1 Title

2 An analysis of the structural relationship between job stress, coping, belief conflict, and
3 occupational dysfunction in healthcare workers involved in dialysis treatment

5 Short title

6 The belief conflict of dialysis treatment

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Abstract

Background. Job stress can be high in healthcare workers involved in dialysis treatment. This study intended to verify the structural relationship among job stress, coping, belief conflict, and occupational dysfunction in healthcare workers involved in dialysis treatment.

Methods. Participants completed a composite questionnaire combining the Brief Job Stress Questionnaires, Coping Scale, Assessment of Belief Conflict in Relationship-14, and Classification and Assessment of Occupational Dysfunction. Hypothetical models were compared using Bayesian structural equation modeling (BSEM).

Results. The 185 participants included 22 physicians, 46 nurses, 38 medical engineers, 50 physical therapists, and 25 occupational therapists. As a result of the BSEM, the following type A of hypothetical model 1 was selected as the most suitable through comparison of the deviance and Bayesian information criteria ($DIC = 5033.848$, $BIC = 5312.447$). Belief conflict had a significant direct effect on occupational dysfunction (direct effect = 0.441, $p = 0.000$), and occupational dysfunction had a direct effect on stress response (direct effect = 0.406, $p = 0.000$).

Discussion. This result suggests that belief conflict has the potential to increase job stress via occupational dysfunction in healthcare workers involved in dialysis treatment. To reduce job stress, belief conflict should be evaluated and appropriate interventions performed.

1 **Introduction**

2 Job stress in healthcare workers involved in dialysis treatment has become a problem,
3 with a study reporting high levels of stress and burnout in hemodialysis nurses (Hayes, Bonner
4 & Douglas, 2015). Indeed, a survey of dialysis facilities suggested that the stress and strain on
5 dialysis staff were more serious than those on geriatric nurses (Kersten et al., 2014). In Japan,
6 three job stressors associated with dialysis treatment are commonly cited by staff: 1) the
7 requirement to undertake advanced procedures and to have high levels of expertise, 2)
8 interaction with patients who are unhappy and complaining, and 3) conflict with colleagues and
9 other healthcare workers (Oohira, 2011; Yoneda et al., 2011).

10 Studies of job stress have traditionally considered coping to be an important factor
11 related to stress (Ashker, Penprase & Salman, 2012; Lewis et al., 1994). However, a recent
12 study of structural relationships between job stress and coping reported that coping does not
13 just reduce the stress response but in some cases can increase it (Takaya & Hasegawa, 2010).

14 In recent years, studies have focused on the fields of occupational therapy, belief
15 conflict, and occupational dysfunction. Occupational dysfunction is defined as a state in which
16 people cannot properly perform daily activities (Teraoka & Kyougoku, 2014), and one of the
17 roles of occupational therapists is assessment and intervention for people who have fallen into
18 this state. However, it has been pointed out that appropriate interventions for occupational
19 dysfunction can be inhibited by belief conflict (Teraoka & Kyougoku, 2014). Belief conflict is
20 a concept first presented within the philosophy of phenomenology (Takeda, 2004). Belief is
21 thinking and sensitivity for meaning, value, and presence, without questioning (Takeda, 2004),
22 and belief conflict is defined as a fundamental confrontation in interpersonal relationships
23 caused by situations where personal beliefs are called into question (Kyougoku, 2011).
24 Occupational therapy theory responding to both occupational dysfunction and belief conflict
25 has seen the development of occupation-based practice 2.0 (OBP2.0) (Teraoka & Kyougoku,
26 2014). This practice not only helps occupational therapists assess and intervene in occupational
27 dysfunction, but also helps with handling the belief conflict (Teraoka & Kyougoku, 2014).

28 Studies have reported relationships between job stress, belief conflict and occupational
29 dysfunction, and coping. A survey of healthcare workers reported that a high proportion

experienced belief conflict (Kohiyama et al., 2013). In addition, many of the healthcare workers who had experienced belief conflict were not able to cope with it (Kono et al., 2014). A study of structural relationships between belief conflict and job stress in healthcare workers suggested that belief conflict may exacerbate job stress (Kyougoku & Teraoka, 2015). A survey for companies that manufacture of electrical machinery information and communication electronics equipment reported that many employers have experienced occupational dysfunction (Akiyama & Kyougoku, 2010). A survey of physical and occupational therapists working in general hospitals reported that, as occupational dysfunction increased, job stress also increased (Miyake et al., 2014), and a study of the structural relationship between occupational dysfunction and job stress suggested that job stress increased with occupational dysfunction (Teraoka & Kyougoku, 2015b).

