, as the questionnaires were distributed and collected at the departmental level, the data obtained were expected to have a multilevel structure, including individual and departmental levels. Therefore, the intraclass correlation coefficient was calculated to examine the effect of the departmental level.

Third, hierarchical multiple regression analyses were conducted to examine the effects of demographic characteristics, job demands and resources, work–family spillover, and affective commitment on WE. Demographic characteristics were used in Step 1, job demands and resources in Step 2, work–family spillover in Step 3, and affective commitments in Step 4. Then, to test the interaction effects of job demands and resources and affective commitment and work–family spillover and affective commitment, each interaction was entered in Step 5.⁴⁴ The interactions were calculated after centering each variable on accounting for multicollinearity

issues.

The analysis was performed using IBM SPSS Statistics version 26 and R version 4.0.0. The significance level for all analyses was set at 5%.

RESULTS

Descriptive statistics

Table 1 shows the demographics of the participants in the analysis. About 90% of the participants were female, 42.4% had a spouse, and 57.6% had no spouse.

Table 2 shows the differences in each variable by marital status. The group with a spouse had a higher age and career in the current job, a higher percentage of managerial positions, and a lower number of night shifts than the group without a spouse. They also had higher supervisor support and higher WE and affective commitment. For work-life balance, WFNS was high, but WFPS and FWPS were high as well.

The intraclass correlation, Pearson’s correlation, and reliability coefficients are shown in Table 3. The intraclass correlation was significantly higher than 0.1, only for age and number of night shifts. All other variables were not significant and less than 0.1. Therefore, we judged that the variation at the multilevel structure’s department level was small for each variable used in this study and conducted the individual-level analysis.

Pearson’s correlation coefficients showed strong correlations among age and length of service, WFPS, and FWPS. Moderate correlations were found between job demands and WFNS, WFNS, and FWNS. Furthermore, the relationship between FWPS and WE, between WE and affective commitment, was moderate.

Although the reliability coefficients for extrinsic rewards were slightly low at 0.65, the rest of the coefficients were above 0.70, considered sufficient.

Hierarchical multiple regression analysis

With WE as the dependent variable, Table 4 shows the results of entering the interaction between job demands, resources, and affective commitment in Step 5, and Table 5 shows the results of joining in the interaction between work–family spillover and affective commitment in Step 5. The unstandardized coefficients, 95% confidence intervals of unstandardized coefficients, standardized coefficients, *P*-values, and VIFs in the two tables are the values obtained when all the variables in Steps 1 to 5 are employed. Considering the multicollinearity problem due to the high correlation coefficient between age and career in the current job in Table 3, we did not include age. Although WFPS and FWPS showed strong correlation, we judged that the problem of multicollinearity was small based on the value of VIF

Table 1. Characteristics of respondents (n = 425)

	<i>n</i>	%	Mean	SD
Age (years)			32.8	8.9
Gender				
Men	37	8.7		
Women	388	91.3		
Education				
University/graduate school graduate	199	46.8		
Junior college graduate	51	12.0		
Vocational school/college graduate	157	36.9		
High school graduate	16	3.8		
Others	2	0.5		
Marital status				
Spouse Yes	180	42.4		
Spouse No	245	57.6		
Number of child(ren)				
0	274	64.5		
1	39	9.2		
2	69	16.2		
3	31	7.3		
≥ 4	12	2.8		
Care recipient (living together)				
Yes	19	4.5		
No	406	95.5		
Care recipient (living apart)				
Yes	25	5.9		
No	400	94.1		
Occupation				
Nurse	401	94.4		
Midwife	24	5.6		
Career in the current job (years)			8.7	7.8
Employee status				
Full-time	412	96.9		
Part-time · others	13	3.1		
Managerial position				
Yes	67	15.8		
No	358	84.2		
Night shift in a recent month (times)			4.9	3.3
Overtime work in a recent week (hours)			4.9	10.9

(1.02–2.62); thus, we entered the two variables.

With WE as the dependent variable, Tables 4 and 5 show a significant increase in the coefficients of determination in Steps 2–4 (ΔR^2) with the strongest effect on affective commitment ($\beta = 0.42, 0.41$; Tables 4

and 5, respectively) followed by FWPS ($\beta = 0.24, 0.25$) and number of children ($\beta = 0.12, 0.13$). All were positive impacts. Job demands and resources did not show a significant direct effect. In Table 4, the increase in the determination coefficient was significant only when an

Table 2. Difference in study variables by marital status ($n = 425$)

