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## The moderating effect of supervisor and coworker support on the association between work-family conflict and psychological distress in nurses in Okinawa, Japan

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### ABSTRACT

The aim of this study was to clarify the moderating effect of support from coworker and supervisor on the association between work-family conflict and psychological distress in nurse to prevent from intent to leave and promote their quality of life. Self-administered questionnaires were distributed to 2595 nurses at 24 hospitals in Okinawa, Japan on August, 2014. Of the 2311 nurses participated in this study, a total of 2012 nurses completed the valid questionnaires. The questionnaire consisted of as psychological distress as dependent variable, work-family conflict as independent variable, support from supervisor and coworker as mediating variables, and demographic and clinical variables as control variables. We applied hierarchical multiple regression and simple slope analysis to evaluate the mediating effect of support on the association between work-family conflict and psychological distress. The results revealed that the significant interaction of coworkers' support was found on the association between work-family conflict and psychological distress, but not on supervisor' support. The result of simple slope analysis shows that the nurses who have high work-family conflict had significantly higher psychological distress scores than those who have low work-family conflict in low support from coworkers. On the other hand, in high support from coworkers, a non-significant difference in psychological distress score was found between nurses who have high work-family conflict and who has low work-family conflict. This study suggests that coworkers play an important role in the mental health, and the support from coworkers is likely to buffer the relationship between work-family conflict and psychological distress on nurses. *Ryukyu Med. J., 35 (1~4) 41~50, 2016*

Key words: Work-family conflict, Psychological distress, support from supervisor and coworker

### INTRODUCTION

In addition to advances in medical care and treatment, nurses' mental health has been exacerbated by diversity of the severity and needs of inpatients and

shortening of the number of hospital days. Previous studies have shown that nurses experience various and complex stressors resulting from human relations with coworkers and supervisors, patients and patients' family, and work environment.<sup>1-4)</sup> These stressful situations negatively affect not only nurses' mental

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health but also hospital management and patients' quality of care and safety.<sup>5)</sup> For example, psychological distress causes depression, which can lead to suicide,<sup>6)</sup> and it accelerates intention to leave and actual turnover. Moreover, nurses with poor mental health cause errors, near-miss errors, and medicine-related problems that are estimated to be 1.5 to 2.9 times higher than those of nurses with good mental health,<sup>7)</sup> and nurse turnover costs 1.2 to 1.3 times nursing salaries.<sup>8)</sup> Recently, the relationship between work-family conflict and mental health has attracted attention, and taking measures to improve nurses' stress and mental health has become an urgent task.

Work-family conflict is defined as a form of interrole conflict generated by the colliding responsibilities of work and family roles.<sup>9)</sup> A review study on general workers<sup>10)</sup> has shown an association between work-family conflict and individual characteristics (e.g., personality type, personality disposition, trait emotional intelligence), individual well-being (e.g., individual physical and psychological well-being, global and composite job satisfaction, organizational commitment and satisfaction with life), and behavioral outcomes (e.g., absenteeism and turnover intention). The review study suggested that work-family conflict is an important factor in human physical and mental health, and that measures and strategies for work-family conflict must be addressed by all levels of society rather than by individuals.

Previous studies on nurses indicate that high work-family conflict is a previously identified cause of nursing staff turnover,<sup>11,12)</sup> poor psychological health,<sup>13)</sup> emotional exhaustion,<sup>14)</sup> and low efficacy.<sup>15)</sup> Furthermore, in a literature review of the association between work-family conflict and health outcome, Takeuchi proposed that future studies on work-family conflict among nurses should examine the relationship in Japan.<sup>16)</sup> We agree with this suggestion in view of a previous finding that work-family conflict differs according to health outcome and sociocultural background.<sup>17)</sup> That is, work-family conflict not only has negative effects on depression, but it also has positive effects in other countries.<sup>18)</sup> Thus, there is a need to examine the association between work-family conflict and mental health and related buffer factors in Japan.