We expected that belief conflict would increase job stress in healthcare workers involved in dialysis treatment, and would also increase occupational dysfunction. However, relationship between belief conflict, occupational dysfunction, coping, and job stress has been unexamined. The purpose of the present study was to verify the structural relationship between job stress, coping, belief conflict, and occupational dysfunction of healthcare workers involved in dialysis treatment. The significance of this study is in suggesting a new viewpoint of belief conflict and occupational dysfunction when occupational therapists consider the problem of job stress.

In this study, we constructed four hypothetical models based on OBP2.0. Figure 1, 2, depicts these models schematically.

Hypothetical Model 1

Type A: The job stressor increases stress responses. In addition, belief conflict increases stress responses and occupational dysfunction. Occupational dysfunction increases stress responses.

Type B: The direction of the path between stress responses and occupational dysfunction in Type A is reversed; i.e., stress responses increase occupational dysfunction.

Hypothetical Model 2

Type A: Coping is included between the job stressor and stress responses in Hypothetical Model 1 Type A. This indicates that the job stressor increases stress responses and belief conflict,

mediated by coping.

Type B: The direction of the path between stress responses and occupational dysfunction in the Hypothetical Model 2 Type A is reversed.

Materials and Methods

Participants and ethics statement

The participants were healthcare workers involved in dialysis treatment, including physicians, nurses, medical engineers, physical therapists, and occupational therapists working at nine hospitals of four prefectures in Okayama Prefecture, Hiroshima Prefecture, Tottori Prefecture, Oosaka. We excluded anyone employed for less than one year at their institution. Each participant was asked to complete a written survey consisting of a set of questionnaires. As a recovery process of the questionnaires, it was requested to be back from each hospitals.

The research protocol and informed consent procedures were approved by the Ethics Committee of Kibi International University (No. 14–35) and the research ethics committees of the partner hospitals. We provided all participants with a letter explaining an outline of the study and its purpose, and informing participants they could leave the research project at any time for any reason. We considered the return of the survey sheet to indicate consent for participation in the study. We fully protected the privacy of all personal information.

Questionnaires

Participant profile

We collected relevant profile data from all participants, including their age, sex, job type, years of clinical experience, job position, working arrangements, working hours, commuting time, opportunities for refreshment at work, satisfaction with their leisure time, time spent sleeping, drinking, smoking, marriage, experience of childbirth, human relationship, and frequency of interacting with hemodialysis patients.

Brief Job Stress Questionnaires

The Brief Job Stress Questionnaires (BJSQ) contain 57 items for 3 factors: Job Stressors (17 items), Stress Responses (29 items), and Social Factors (11 items). These are based on the model of stress by the U.S. National Institute for Occupational Safety and Health (Hurrell & McLaney, 1988). Job Stressor was defined as a cause of stress, and Stress Response as the psychosomatic response that occurred when stress was caused. Social Factors were other factors, such as support and job satisfaction, that could affect the stress response. The BJSQ were scored on a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree), with higher scores indicating job stress. Items 1–7 and 11–13 for Job Stressors and items 1–3 for Stress Responses have reversed questions.

The 17 items for Job Stressors relate to nine subscales: quantitative overload (items 1–3), mental demand (items 4–6), physical workload (item 7), job control (items 8–10), utilization of techniques (item 11), interpersonal relationships (items 12–14), work environment (item 15), fit to the job (item 16), and reward for the work (item 17). The 29 items for Stress Responses relate to six subscales: lack of vigor (items 1–3), irritability (items 4–6), fatigue (items 7–9), anxiety (items 10–12), depression (items 13–18), and somatic symptoms (items 19–27). The 11 items for Social Factors relate to four subscales: supervisor support (items 1, 4, and 7), coworker support (items 2, 5, and 8), support of family and friends (items 3, 6, and 9), and job satisfaction (items 10 and 11).