	Spouse No $n = 245$		Spouse Yes $n = 180$		Total $n = 425$		<i>P</i> value
	Mean	SD	Mean	SD	Mean	SD	
Age (years)	29.7	7.9	36.9	8.6	32.8	8.9	0.000
Gender n (%)							
Men	21	(8.6)	16	(8.9)	37	(8.7)	0.909*
Women	224	(91.4)	164	(91.1)	388	(91.3)	
Career in the current job (years)	5.9	6.3	12.5	8.2	8.7	7.8	0.000
Managerial position n (%)							
Yes	23	(9.4)	44	(24.4)	67	(15.8)	0.000*
No	222	(90.6)	136	(75.6)	358	(84.2)	
Night shift in a recent month (times)	5.2	3.0	4.5	3.6	4.9	3.3	0.030
Overtime work in a recent week (hours)	5.1	11.5	4.7	10.2	4.9	10.9	0.738
Job demands	19.5	2.9	19.7	2.7	19.6	2.8	0.460
Job control	7.6	1.6	7.8	1.6	7.7	1.6	0.097
Supervisor support	7.9	1.9	8.3	1.9	8.0	1.9	0.042
Co-worker support	9.0	2.1	8.9	2.0	8.9	2.0	0.669
Extrinsic reward	19.6	2.4	19.9	2.2	19.7	2.3	0.181
Work to family negative spillover	6.9	4.9	9.0	5.6	7.8	5.3	0.000
Work to family positive spillover	5.0	3.0	5.8	2.9	5.3	3.0	0.004
Family to work negative spillover	1.0	1.8	0.9	1.6	1.0	1.7	0.505
Family to work positive spillover	4.5	3.2	6.2	3.1	5.2	3.3	0.000
Work engagement	22.3	9.2	26.4	8.3	24.1	9.0	0.000
Affective commitment	18.7	3.8	19.8	3.8	19.2	3.9	0.004

*chi-square test.

interaction between supervisor support and affective commitment was entered in Step 5 ($P < 0.05$, *n.s.* for all others). A simple slope analysis revealed that, for low affective commitment (mean $- 1$ SD), the WE did not change with the support of the supervisor; however, for high affective commitment (mean $+ 1$ SD), WE increased with the support of the supervisor (Fig. 1). As shown in Table 5, the increase in the determination coefficient was significant only when an interaction between FWNS and affective commitment was introduced in Step 5 ($P < 0.01$, *n.s.* for all others). When the affective commitment was low (mean $- 1$ SD), higher FWNS resulted in lower WE; however, when it was high (mean $+ 1$ SD), higher FWNS did not change WE (Fig. 2).

DISCUSSION

This study aimed to examine the effects of WLB, organizational commitment, and job demands and resources on WE among nurses. Furthermore, we examined

whether the level of organizational commitment modulates the relationships between job resources and WE and between FWPS and WE. Affective commitment, FWPS, and the number of children directly affected WE, respectively, concerning the extent of the impact. Job demands and resources did not have significant effects on any of the variables. Additionally, the affective commitment had a moderating effect on the association between support from supervisors and WE and between FWNS and WE.

First, from among the four aspects of WLB, only FWPS showed a significant association with WE, thus supporting Hypothesis 1. These results are similar to those reported by Okada et al.²³ Second, the effect of FWPS was more significant for nurses who were married than for those who were not married ($P < 0.05$; Table 2). This finding is similar to that reported by Okada et al.²³ In other words, the present results corroborate the findings of Okada et al. that having

Table 3. Intraclass coefficient, correlations and reliability estimates for study variables (Cronbach's alpha) (n = 425)

	ICC	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Age (years)	0.14*	–															
2. Career in the current job (years)	0.06	0.85**	–														
3. Night shift in a recent month (times)	0.30**	0.03	0.06	–													
4. Overtime work in a recent week (hours)	0.01	–0.05	–0.04	0.04	–												
5. Number of child(ren)	0.02	0.56**	0.53**	–0.13**	–0.08	–											
6. Job demands	0.06	0.06	0.07	0.04	–0.02	0.05	(0.83)										
7. Job control	0.05	0.07	0.13**	0.01	0.00	0.05	–0.20**	(0.70)									
8. Supervisor support	0.07	–0.03	–0.02	–0.07	0.04	0.05	–0.08	0.30**	(0.83)								
9. Co-worker support	0.02	–0.14**	–0.10*	–0.06	–0.01	–0.07	–0.06	0.31**	0.61**	(0.90)							
10. Extrinsic reward	0.01	–0.03	0.00	–0.02	0.06	–0.03	–0.24**	0.32**	0.44**	0.28**	(0.65)						
11. Work to family negative spillover	0.00	0.14**	0.11*	–0.04	–0.03	0.27**	0.40**	–0.22**	–0.16**	–0.18**	–0.31**	(0.91)					
12. Work to family positive spillover	0.00	–0.03	0.00	–0.10*	–0.01	0.13**	–0.01	0.14**	0.25**	0.18**	0.18**	0.08	(0.81)				
13. Family to work negative spillover	0.00	0.05	0.07	0.07	–0.01	0.00	0.09	–0.10*	–0.07	–0.05	–0.24**	0.40**	0.11*	(0.84)			
14. Family to work positive spillover	0.00	0.14**	0.15**	–0.08	–0.01	0.25**	0.00	0.20**	0.31**	0.18**	0.21**	0.07	0.71**	0.04	(0.85)		
15. Work engagement	0.00	0.22**	0.20**	–0.16**	0.02	0.25**	–0.05	0.31**	0.33**	0.21**	0.34**	–0.11*	0.34**	–0.09	0.44**	(0.93)	
16. Affective commitment	0.01	0.17**	0.18**	–0.21**	0.04	0.14**	–0.02	0.31**	0.34**	0.17**	0.40**	–0.16**	0.29**	–0.08	0.32**	0.59**	(0.85)