As a workplace buffer, coworker and supervisor support is an essential element of the physical and mental health of workers and work environments.<sup>19,20)</sup>

For example, Tianan's secondary data analysis of the 2010 wave of the Health and Retirement Survey in the United States<sup>20)</sup> showed that low support from coworkers and supervisors had a direct, significant effect on high job stress. Support from both supervisors and coworkers produced a positive influence on organizational support in that employees believed that their organization valued their contributions and cared about their well-being.<sup>21)</sup> However, in a study of 1,147 care staff in the Netherlands, Willemse et al.<sup>22)</sup> reported that supervisor support can buffer job demands that cause emotional exhaustion in situations with low decision authority; however, coworker support had an adverse effect on personal accomplishment in high-strain situations. Moreover, lower support from coworkers, but not supervisors, predicted greater emotional exhaustion, depersonalization, and lower personal accomplishment.<sup>23)</sup>

However, the above findings from the Netherlands are not consistent with those of previous studies.<sup>19-21)</sup> It is important to understand the moderating effect on the association between work-family conflict-which has become an urgent issue affecting workers-with nurses' psychological distress in Japan in order to prevent intention to leave and promote their physical and mental health.

Therefore, this study aimed to clarify the moderating effect of coworker and supervisor support on the association between work-family conflict and psychological distress in nurses.

## METHODS

### Participants

In August 2014, we distributed self-administered questionnaires to 2,595 nurses at 24 hospitals (out of 38 hospitals with over 300 beds and less than 50% sanatorium beds) across Okinawa, Japan that agreed to cooperate with our research. A total of 2,311 nurses participated in this study (response rate, 89.1%). After excluding 299 nurses who had submitted incomplete questionnaires, we analyzed data from 2,012 questionnaires.

### Ethical considerations

Ethical approval for this study was obtained from the Ethics Committee of the University of the Ryukyus, Japan. All participants received a written explanation regarding research aims, methods,

privacy, confidentiality, data management, and intention to publish.

### Measures

In this study, we used three measurements (i.e., psychological distress as dependent variable, work-family conflict as an independent variable, and support from supervisors and coworkers as a mediating variable) to assess the buffering effect of support on the association between work-family conflict and mental health.

#### Psychological distress

We utilized Kessler's K6 questionnaire,<sup>24,25)</sup> which was designed to screen for psychiatric disorders and mood and anxiety disorders. The K6 asks respondents how frequently they have felt psychological distress during the past 30 days in terms of six items (i.e., nervous, hopeless, restless or fidgety, so depressed that nothing could cheer you up, that everything was an effort, and worthless) rated on a 5-point scale from 0 (*none of the time*) to 4 (*all of the time*). Total scores range from 0 to 24, with higher total scores indicating greater psychological distress. Cronbach's alpha coefficient for participants in this study was 0.90.

#### Work-family conflict

To measure work-family conflict arising out of incompatible demands between work and family responsibilities, we used the Japanese version of the Work-Family Conflict Scale (WFCS) by Watai *et al.*<sup>26)</sup>, which was based on the original work-family conflict scale by Carlson *et al.*<sup>27)</sup> The WFCS has high internal consistency, discriminant validity, construct validity, and adequate reproducibility among Japanese workers. The WFCS is composed of 18 items (i.e., "My work keeps me from my family activities more than I would like," "The time I spend with my family often causes me not to spend time in activities at work that could be helpful to my career," and "I am often so emotionally drained when I get home from work that it prevents me from contributing to my family") scored on a five-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Total scores range from 18 to 90, with higher scores indicating greater work-family conflict. Cronbach's alpha was 0.91 in this study.

#### Social support

We measured workplace social support from coworkers and supervisors using the Japanese version of the Job Content Questionnaire (J-JCQ), which has been validated and tested for reliability.<sup>28)</sup>

Social support from coworkers (i.e., co-worker competent, co-worker interest in me, friendly co-worker, and co-worker helpful) and supervisor (i.e., supervisor is concerned, supervisor pay attention, helpful supervisor, and supervisor good organizer) consisted of four items each. Responses are rated on a 4-point Likert-scale from 1 (*strongly disagree*) to 4 (*strongly agree*), with higher scores indicating higher support from coworkers and supervisors. Cronbach's alpha coefficients among nurses participating in this study were 0.85 for coworker support and 0.94 for supervisor support, which indicates good internal consistency.

#### Sociodemographic and clinical variables

Confounding factors of two-way analysis of variance included gender (man or woman), age (20s, 30s, 40s, 50s, or 60s or older), education (vocational school or junior college, or college and higher), marital status (married, divorced or widowed, unmarried or other), employment status (full-time or part-time), job status (head nurse, assistant head nurse, staff, or other), years of nursing experience, years of working on the ward, and number of night shifts worked per month.