Coping Scale

The Coping Scale contains 31 items on 5 subscales based on various coping strategies: active, distancing, seeking social support, resignation, and restraint (Shimazu & Kosugi, 2003). Active (9 items) is a coping strategy that is concrete and practical. Distancing (7 items) is a coping strategy that reduces the need for problem solving by ignoring and forgetting. Seeking social support (5 items) is a coping strategy that utilizes available human resources effectively. Resignation (5 items) is a coping strategy that abandons any solution while remaining aware of the need. Restraint (5 items) is a coping strategy that suppresses premature execution and emotional resolution. The Coping Scale is scored on a 4-point Likert scale (1 = not used at all, to 4 = used a great deal).

Assessment of Belief Conflict in Relationship-14

The Assessment of Belief Conflict in Relationship-14 instrument (ABCR-14) contains 14 items related to three factors: belief conflict among the same healthcare workers (5 items), belief conflict between healthcare workers and other staff (5 items), and belief conflict in the therapeutic relationships (4 items), based on the Dissolution Approach for Belief Conflict methodology (Kyoungoku et al., 2015). The ABCR-14 is scored on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree). High scores indicate a higher degree of belief conflict.

Classification and Assessment of Occupational Dysfunction

The Classification and Assessment of Occupational Dysfunction instrument (CAOD) contains 16 items related to 4 factors based on the OBP2.0: occupational imbalance, occupational deprivation, occupational alienation, and occupational marginalization (Teraoka & Kyoungoku, 2014; Teraoka & Kyoungoku, 2015a). Occupational imbalance (4 items) is a loss of balance in engagement during daily activities (Dana et al., 2010). Occupational deprivation (3 items) is a lack of choice in daily activities beyond the individual's control (Gail, 2000). Occupational alienation (3 items) is the failure to fulfill one's inner needs in everyday activities (Bryant, Craik & McKay, 2004). Occupational marginalization (6 items) is defined as impeding participation in daily activities (Townsend & Wilcock, 2004). The CAOD is scored on a 7-point Likert scale (1 = strongly disagree, to 7 = strongly agree). High scores indicate a higher degree of occupational dysfunction.

Statistical analysis

HAD version 13.0 (<http://norimune.net/had>) was used for analyzing the sample characteristics and for the correlation analysis, Exametrika version 5.3 (<http://www.rd.dnc.ac.jp/~shojima/exmk/index.htm>) was used for the item validity, and Mplus version 7.2 (<https://www.statmodel.com>) was used for the structural validity, an estimate of the factor scores, and the structural relationship.

Participants' characteristics

The participants' demographics were summarized using descriptive analysis. The BJSQ, Coping Scale, ABCR-14, and CAOD scores were tested for normality of distribution using the Jarque–Bera test (with significance set at $p < 0.05$).

Item analysis

We investigated the validity and reliability of all items of the BJSQ, Coping Scale, ABCR-14, and CAOD. To examine the items' validity, we calculated the mean information content (entropy) and total polyserial correlation coefficient (PCC) for all items of each scale (Toyoda, 2002). A PCC value >0.2 is considered to be the standard for demonstrating item validity (Toyoda, 2002). In addition, the items' reliability was examined using Item Response Theory (IRT) to estimate the item slope parameter (α) and item difficulty parameter (β). Items were considered to be reliable if they met the criteria $0.2 < \alpha < 2.0$ and $\beta < |\pm 4.0|$; any items that did not meet these criteria were considered for removal from the survey (Toyoda, 2002). The marginal maximum likelihood estimation method with the EM algorithm (MML–EM) was utilized as the estimation method.

Structural validity

The factor structure of each scale (BJSQ, Coping scale, ABCR-14, and CAOD) was determined by confirmatory factor analysis (CFA) for ordered categorical data. Any item that did not meet the PCC and IRT criteria was deleted from the CFA models. A robust weighted least squares factoring method with missing data (WLSMV) was utilized as an estimation method (Kosugi & Shimizu, 2014). To reflect the background that participants were engaged in the dialysis treatment, survey results for the demographic data were entered into the CFA models as covariates. We selected the models that were judged the most appropriate. CFA model fit was assessed using the comparative fit index (CFI), the Tucker–Lewis index (TLI), and the root mean square error of approximation (RMSEA). The critical values of CFI and TLI were $CFI > 0.90$ and $TLI > 0.90$. Diagnostic values of RMSEA from 0.08 to 0.10 indicate a modest fit whereas those less than 0.08 indicate a good fit (Kline, 2011).