* $P < 0.05$; ** $P < 0.01$.

multiple roles at work and home improves WE.²³

It is known that employees who are married or have children are very likely to use family benefit systems to balance work and family life.⁴⁵ Further, improvement in WE is associated with psychological health, job performance and well-being.^{21, 46} In other words, it is conceivable that it may be beneficial to develop policies that consider nurses' household roles,

such as offering shorter work hours and time off for child-rearing and eldercare. This would enable nurses to work energetically and maintain their health. Their improved job performance would, in turn, contribute to the revitalization of hospital organizations.

This study's results did not indicate significant direct associations between job resources and any of the variables. These results differed from those of Okada et

Table 4. Results of hierarchical multiple regression analysis which tested interaction effects of job demand and resources, affective commitment ($n = 425$)

	B^a	95% CI	β^b	P value	ΔR^2	Adjusted R^2	VIF
Step 1					0.10	0.09***	
Gender (0 = Men, 1 = Women)	0.49	-1.88 — 2.87	0.02	0.684			1.08
Marital status (0 = Spouse No, 1 = Yes)	0.44	-1.29 — 2.17	0.02	0.618			1.77
Number of child(ren)	0.94	0.12 — 1.76	0.12	0.024			2.15
Career in the current job (years)	-0.02	-0.14 — 0.10	-0.02	0.721			2.21
Managerial position (0 = No, 1 = Yes)	1.74	-0.38 — 3.86	0.07	0.108			1.44
Night shift in a recent month (times)	-0.06	-0.27 — 0.15	-0.02	0.578			1.17
Overtime work in a recent week (hours)	0.01	-0.05 — 0.06	0.01	0.866			1.02
Step 2					0.17***	0.25***	
Job demands	0.06	-0.21 — 0.32	0.02	0.665			1.34
Job control	0.43	-0.04 — 0.90	0.08	0.071			1.33
Supervisor support	0.07	-0.41 — 0.54	0.01	0.784			2.03
Co-worker support	0.24	-0.19 — 0.66	0.05	0.269			1.74
Extrinsic reward	0.25	-0.10 — 0.60	0.06	0.160			1.59
Step 3					0.08***	0.33***	
Work to family negative spillover	-0.09	-0.25 — 0.07	-0.06	0.248			1.75
Work to family positive spillover	-0.05	-0.37 — 0.28	-0.01	0.785			2.27
Family to work negative spillover	-0.05	-0.48 — 0.39	-0.01	0.836			1.34
Family to work positive spillover	0.66	0.36 — 0.97	0.24	0.000			2.37
Step 4					0.10***	0.44***	
Affective commitment	0.97	0.76 — 1.18	0.42	0.000			1.57
Step 5					0.02	0.44***	
Job demands \times Affective commitment	0.02	-0.04 — 0.08	0.03	0.447			1.17
Job control \times Affective commitment	-0.02	-0.14 — 0.10	-0.02	0.717			1.68
Supervisor support \times Affective commitment	0.13	0.01 — 0.25	0.11	0.032			2.08
Co-worker support \times Affective commitment	-0.06	-0.16 — 0.04	-0.05	0.271			1.94
Extrinsic reward \times Affective commitment	0.04	-0.05 — 0.12	0.04	0.385			1.71

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$. ^aUnstandardized regression coefficients. ^bStandardized regression coefficients. VIF, variance inflation factor.

Table 5. Results of hierarchical multiple regression analysis which tested interaction effects of work-life balance and affective commitment ($n = 425$)