#### Statistical analysis

We investigated differences or associations of psychological distress with demographic and clinical variables, work-family conflict, and support from coworkers and supervisors using Pearson's correlation coefficient or Spearman's correlations. Hierarchical multiple regression was used to evaluate the moderating effect of coworker and supervisor support on the relationship between psychological distress and work-family conflict after adjusting for gender, age, and years working on the ward, which revealed a moderate or strong significant correlation with psychological distress. Although marital status and years of nursing experience showed a significant correlation with psychological distress, these variables also showed a significant correlation with age and marital status ( $r_s = -.41, p < .001$ ) and years of nursing experience ( $r = .85, p < .001$ ), and were thus eliminated from analysis to prevent multicollinearity.

In Model 1 of the hierarchical multiple regression, to reveal the correlation between psychological distress and demographic and clinical variables, psychological distress was the dependent variable, and gender, age, and years of working on the ward were covariates. In Models 2 and 3, to estimate main effects of work-family conflict and

supervisor or coworker support on psychological distress, we input variables into the model using a mean-centered approach to prevent a high degree of multicollinearity.<sup>29)</sup> In Model 4, to estimate the moderating effect of support on the relationship between work-family conflict and psychological distress, cross-product interaction terms (i.e., work-family conflict $\times$ supervisor support, and work-family conflict $\times$ coworker support) were incorporated. To examine the significant interaction between work-family conflict and support, simple slope analyses<sup>30)</sup> were conducted by dividing total work-family conflict scores and support scores into the following two levels: mean $-SD$  (low) and mean $+SD$  (high), respectively. Reliability of these scales was tested by computing Cronbach's alpha coefficients. The level of statistical significance was set at  $p < .05$ . All analyses were performed using SPSS20.0J for Windows (SPSS Japan Inc., Tokyo, Japan).

## RESULTS

Table 1 shows participants' demographic and clinical characteristics. Participants were mostly married (54.2%), women (77.0%), 30 to 39 years old (31.2%), with vocational school or junior college (87.9%), working full-time (93.4%), and staff nurses (84.4%). Average years of nursing experience and working on a ward were  $14.4 \pm 10.0$  and  $3.8 \pm 4.3$ , respectively. Average number of night shifts worked per month was  $5.8 \pm 3.9$ . Mean scores for psychological distress and work-family conflict were  $6.4 \pm 5.2$  and  $49.5 \pm 11.0$ , respectively. Mean scores of workplace social support was  $3.0 \pm 0.6$  for supervisor support and  $3.0 \pm 0.5$  for coworker support.

Table 2 presents the correlation of psychological distress with demographic and clinical characteristics, work-family conflict, and workplace social support. Significant correlations of psychological distress were found for gender ( $r_s = .063, p = .001$ ), age ( $r_s = -.079, p = .002$ ), marital status ( $r_s = .110, p < .001$ ), employment status ( $r_s = .040, p = .031$ ), years of nursing experience ( $r = -.079, p < .001$ ), and years of working on the ward ( $r = -.063, p = .003$ ). No associations were found between psychological distress and education ( $r_s = .017, p = .525$ ), job status ( $r_s = .015, p = .476$ ), and number of night shifts ( $r = .029, p = .225$ ). Psychological distress was significantly associated with work-family conflict

Table 1 Characteristics of the participants

Variable	n	(%)	Mean	SD
Sex				
Male	462	(23.0)		
Female	1550	(77.0)		
Age (years)				
20 - 29	439	(21.8)		
30 - 39	628	(31.2)		
40 - 49	558	(27.7)		
50 - 59	354	(17.6)		
60 -	33	( 1.6)		
Education				
Vocational school or junior college	1769	(87.9)		
College and higher	243	(12.1)		
Marital status				
Married	1091	(54.2)		
Divorced or widowed	185	( 9.2)		
Unmarried	722	(35.9)		
Other	14	( 0.7)		
Employ status				
Part-time or other	132	( 6.6)		
Full-time	1880	(93.4)		
Job status				
Head nurse	52	( 2.6)		
Assistant head nurse	252	(12.5)		
Staff	1698	(84.4)		
Other	10	( 0.5)		
Years of nursing experience			14.4	10.0
Years of working on the ward			3.8	4.3
Number of night shift worked (per month)			5.8	3.9
Psychological distress (K6)			6.4	5.2
Work-family conflict			49.5	11.0
Supervisor support			3.0	0.6
Coworker support			3.0	0.5

( $r = .489, p < .001$ ), supervisor support ( $r = -.195, p < .001$ ), and coworker support ( $r = -.144, p < .001$ ).