According to the developers of BJSQ, factor analysis of Job Stressors has been

reported to have converged with five subscales: quantitative overload (items 1, 2, and 3), mental demand (items 4, 5, and 6), interpersonal relationships (items 8, 9, and 10), job control (items 12, 13, and 14), and fit to the job (items 16 and 17). Likewise, Social Factors has been reported to have converged with three subscales: supervisor support (items 1, 4, and 7), coworker support (items 2, 5, and 8), and support of family and friends (items 3, 6, and 9). We therefore followed their methods.

If models did not meet the CFA criteria, we performed an exploratory factor analysis (EFA) for ordered categorical data utilizing a WLSMV. In addition, to estimate the model data fit we utilized CFI, TLI, and RMSEA. After analysis by EFA, we reanalyzed the factor structure using CFA.

Correlation analysis

We examined the association between the factor, subscale, and total scores of BJSQ, Coping Scale, ABCR-14, and CAOD, and the profile data of all participant) by Spearman's or polyserial correlation. The factor, subscale, and total scores of each scale were converted to an internal scale by calculation of estimated values. Values of 0.2–0.4 indicate a weak correlation, 0.4–0.7 indicate a moderate correlation, and 0.7–0.9 indicate a strong correlation.

Structural relationship

Each hypothetical model was analyzed using structural equation modeling with Bayesian estimation (BSEM). We used Markov chain Monte Carlo algorithms to estimate the posterior distributions of the parameters; the number of chains was specified as 5, and the simulation number was set to 10,000 times. The convergence decision used potential scale reduction (PSR), with values close to 1 indicating convergence has been reached (Kosugi & Shimizu, 2014). The model fit index used the deviance information criterion (DIC) and the Bayesian information criterion (BIC) (Kosugi & Shimizu, 2014). The model with the lowest values of DIC and BIC was adopted as the best fit model. A covariate was a variable that correlated with latent variables at a significance level less than 1% in the correlation analysis.

Results

Participant characteristics

We recruited a total of 323 health care workers from nine hospitals. Of these, 185 completed the questionnaire; 80 (43.2%) were male, 103 (55.1%) were female, and the remaining two participants did not specify their sex. The mean age was 36.1 ± 10.8 years. Details of the participants' characteristic are reported in Table 1. Table 2 presents descriptive statistics and the results of the test of normality.

Item analysis

Items 7 and 11 of the BJSQ and items 3 and 8 of the Coping Scale were deleted from analysis of structural validity, correlation and structural relationship because they did not meet the PCC and item slope parameter criteria (Tables 3 and 4).

Structural validity

Brief Job Stress Questionnaires

As stated, items 7 and 11 of the BJSQ were removed from the CFA model as a result of the item analysis; both were related to the Job Stressors factor. A first-order factor model without covariate was adopted for Job Stressors, but model fit was poor (CFI = 0.893, TLI = 0.854, RMSEA = 0.107). We therefore conducted the EFA and found that Job Stressors was reconstructed as 11 items with 4 factors: quantitative overload (2 items), mental demand (4 items), job control (3 items), and interpersonal relationships (2 items). The index values for this model were CFI = 0.985, TLI = 0.953, and RMSEA = 0.070. As a result of reanalysis by CFA, the goodness of fit of the factor structure for Job Stressors based on the EFA was confirmed (CFI = 0.968, TLI = 0.949, RMSEA = 0.072) (Figure 3).

For Stress Responses, a second-order factor model with covariate showed a good model fit (CFI = 0.952, TLI = 0.949, RMSEA = 0.039). Regarding Social Factors, items 10 and 11 (about job satisfaction) were removed as recommended by a previous study. A second-order factor model with covariate showed a good fit (CFI = 0.956, TLI = 0.949, RMSEA = 0.041)

(Figure 4).