	B^a	95% CI	β^b	P value	ΔR^2	Adjusted R^2	VIF
Step 1					0.10	0.09***	
Gender (0 = Men, 1 = Women)	0.21	-2.17 — 2.58	0.01	0.865			1.08
Marital status (0 = Spouse No, 1 = Yes)	0.34	-1.39 — 2.07	0.02	0.700			1.77
Number of child(ren)	1.03	0.21 — 1.85	0.13	0.014			2.14
Career in the current job (years)	-0.03	-0.15 — 0.09	-0.03	0.631			2.17
Managerial position (0 = No, 1 = Yes)	1.85	-0.28 — 3.98	0.07	0.089			1.46
Night shift in a recent month (times)	-0.07	-0.28 — 0.14	-0.03	0.519			1.19
Overtime work in a recent week (hours)	0.01	-0.05 — 0.07	0.01	0.761			1.03
Step 2					0.17***	0.25***	
Job demands	0.03	-0.23 — 0.29	0.01	0.817			1.30
Job control	0.34	-0.07 — 0.86	0.07	0.092			1.33
Supervisor support	0.11	-0.36 — 0.58	0.02	0.643			2.00
Co-worker support	0.23	-0.19 — 0.65	0.05	0.276			1.72
Extrinsic reward	0.22	-0.13 — 0.57	0.06	0.223			1.60
Step 3					0.08***	0.33***	
Work to family negative spillover	-0.08	-0.24 — 0.08	-0.05	0.337			1.75
Work to family positive spillover	-0.04	-0.37 — 0.28	-0.01	0.793			2.24
Family to work negative spillover	-0.05	-0.49 — 0.38	-0.01	0.814			1.35
Family to work positive spillover	0.70	0.40 — 1.01	0.25	0.000			2.35
Step 4					0.11***	0.44***	
Affective commitment	0.97	0.76 — 1.18	0.41	0.000			1.54
Step 5					0.01	0.44***	
Work to family negative spillover \times Affective commitment	0.00	-0.04 — 0.03	0.00	0.916			1.38
Work to family positive spillover \times Affective commitment	0.03	-0.05 — 0.10	0.03	0.496			2.62
Family to work negative spillover \times Affective commitment	0.14	0.02 — 0.26	0.11	0.018			1.31
Family to work positive spillover \times Affective commitment	-0.01	-0.08 — 0.06	-0.01	0.819			2.54

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$. ^aUnstandardized regression coefficients. ^bStandardized regression coefficients. VIF, variance inflation factor.

al. and other previous studies that reported a significant association between WE and job resources.^{17, 18, 23, 47} The variables related to job resources used in the present study pertained to control and support in the job demands–control–support model and extrinsic rewards from the effort–reward imbalance model.^{48, 49} These variables are related to job resources in the conventional representative occupational stress model. These variables were defined and used as they were.

However, Okada et al. combined the variables of job resources at the job level,²³ department level, and workplace level from the New Brief Job Stress Questionnaire.⁵⁰ They used them for a similar hierarchical multiple regression analysis as conducted in the present study. Therefore, the differing results between these two studies could be attributed to the fact that the present study did not examine job resources as a part of job level, department level, and workplace level

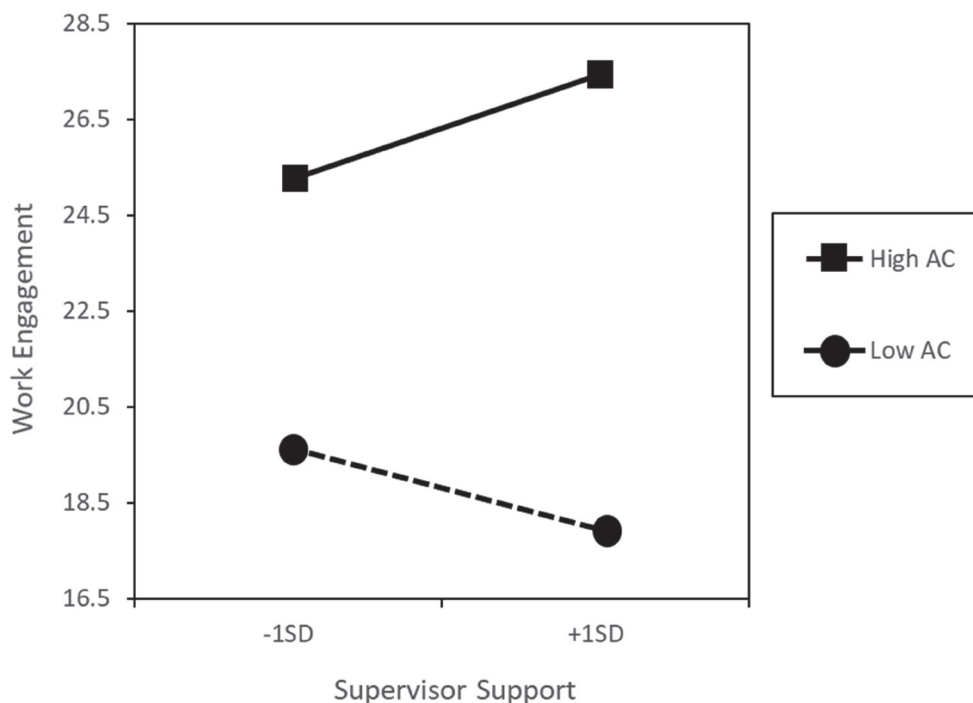


Fig. 1. Interaction effect of supervisor support and affective commitment on work engagement.