Tables 3 and 4 show results of hierarchical regression analysis on the association of work-family conflict with supervisor and coworker support and psychological distress, adjusted for covariate variables. In Model 1, a significant correlation between psychological distress and covariate variables accounted for 1.1% of the unique variance ( $R^2 = .011, \text{adj}R^2 = .009, p < .001$ ). In Model 2, a significant main effect was demonstrated for work-family conflict ( $\beta = .498, p < .001$ ), which indicates that increased work-family conflict was associated with higher psychological distress. Model 2 accounted for 24.6% of the unique variance ( $R^2 = .246, \text{adj}R^2 = .245, p < .001$ ), and significantly increased the overall variance explained in Model 1 by 23.6% ( $p < .001$ ). In Model 3, a significant main effect was shown for supervisor support (Table 3) and coworker

**Table 2 Correlation of psychological distress with work-family conflict, workplace social support and sociodemographic and clinical variables**

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Psychological distress (K6)	1												
2 Work-family conflict	.489 ***	1											
3 Supervisor support	-.195 ***	-.237 ***	1										
4 Coworker support	-.144 ***	-.176 ***	.495 ***	1									
5 Sex	.063 **	.005	-.068 **	.064 **	1								
6 Age	-.079 ***	-.186 ***	-.054 *	-.053 *	.035	1							
7 Education	.017	.100 ***	.014	-.048 *	.043 *	-.235 ***	1						
8 Marital status	.110 ***	.035	-.007	-.047 *	.192 ***	-.411 ***	.177 ***	1					
9 Employment status	.040 *	.006	.009	.085 ***	-.107 ***	-.095 ***	.026	.026	1				
10 Job status	.015	.036	-.039	.007	.024	-.260 ***	.035	.166 ***	-.121 ***	1			
11 Years of nursing experience	-.079 ***	-.171 ***	-.067 **	-.052 *	.096 ***	.850 ***	-.245 ***	-.380 ***	-.086 ***	-.304 ***	1		
12 Years of working on the ward	-.063 **	-.070 **	.000	-.038	-.019	.269 ***	-.112 ***	-.160 ***	.014	-.119 ***	.279 ***	1	
13 Number of night shift worked	.029	-.069 **	-.070 **	.079 ***	-.152 ***	-.080 ***	.017	.079 ***	.163 ***	.262 ***	-.090 ***	-.033	1

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

**Table 3 The result of mediate effect of support from supervisor on the relationship between psychological distress and work-family conflict**

	Model 1				Model 2				Model 3				Model 4			
	B	SE	$\beta$	$p$ -value	B	SE	$\beta$	$p$ -value	B	SE	$\beta$	$p$ -value	B	SE	$\beta$	$p$ -value
Sex	.783	.275	.064	.004	.365	.241	.030	.130	.306	.240	.025	.202	.326	.240	.026	.174
Age (years)	-.240	.112	-.049	.033	-.169	.098	-.035	.084	-.197	.098	-.040	.044	-.184	.098	-.038	.059
Employ status	.751	.469	.036	.109	.200	.411	.010	.626	.161	.409	.008	.693	.152	.409	.007	.710
Years of working on the ward	-.053	.028	-.043	.060	-.035	.024	-.029	.147	-.034	.024	-.028	.157	-.034	.024	-.028	.155
Work-family conflict					.232	.009	.489	$p < 0.001$	.222	.009	.468	$p < 0.001$	.223	.010	.470	$p < 0.001$
Supervisor support									-.735	.161	-.091	$p < 0.001$	-.718	.162	-.089	$p < 0.001$
Work-family conflict $\times$ Supervisor support													-.025	.013	-.038	.052
R <sup>2</sup>	.011			$p < 0.001$	.246			$p < 0.001$	.254			$p < 0.001$	.256			$p < 0.001$
Adj R <sup>2</sup>	.009				.245				.252				.253			
$\Delta R^2$					.236			$p < 0.001$	.008			$p < 0.001$	.001			.052

NOTE. n=2012. B=unstandardized coefficients, SE=standard deviation,  $\beta$ =standardized coefficients, R<sup>2</sup>= explanation rate, Adj R<sup>2</sup>=Adjusted explanation rate,  $\Delta R^2$ = change in explanation rate, each step. Sex (0: Men. 1: Women). Employment status (0: Part-time or other 1: Full-time). Work-family conflict  $\times$  Supervisor support=the product (interaction) term of work-family conflict and supervisor support