Coping Scale

As a result of the item analysis, Items 3 and 8 were removed from the CFA model for the Coping Scale. The fit was poor for both the first-order and second-order factor models. We therefore conducted the EFA, and found that the Coping Scale was reconstructed as 19 items with 3 factors, including Active (9 items), Seeking Social Support (4 items), and Passive (6 items). The index values for this model were CFI = 0.948, TLI = 0.924, and RMSEA = 0.066. As a result of reanalysis by CFA, goodness of fit was confirmed for the factor structure of the Coping Scale based on EFA (CFI = 0.924, TLI = 0.913, RMSEA = 0.071) (Figure 5).

Assessment of Belief Conflict in Relationship-14

The first-order model with covariate for ABCR-14 showed a good model fit (CFI = 0.957, TLI = 0.966, RMSEA = 0.042).

Classification and Assessment of Occupational Dysfunction

The second-order model with covariate for CAOD showed a good model fit (CFI = 0.898, TLI = 0.907, RMSEA = 0.061).

Correlation analysis

The results of the correlation analysis are presented in Tables 5 and 6. The BJSQ showed weak to moderate correlations with ABCR-14 and CAOD. The ABCR-14 showed weak to strong correlations with CAOD. The factor scores for Stress Responses showed moderate correlations with time of sleeping and human relationships. Both the factor scores for Social Factors and the total score for ABCR-14 showed a moderate correlation with human relationships. The total score of CAOD was moderately correlated with opportunity for refreshment, satisfaction with leisure, time of sleeping, and human relationships.

Structural relationship

The PSR values for all of the hypothetical models did not exceed 1.1, thus confirming convergence. In Table 7, type A of Hypothetical Model 1 was adopted as the final model after comparison of the information criterion values for each hypothetical model (DIC = 5033.848, BIC = 5312.447). The final model is shown in Table 8 and Figure 6.

Belief conflict had a direct effect on occupational dysfunction (direct effect = 0.441, $p = 0.000$, 95%CI 0.303–0.568). Occupational dysfunction had a direct effect on stress response (direct effect = 0.406, $p = 0.000$, 95%CI 0.191–0.616). Belief conflict had an indirect effect on stress response via occupational dysfunction. Structural relationships were indicated between covariates (such as human relationships and social support) and belief conflict, between covariates (such as opportunities for refreshment, satisfaction with leisure time, and time of sleeping) and occupational dysfunction, and between covariates (such as a passive coping strategy) and stress response. The two paths from job stressor and belief conflict toward stress response were not significant.

Discussion

The purpose of this study was to verify the structural relationship between job stress, coping, belief conflict, and the occupational dysfunction of healthcare workers engaged in dialysis treatment. As a result of analysis based on BSEM, belief conflict increased occupational dysfunction and that belief conflict also indirectly increased job stress mediated by occupational dysfunction. The theoretical forecast of OBP2.0 that belief conflict has been involved in the progression of occupational dysfunction revealed the structural relationship of belief conflict, occupational dysfunction, and job stress. This was also supported by the results of correlation analysis, which suggested that belief conflict, occupational dysfunction, and job stress were related to each other.

The measurement accuracy of analysis in this study was considered to have increased through performing the item and factor analyses prior to the BSEM. The factor structure of belief conflict in the final model revealed a stronger impact of belief conflict between colleagues, and between healthcare workers and other staff, than between healthcare workers and the patients or their families. The factor structure of occupational dysfunction in the final

1 model revealed an especially strong impact on occupational imbalance and occupational
2 deprivation. The factor structure of stress response in the final model revealed an especially
3 strong impact on anxiety and depression. In addition, physical aspects such as somatic
4 symptoms were included in the factor structure of stress response as well as mental aspects such
5 as a lack of vigor, irritability, fatigue, anxiety, and depression. Furthermore, disorder appeared
6 on both sides, mental and physical.

7 The covariate analysis of the final model revealed the following. 1) A lack of social
8 support from the participant's manager, colleagues, family members, and friends increased
9 belief conflict. 2) The passive coping strategy applied to job stress increased job stress. 3)
10 Worsening of human relationships in the workplace increased belief conflict, and a lack of
11 refreshment opportunities, leisure, and sleep increased occupational dysfunction. The risk
12 factor for belief conflict was the lack of support from the people around the individual, such as
13 the manager, colleagues, family, and friends. Insufficient availability of certain person factors
14 such as opportunities for refreshment, leisure, and sleeping time were risk factors for increasing
15 occupational dysfunction. The use of a passive coping strategy, such as ignoring the situation
16 or escaping from it, increased the stress response, seemingly paradoxically.