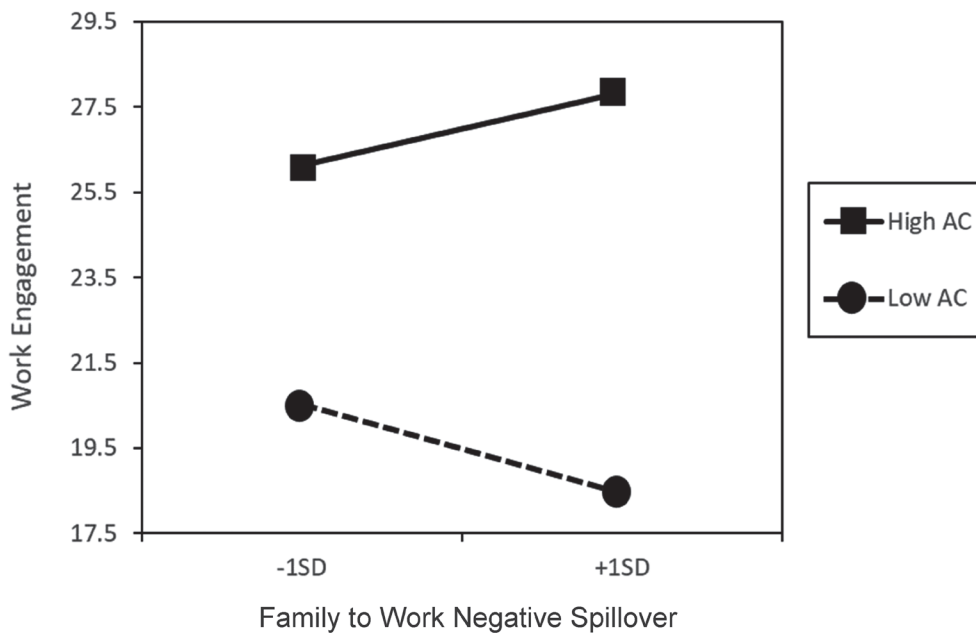


Fig. 2. Interaction effect of family to work negative spillover and affective commitment on work engagement.

variables. Indeed, the use of these variables separately or consolidating them as a single variable affected the results. Considering that job resources are an extremely comprehensive concept,⁵¹ future studies need to investigate how the concepts used to assess job resources and

the differences in calculation methods affect the results and reflect the actual workplace situation accurately.

The affective commitment had the strongest association with WE, thus supporting Hypothesis 2. Mowday et al. commented that, among the differences

between organizational commitment and job satisfaction, the latter is readily affected by day-to-day events while the former is not.²⁶ Organizational commitment takes a relatively long time to develop, and it is stable. Additionally, in nurses, affective commitment is associated with learning behavior and professional activities.^{38, 52} In other words, when organizational commitment increases, nurses can consistently in a state of high WE and can work on nursing service diligently. Considering the JD-R model's organizational attachment formation process,²⁵ it is conceivable that workplace environments with abundant job resources and where work is fulfilling invigorate employees to work energetically. Further, engaging in work with a positive attitude leads to the formation of organizational attachment. We believe that organizational attachment formation creates a virtuous circle that enables employees to work energetically consistently and sustainably.

This study demonstrated two moderating effects of affective commitment. The results indicated that WE increased when the affective commitment was high, and there was support from supervisors. However, when the affective commitment was low, WE did not change despite support from supervisors. This shows the moderating effect of affective commitment on the association between supervisors and WE's support, thus partially supporting Hypothesis 3. This finding suggests that nurses who are attached to the organization can work even more energetically if they have support from supervisors.

WE can be improved effectively by providing abundant job resources.⁵³ Based on the Pearson product-moment correlation coefficient, the present study found a significant positive association between each variable of job resources and WE (Table 3). However, this result was not confirmed in the hierarchical multiple regression analysis (Tables 4 and 5). Therefore, it is essential to develop a deeper understanding of employees' sense of belonging to their organizations and their value on their job descriptions. Although the JD-R model positions WE as a mediator in the relationship between job resources and organizational commitment,²⁵ the present results observed individual differences in the extent to which job resources increased WE. In other words, it is conceivable that organizational commitment is formed by first improving WE.²⁵ Furthermore, the present results suggest that organizational commitment indirectly affects WE through supervisors' support, which is a job resource.

This study did not find significant moderating effects of affective commitment in the association of FWPS with WLB and WE. Thus, Hypothesis 4 was not supported. Meanwhile, it was observed that when the

affective commitment was low, WE decreased if FWNS was high. Conversely, when the affective commitment was high, there was no change in WE even when FWNS was high. In other words, this study found that affective commitment had significant moderating effects on the association of FWNS with WLB and WE. These results suggest that organizational attachment buffers the home's negative influence, thus enabling nurses to continue to work energetically.

Aryee et al. reported that work-life balance is associated with affective commitment and used the social exchange theory to explain the effect of WLB measures on organizations.^{54, 55} They found that when employees perceive that the organization shows concern and interest in their work and family roles, the employees begin to feel obligated to reciprocate to the organization.⁵⁴ Possibly, when organizations promote WLB policies that consider employees' families, employees experience a sense of attachment to their organization, and they work energetically in return. Furthermore, due to the moderating effect of affective commitment on the association between FWNS and WE, promotion of WLB may enable nurses to continue to perform even better despite the negative impact of FWNS on WE.