**Table 4 The result of mediate effect of support from coworker on the relationship between psychological distress and work-family conflict**

	Model 1				Model 2				Model 3				Model 4			
	B	SE	$\beta$	$p$ -value	B	SE	$\beta$	$p$ -value	B	SE	$\beta$	$p$ -value	B	SE	$\beta$	$p$ -value
Sex	.783	.275	.064	.004	.365	.241	.030	.130	.391	.240	.032	.103	.403	.239	.033	.092
Age (years)	-.240	.112	-.049	.033	-.169	.098	-.035	.084	-.250	.099	-.051	.012	-.236	.099	-.049	.018
Employ status	.751	.469	.036	.109	.200	.411	.010	.626	.197	.409	.009	.631	.230	.408	.011	.573
Years of working on the ward	-.053	.028	-.043	.060	-.035	.024	-.029	.147	-.038	.024	-.031	.118	-.037	.024	-.031	.125
Work-family conflict					.232	.009	.489	$p < 0.001$	.225	.009	.474	$p < 0.001$	.226	.009	.477	$p < 0.001$
Coworker support									-.939	.219	-.086	$p < 0.001$	-.962	.219	-.088	$p < 0.001$
Work-family conflict $\times$ Coworker support													-.052	.017	-.058	.003
R <sup>2</sup>	.011			$p < 0.001$	.246			$p < 0.001$	.253			$p < 0.001$	.257			$p < 0.001$
Adj R <sup>2</sup>					.245				.251				.254			
$\Delta R^2$					.236			$p < 0.001$	.007			$p < 0.001$	.003			.003

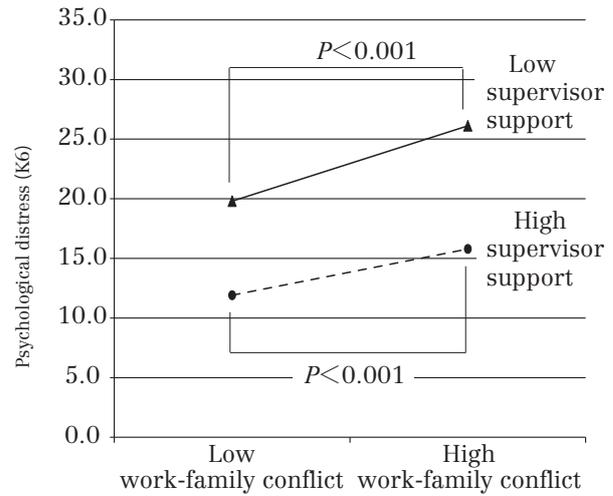
NOTE. n=2012. B=unstandardized coefficients, SE=standard deviation,  $\beta$ =standardized coefficients, R<sup>2</sup>=explanation rate, Adj R<sup>2</sup>=Adjusted explanation rate,  $\Delta R^2$ = change in explanation rate, each step. Sex (0: Men. 1: Women). Employment status (0: Part-time or other 1: Full-time). Work-family conflict  $\times$  Coworker support=the product (interaction) term of work-family conflict and coworker support

support (Table 4), which indicates that increased supervisor support ( $\beta = -.091, p < .001$ ) or coworker support ( $\beta = -.086, p < .001$ ) is associated with significantly lower psychological distress. Model 3 (Table 3) accounted for 25.4% of the unique variance ( $R^2 = .254, \text{adj}R^2 = .252, p < .001$ ) in supervisor support and significantly increased the overall variance explained in Model 2 by 0.8% ( $p < .001$ ). Model 3 (Table 4) accounted for 25.3% of the unique variance ( $R^2 = .253, \text{adj}R^2 = .251, p < .001$ ) in coworker support, and significantly increased the overall variance explained in Model 2 by 0.7% ( $p < .001$ ). Model 4 showed an interaction effect of supervisor support (Table 3) and coworker support (Table 4) on the association between psychological distress and work-family conflict, which indicates that, although supervisor support did not provide a moderating effect on the association between work-family conflict and psychological distress ( $\beta = -.038, p = .052$ ), coworker support did ( $\beta = -.058, p = .003$ ). Model 3 in Table 3 accounted for 25.6% of the unique variance ( $R^2 = .256, \text{adj}R^2 = .253, p < .001$ ), and increased the overall variance explained in Model 3 by 0.1% ( $p = .052$ ). Model 3 in Table 4 accounted for 25.7% of the unique variance ( $R^2 = .257, \text{adj}R^2 = .254, p < .001$ ), and significantly increased the overall variance explained in Model 3 by 0.3% ( $p = .003$ ).