17 The two paths in the Hypothetical Model from job stressor and belief conflict toward
18 stress response were not significant. Two explanations have been put forward: the indirect
19 impact of belief conflict on stress response through occupational dysfunction was stronger than
20 the direct impact of job stress and belief conflict on the stress response. Alternatively, many of
21 the participants' stress responses in this study occurred due to belief conflict or to occupational
22 dysfunction that was increased by belief conflict.

23 A limitation of this study was that it was cross-sectional in nature, and so strong causal
24 relationships could not be shown clearly. Another limitation was the possibility of there being
25 sampling errors because of the small sample size.

26 27 **Clinical application**

28 The structural relationship in this study suggested that occupational dysfunction and
29 job stress would be likely to diminish through the evaluation and intervention of belief conflict.

1 The results of this study also showed that occupational therapists can contribute to improving
2 mental health in the workplace. In particular, belief conflict and occupational dysfunction can
3 be assessed using ABCR-14 and CAOD, based OBP2.0. In future, we should seek effective
4 strategies to address belief conflict and occupational dysfunction.

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1 Table1. Participant characteristics

Characteristics		N = 185	%	Mean	SD
Age				36.1	10.8
Sex	Female	80	43.2		
	Male	103	55.1		
Job	Physician	22	11.9		
	Nurse	46	24.9		
	Medical engineer	38	20.5		
	Physical therapist	50	27.0		
	Occupational therapist	25	13.5		
Years of clinical experience				12.1	10.1
Job position	Non-engaged	148	80		
	Engaged	29	15.7		
Working arrangement	Three shifts	2	1.1		
	Two shifts	40	21.6		
	Other shifts	5	2.7		
	Duty system	6	3.2		
	Day shift only	114	61.6		
	Night shift full-time	6	3.2		
	Occasional night shift	1	0.5		
	On-call system	4	2.2		
	Other	7	3.8		
Work time per day (h)				8.6	2.8
Commuting time per day (h)				24.9	17.2
Opportunities for refreshment	Very good	17	9.2		
	Good	117	63.2		
	Neither good nor bad	14	7.6		
	Fair	24	13.0		

	Poor	8	4.3		
Satisfaction with leisure time	Very high	7	3.8		
	High	92	49.7		
	Neither high nor low	33	17.8		
	Fair	39	21.1		
	Low	8	4.32		
Time for sleeping	Sufficient	80	43.2		
	Insufficient	100	54.1		
Alcohol consumption	Yes	71	38.4		
	No	109	58.9		
Smoking	Yes	18	9.7		
	No	161	87.0		
Marital status	Married	97	52.4		
	Unmarried	73	39.5		
	Divorce	9	4.9		
Experience of childbirth	Yes	45	24.3		
	No	133	71.9		
Human relationships	Very good	12	6.5		
	Good	117	63.2		
	Neither good nor bad	39	21.1		
	Fair	5	2.7		
	Poor	6	3.2		
Frequency of interacting with hemodialysis patients			4.5	1.4	

1 Note. SD = standard deviation

1 Table 2. Descriptive statistics and the test of normality

Questionnaire	Mean	SD	Kurtosis	Jarque–Bera
BJSQ factor				
Job stressor	43.5	5.6	−0.1	0.75
Stress response	57.7	14.2	0.2	0.01
Social factor	23.6	5.7	0.3	0.66
Total	124.7	20.4	0.1	0.03
Coping Scale factor				
Active	20.6	5.0	0.5	0.00
Distancing	12.3	3.4	0.0	0.00
Seeking social support	10.1	3.3	−0.1	0.01
Resignation	10.1	3.1	−0.1	0.01
Restraint	11.7	2.6	−0.4	0.02
Total	64.9	11.2	0.7	0.00
ABCR-14 factor				
Belief conflict among the same healthcare workers	16.2	6.2	0.2	0.10
Belief conflict between healthcare workers and other staff	18.0	6.7	−0.3	0.49
Belief conflict in therapeutic relationships	15.7	5.4	−0.4	0.13
Total	49.9	14.8	0.0	0.88
CAOD factor				
Occupational imbalance	15.5	6.3	−0.9	0.05
Occupational deprivation	9.9	4.6	−0.6	0.04
Occupational alienation	9.9	4.5	−0.6	0.08
Occupational marginalization	17.2	6.6	−0.7	0.10
Total	52.4	17.9	−0.5	0.35