Finally, there were several limits to this study. The survey results were obtained from nurses working at a single university hospital. Therefore, it is necessary to verify these results with nurses from other institutions. Additionally, as this was a cross-sectional survey, each measured variable's causal relationships cannot be described. There is a need to conduct a longitudinal study in the future, especially to examine the causal relationship between affective commitment and WE. Further, WFPS did not have a significant effect on WE. This study focused on examining the extent to which work-family spillover affects WE. Therefore, WE was set as the dependent variable. However, studies have suggested that expending positive efforts at work has a positive work-to-family effect, that WE mediates WFPS.⁵⁶ Further, they suggest that this relationship is linked to satisfaction with home life.⁵⁷ In the future, it will be necessary to examine this positive cycle of work and home balance in which WE mediates the relationship between FWPS and WFPS. This study only examined affective commitment, the representative subordinate concept of organizational commitment. The present findings demonstrated the importance of the level of affective commitment in the JD-R model motivational process. However, it will be necessary to verify whether normative and continuance commitment also have similar effects in the future. Finally, as described in the Discussion section, the variables related to job resources used in this study were those of the work level variables

in the representative occupational stress model.^{48, 49} The present results demonstrate that WE improves due to the interaction between support from supervisors and affective commitment. However, job resources are a comprehensive concept that includes other variables, such as how work is performed in the organization that were not used in this study.⁵¹ Therefore, in the future, it will be necessary to examine which variables of job resources are associated with WE and under which conditions job resources exhibit an association with WE.

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REFERENCES

- Office for Work-Life Balance, Gender Equality Bureau, Cabinet Office. [Internet]. Tokyo: Work-life balance charter [cited 2020 Nov 12]. Available from: <http://www.cao.go.jp/wlb/towa/index.html>. Japanese.
- Takeishi E. Challenges to achieving a work-life balance: Implications from an international comparative Study. RIETI policy discussion paper series 10-P-004. 2010;1-36.
- The Japan Institute for Labour Policy and Training [Internet]. Tokyo: Work-life balance [cited 2005 Dec]. Available from: https://www.jil.go.jp/foreign/labor_system/2005_12/world_01.html. Japanese.
- Bureau of International Health Cooperation. National Center for Global Health and Medicine [Internet]. Tokyo: State of world's nursing [cited 2020 Nov]. Available from: https://kyo-kuhp.ncgm.go.jp/library/other_doc/2020/Sekainokango2020_light_n.pdf. Japanese.
- Japan Nursing Association. 2010-2015 Work-Life Balance (WLB) Index Survey of Nursing Professionals. Tokyo: Mitsubishi UFJ Research & Consulting Co; 2016. Japanese.
- Brewer CS, Kovner CT, Greene W, Cheng Y. Predictors of RNs' intent to work and work decisions 1 year later in a U.S. national sample. *Int J Nurs Stud*. 2009;46:940-56. DOI: 10.1016/j.ijnurstu.2008.02.003, PMID: 18377910
- Simon M, Kümmerling A, Hasselhorn HM; Next-Study Group. Work-home conflict in the European nursing profession. *Int J Occup Environ Health*. 2004;10:384-91. DOI: 10.1179/oe.2004.10.4.384, PMID: 15702752
- Japan Ministry of Health. Labor and Welfare [Internet]. Tokyo: Dainanaji Kangoshokuin jukyumitooshi ni kansuru kentouhoukokusho [cited 2010 Dec 14]. Available from: <https://www.mhlw.go.jp/stf/houdou/2r9852000000z68-fimg/2r9852000000z6df.pdf>. Japanese.