Results of simple slope analyses of the relationship between the interaction term for work-family conflict and supervisor support and psychological distress showed that the psychological distress score for high work-family conflict (mean+SD) was significantly higher than that for low work-family conflict (mean-SD) in both nurses who could expect supervisor support and those who could not (Fig. 1). On the other hand, although the psychological distress score for high work-family conflict (mean+SD) was significantly higher than that for low work-family conflict (mean-SD) in nurses who could not expect coworker support, in nurses who could, the psychological distress score for high work-family conflict was not higher than that for low work-family conflict (Fig. 2).

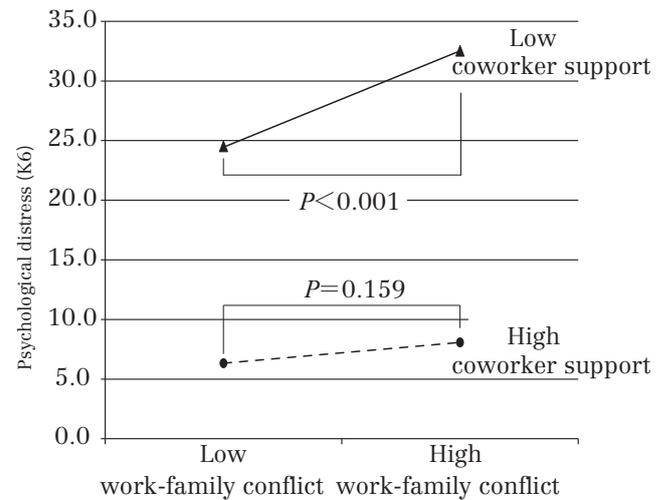
**DISCUSSION**

In the present study, we investigated the moderating effect of supervisor and coworker support on the relationship between work-family conflict and



**Fig.1 Interaction plot illustrating the moderating effect of supervisor support**

Note. The term 'low' refers to -1 standard deviation from the mean scores and 'high' refers to +1 standard deviation from mean scores on the given work-family conflict and supervisor support score.



**Fig.2 Interaction plot illustrating the moderating effect of coworker support**

Note. The term 'low' refers to -1 standard deviation from the mean scores and 'high' refers to +1 standard deviation from mean scores on the given work-family conflict and coworker support score.

psychological distress in nurses in Okinawa. As a result, we found a significant interaction for coworker support, but not supervisor support, in the association between work-family conflict and psychological distress. Simple slope analysis for low coworker support showed that nurses with high work-family conflict had significantly higher psychological distress

scores than those with low work-family conflict. On the other hand, for high coworker support, we found a nonsignificant difference in psychological distress scores between nurses with high work-family conflict and those with low work-family conflict. Based on these results, coworkers play an important role in nurses' mental health, and support from coworkers is likely to buffer the relationship between work-family conflict and psychological distress in nurses.

We found a significant association between psychological distress and demographic variables (e.g., gender, age, and marital status) and clinical variables (e.g., employment status and years of experience). Our results are consistent with previous studies on demographic variables<sup>31,32</sup> and clinical variables.<sup>33,34</sup> In particular, gender is an important factor of mental health and work-family conflict. Possible explanations include social factors, such as social role and status, life events, and social support, in addition to sex differences due to biological and psychological factors.<sup>35,36</sup> That is, not only do female nurses have a crucial work role, they also typically take on a greater share of domestic responsibilities in their personal lives, especially time-consuming activities such as cleaning, food preparation, and child-rearing; this dual workload might lead to poorer mental health.

As for the association between work-family conflict and psychological distress, increased work-family conflict is associated with worse psychological distress, which result is consistent with previous studies on general workers<sup>17,37,38</sup> and nurses.<sup>13,39</sup> Moreover, work-family conflict was associated with cortisol in saliva, which reflects the status of stress *in vivo*.<sup>40</sup> Work-family conflict affects not only subjective health, but also objective physiological indicators. Chandola and colleagues<sup>17</sup> found a significant correlation between work-family conflict and mental health in general workers in Finland, England, and Japan, with Japan's scores for work-family conflict and depression, especially in women, the highest of all. Sociocultural background, such as the traditional role of women in Japan, was thought to account for this result. As traditional gender roles in Japan have had a great impact on female nurses and the health of female workers, formulating measures that take into account gender through gender studies should be possible in the future.