- Greenhaus JH, Beutell NJ. Sources of Conflict Between Work and Family Roles. *Acad Manage Rev*. 1985;10:76-88. DOI: 10.5465/amr.1985.4277352
- Allen TD, Herst DEL, Bruck CS, Sutton M. Consequences associated with work-to-family conflict: A review and agenda for future research. *J Occup Health Psychol*. 2000;5:278-308. DOI: 10.1037/1076-8998.5.2.278, PMID: 10784291
- Greenhaus JH, Powell GN. When Work And Family Are Allies: A Theory Of Work-Family Enrichment. *Acad Manage Rev*. 2006;31:72-92. DOI: 10.5465/amr.2006.19379625
- Wayne JH, Grzywacz JG, Carlson DS, Kacmar KM. Work-family facilitation: A theoretical explanation and model of primary antecedents and consequences. *Hum Resour Manage Rev*. 2007;17:63-76. DOI: 10.1016/j.hrmr.2007.01.002
- McNall LA, Nicklin JM, Masuda AD. A Meta-Analytic Review of the Consequences Associated with Work-Family Enrichment. *J Bus Psychol*. 2010;25:381-96. DOI: 10.1007/s10869-009-9141-1
- Schaufeli WB, Salanova M, González-romá V, Bakker AB. The Measurement of Engagement and Burnout: A Two Sample Confirmatory Factor Analytic Approach. *J Happiness Stud*. 2002;3:71-92. DOI: 10.1023/A:1015630930326
- Simpson MR. Engagement at work: A review of the literature. *Int J Nurs Stud*. 2009;46:1012-24. DOI: 10.1016/j.ijnurstu.2008.05.003, PMID: 18701104
- Sakai M, Naruse T, Watai I, Arimoto A, Murashima S. A Literature Review on Work Engagement of Nurses. *J Jpn Acad Nurs Sci*. 2012;32:71-78. Japanese with English abstract. DOI: 10.5630/jans.32.4_71
- Spence Laschinger HK, Wilk P, Cho J, Greco P. Empowerment, engagement and perceived effectiveness in nursing work environments: does experience matter? *J Nurs Manag*. 2009;17:636-46. DOI: 10.1111/j.1365-2834.2008.00907.x, PMID: 19575722
- Adriaenssens J, De Gucht V, Van Der Doef M, Maes S. Exploring the burden of emergency care: predictors of stress-health outcomes in emergency nurses. *J Adv Nurs*. 2011;67:1317-28. DOI: 10.1111/j.1365-2648.2010.05599.x, PMID: 21371083
- Tsukada T. Research trend and penetration of Work Engagement in Japan: from domestic literature review and net search results. *Keieironshu*. 2017;6:43-53. Japanese.
- Nakamura M, Yoshioka S. Factors related to work engagement among nursing staffs working in a university hospital. *J Yonago Med Ass*. 2016;67:17-28. Japanese with English abstract.
- Saiga E, Yoshioka S. Factors Influencing the Happiness of Japanese Nurses: Association with Work Engagement and Workaholicism. *Kawasaki J Med Welf*. 2021;26:81-93.
- Nakai M, Oda Y, Takahashi Y, Tabuchi Y, Kimura N, Morioka I. Relationship between work-life balance and mental health of nurses in a hospital. *Jpn J Health Edu Promotion*. 2011;19:302-21. Japanese with English abstract.
- Okada N, Yabase K, Kobayashi T, Okamura H. Do multiple personal roles promote working energetically in female nurses? A cross-sectional study of relevant factors promoting work engagement in female nurses. *Environ Health Prev Med*. 2019;24:56. DOI: 10.1186/s12199-019-0810-z, PMID: 31510922
- Grzywacz JG. Work-family spillover and health during midlife: is managing conflict everything? *Am J Health Promot*. 2000;14:236-43. DOI: 10.4278/0890-1171-14.4.236, PMID: 10915535
- Bakker AB, Demerouti E. The Job Demands-Resources model: state of the art. *J Manag Psychol*. 2007;22:309-28. DOI: 10.1108/02683940710733115
- Mowday RT, Steers RM, Porter LW. The measurement of organizational commitment. *J Vocat Behav*. 1979;14:224-47. DOI: 10.1016/0001-8791(79)90072-1
- Williams LJ, Hazer JT. Antecedents and consequences of satisfaction and commitment in turnover models: A reanalysis using latent variable structural equation methods. *J Appl Psychol*. 1986;71:219-31. DOI: 10.1037/0021-9010.71.2.219

- 28 Stewart NJ, MacLeod MLP, Kosteniuk JG, Olynick J, Penz KL, Karunanayake CP, et al. The importance of organizational commitment in rural nurses' intent to leave. *J Adv Nurs*. 2020;76:3398-417. DOI: 10.1111/jan.14536, PMID: 33048386
- 29 Bateman TS, Strasser S. A longitudinal analysis of the antecedents of organizational commitment. *Acad Manage J*. 1984;27:95-112. PMID: 10265651
- 30 Morris JH, Sherman JD. Generalizability of an Organizational Commitment Model. *Acad Manage J*. 1981;24:512-26. DOI: 10.2307/255572
- 31 Hakanen JJ, Schaufeli WB, Ahola K. The Job Demands-Resources model: A three-year cross-lagged study of burnout, depression, commitment, and work engagement. *Work Stress*. 2008;22:224-41. DOI: 10.1080/02678370802379432
- 32 Brown SP. A meta-analysis and review of organizational research on job involvement. *Psychol Bull*. 1996;120:235-55. DOI: 10.1037/0033-2909.120.2.235
- 33 Takagi H. Psychological aspects of organizations: An exploration of organizational commitment. Tokyo: Hakutou Shobou; 2003. Japanese.
- 34 Yang T, Guo Y, Ma M, Li Y, Tian H, Deng J. Job Stress and Presenteeism among Chinese Healthcare Workers: The Mediating Effects of Affective Commitment. *Int J Environ Res Public Health*. 2017;14:978. DOI: 10.3390/ijerph14090978, PMID: 28850081
- 35 Santos A, Chambel MJ, Castanheira F. Relational job characteristics and nurses' affective organizational commitment: the mediating role of work engagement. *J Adv Nurs*. 2016;72:294-305. DOI: 10.1111/jan.12834, PMID: 26467032
- 36 Begley TM, Czajka JM. Panel analysis of the moderating effects of commitment on job satisfaction, intent to quit, and health following organizational change. *J Appl Psychol*. 1993;78:552-6. DOI: 10.1037/0021-9010.78.4.552, PMID: 8407703
- 37 Mottaz CJ. Determinants of Organizational Commitment. *Hum Relat*. 1988;41:467-82. DOI: 10.1177/001872678804100604
- 38 Sawada T. The relationship of occupational and organizational commitments with professional activities and burnout tendencies in nurses. *Jpn J Psychol*. 2009;80:131-37. DOI: 10.4992/jjpsy.80.131. Japanese with English abstract.
- 39 Shimada K, Shimazu A, Geurts SAE, Kawakami N. Reliability and validity of the Japanese version of the Survey Work-Home Interaction - NijmeGen, the SWING (SWING-J). *Community Work Fam*. 2019;22:267-83. DOI: 10.1080/13668803.2018.1471588
- 40 Shimomitsu T, Haratani T, Nakamura K, Kawakami N, Hayashi T, Hiro H, et al. Final development of the brief job stress questionnaire mainly used for assessment of the individuals. In: Kato S, editor, Report of the research grant for the prevention of work-related diseases from the Ministry of Labor Tokyo Medical University. Tokyo; 2000. p. 126-64. Japanese.
- 41 Tsutsumi A, Kawanami S, Horie S. Effort-reward imbalance and depression among private practice physicians. *Int Arch Occup Environ Health*. 2012;85:153-61. DOI: 10.1007/s00420-011-0656-1, PMID: 21655960
- 42 Shimazu A, Schaufeli WB, Kosugi S, Suzuki A, Nashiwa H, Kato A, et al. Work Engagement in Japan: Validation of the Japanese Version of the Utrecht Work Engagement Scale. *Appl Psychol*. 2008;57:510-23. DOI: 10.1111/j.1464-0597.2008.00333.x
- 43 Kuratani N, Kido Y. Organizational commitment in the public-administration organization: an empirical study on the antecedents and consequences of organizational commitment. *Sanno Univ Bull*. 2006;26:55-71. Japanese with English abstract.
- 44 Cohen J, Cohen P, West SG, Aiken LS. Applied multiple regression/correlation analysis for the behavioral sciences, 3rd ed. Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers; 2003.
- 45 Thompson CA, Beauvais LL, Lyness KS. When work-family benefits are not enough: the influence of work-family culture on benefit utilization, organizational attachment, and work-family conflict. *J Vocat Behav*. 1999;54:392-415. DOI: 10.1006/jvbe.1998.1681
- 46 Shimazu A, Schaufeli WB, Kubota K, Kawakami N. Do workaholism and work engagement predict employee well-being and performance in opposite directions? *Ind Health*. 2012;50:316-21. DOI: 10.2486/indhealth.MS1355, PMID: 22673364
- 47 Sato Y, Miki A. Influences of Job Stress, Coping profile and social support on work engagement among hospital nurses: A comparative analysis according to their years of clinical experience. *J Sci Labor*. 2014;90:14-25. Japanese with English abstract.
- 48 Johnson JV, Hall EM. Job strain, work place social support, and cardiovascular disease: a cross-sectional study of a random sample of the Swedish working population. *Am J Public Health*. 1988;78:1336-42. DOI: 10.2105/AJPH.78.10.1336, PMID: 3421392
- 49 Siegrist J. Adverse health effects of high-effort/low-reward conditions. *J Occup Health Psychol*. 1996;1:27-41. DOI: 10.1037/1076-8998.1.1.27, PMID: 9547031
- 50 Inoue A, Kawakami N, Shimomitsu T, Tsutsumi A, Haratani T, Yoshikawa T, et al. Development of a short questionnaire to measure an extended set of job demands, job resources, and positive health outcomes: the new brief job stress questionnaire. *Ind Health*. 2014;52:175-89. DOI: 10.2486/indhealth.2013-0185, PMID: 24492763
- 51 Demerouti E, Bakker AB, Nachreiner F, Schaufeli WB. The job demands-resources model of burnout. *J Appl Psychol*. 2001;86:499-512. DOI: 10.1037/0021-9010.86.3.499, PMID: 11419809
- 52 Nakamura E. Relationships between pediatric nurses' learning behavior and work commitment. *FPU J Nurs Res*. 2008;5:80-8. Japanese.
- 53 Bakker AB, Leiter MP. Work engagement: A handbook of essential theory and research. New York: Psychology Press; 2010.
- 54 Aryee S, Srinivas ES, Tan HH. Rhythms of life: antecedents and outcomes of work-family balance in employed parents. *J Appl Psychol*. 2005;90:132-46. DOI: 10.1037/0021-9010.90.1.132, PMID: 15641894
- 55 Blau P. Exchange and power in social life. NY: Wiley; 1964.
- 56 Bakker AB, Geurts SAE. Toward a Dual-Process Model of Work-Home Interference. *Work Occup*. 2004;31:345-66. DOI: 10.1177/0730888404266349
- 57 Bakker AB, Shimazu A, Demerouti E, Shimada K, Kawakami N. Work engagement versus workaholism: a test of the spillover-crossover model. *J Manag Psychol*. 2013;29:63-80. DOI: 10.1108/JMP-05-2013-0148