Hierarchical multiple regression analysis on mediating effects revealed a significant interaction

for coworker support on the relationship between work-family conflict and psychological distress. To the best of our knowledge, this study is one of the first to examine this mediating effect. Staff nurses often work in teams and in close collaboration with one another. While working, they are most frequently in contact with coworkers, who are supportive, caring, and willing to help and share their knowledge, skills, and experience of not only treatment, patient care, and patient-related problem solving, but also housework and child-rearing.<sup>41,42</sup> Ogata<sup>42</sup> suggested that colleagues acquire implicit rules and cultural knowledge at their workplace through formal or informal communication between coworkers in the workplace, and that formal or informal communication between coworkers might create better ties that mutually strengthen instrumental and emotional support. Moreover, coworker support alleviates mental health issues such as anxiety, fear, or doubt in fellow coworkers, and helps them adapt to the workplace by sharing their experiences<sup>41</sup> on how to balance work and family responsibilities. We can suggest that such instrumental and emotional support from coworkers would mitigate nurses' work-family conflict caused by time constraints and stress over work and family responsibilities, and it might alleviate their psychological distress.

On the other hand, we did not find a mediating effect of supervisor support on the relationship between work-family conflict and psychological distress. Although supervisor support had a positive effect on workers' health, the support mechanism underlying the relationship shown in the present study might be similar to that in most previous studies, which had examined these two support mechanisms separately.<sup>43</sup> Supervisor support might not have a direct effect on workers' mental health, which means that supervisors do not treat and care for patients alongside nursing staff to reduce time constraints and stress in daily work. In view of the current emphasis on supervisor support for improving the workplace environment in terms of "creating a work environment and corporate culture for the creative practice of nursing," "supporting skill development and nurturing human resources and staff," and "health management of staff," it is conceivable that a smaller effect of supervisor support occurs in the context of work-family conflict and psychological distress. In fact, supervisor

support can buffer adverse effects of job demands, which worsen work-family conflict, and the mechanism underlying the mediating relationship is that supervisor support can compensate for a lack of decision authority in the management of work demands, which would have a positive effect on nurses' mental health.<sup>22)</sup> Further investigation is needed to focus on respective degrees of support from supervisors and coworkers, the types of support (e.g., instrumental, emotional, provided, or received support), and the mechanism underlying work-family conflict and psychological distress.

### LIMITATIONS

The present study has some limitations. First, its cross-sectional design shows no causal association between work-family conflict and psychological distress. In Tahera and colleagues' longitudinal and life course study from the 1958 British birth cohort study of 9,008 workers,<sup>44)</sup> work-family conflict was prospectively associated with increased risk of common mental disorders ( $OR=1.76$ ; 95%  $CI=1.36-2.20$ ). A longitudinal study is needed to confirm causal associations in Japan due to differences in culture and work environment that affect work-family conflict and mental health. Second, as the study was conducted in Okinawa, generalizability of the present findings might be limited. A literature review of work-family conflict among nurses from 1993 to 2009<sup>46)</sup> has identified 16 articles (14 European or American articles, 2 Japanese articles), and we identified 56 articles (54 from Europe, the United States, China, or other countries, 2 from Japan) utilizing the same research method from 2010 to 2015. Even though work-life balance has become an urgent challenge for the elimination of the conflict between work and family life and for promoting nurses' physical and mental health, few studies have been conducted in Japan and the sample size of two previous studies were not sufficient. Although the number of nurses in Japan increases by approximately 30,000 nurses per year, the Ministry of Health, Labour and Welfare<sup>45)</sup> estimates that in 10 years Japan will face a shortage of 500,000 nurses by 2025. Therefore, this impending shortage is expected to promote collaboration between universities and the Japanese Nursing Association to evaluate work environment strategies for nursing

retention.

### CONCLUSIONS

Despite these limitations, our results reveal the importance of coworker support on psychological distress due to work-family conflict leading to nurse burnout and intention to leave. As suggested by Ushiro et al,<sup>46)</sup> the colleague support system can be improved by efforts to increase opportunities for informal communication formed outside the workplace in order to positively affect workplace productivity and human relations.

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