2 Note. BJSQ = Belief Job Stress Questionnaires; ABCR-14 = Assessment of Belief Conflict in
3 Relationship-14; CAOD = Classification and Assessment of Occupational Dysfunction; SD =
4 standard deviation

1 Table 3. The item slope and item difficulty parameters, and polyserial correlation coefficients
2 (PCC) for the Belief Job Stress Questionnaires

Item	α	β_1	β_2	β_3	PCC
Job stressor					
1	1.01	-1.77	-0.70	0.78	0.64
2	1.04	-1.37	-0.32	0.97	0.57
3	0.70	-2.40	-1.50	0.18	0.53
4	0.93	-2.38	-1.49	0.13	0.60
5	0.66	-2.68	-1.51	0.64	0.40
6	0.97	-1.78	-0.67	0.62	0.51
7	0.11	-2.28	-0.93	1.39	0.09
8	0.98	-1.79	-0.19	1.00	0.57
9	0.95	-1.40	0.25	1.43	0.52
10	0.46	-2.01	0.01	1.74	0.29
11	0.23	-0.68	1.54	2.12	0.17
12	0.81	-1.61	-0.01	1.38	0.47
13	0.77	-1.00	0.90	1.93	0.42
14	1.08	-0.79	1.01	1.94	0.61
15	0.99	-0.82	0.32	1.30	0.47
16	0.83	-0.88	0.86	2.17	0.55
17	0.77	-0.33	1.30	2.04	0.44
Stress response					
1	0.71	-2.08	-0.68	1.73	0.50
2	0.66	-2.07	-0.75	1.63	0.44
3	0.75	-2.07	-0.89	1.28	0.51
4	0.92	-1.08	0.45	1.98	0.56
5	0.86	-0.93	0.41	1.98	0.59
6	0.93	-1.19	0.41	1.87	0.63

7	1.15	−1.75	−0.22	1.15	0.75
8	1.03	−1.03	0.15	1.52	0.66
9	1.13	−1.40	0.08	1.22	0.74
10	1.04	−1.29	0.03	1.23	0.57
11	1.03	−0.89	0.53	1.68	0.71
12	0.95	−0.35	1.00	2.04	0.76
13	0.95	−0.52	0.72	1.91	0.80
14	0.94	−0.36	1.09	2.08	0.69
15	0.87	−0.45	1.39	2.21	0.72
16	0.90	−0.66	0.94	1.95	0.74
17	0.77	0.25	1.55	2.18	0.68
18	0.75	0.49	1.49	2.12	0.64
19	0.75	0.75	1.75	2.52	0.57
20	0.78	0.28	1.38	2.09	0.61
21	1.01	−0.39	0.80	1.95	0.67
22	0.98	−1.08	−0.13	0.88	0.63
23	0.81	−0.59	0.42	1.29	0.51
24	1.16	−1.08	0.13	0.96	0.66
25	0.79	0.55	1.50	2.26	0.63
26	0.86	0.19	1.25	2.52	0.61
27	0.71	0.93	1.97	2.68	0.70
28	0.67	0.03	1.05	1.97	0.51
29	0.90	0.13	1.06	1.90	0.63
<hr/> Social factor <hr/>					
1	1.05	−2.04	−0.27	2.21	0.71
2	1.06	−1.00	0.72	2.62	0.72
3	1.01	−0.12	1.39	3.04	0.74
4	1.04	−1.44	0.30	1.76	0.72

5	1.05	-1.16	0.51	2.26	0.79
6	1.08	-0.70	0.74	2.42	0.71
7	1.09	-1.58	0.14	1.66	0.77
8	1.10	-1.35	0.32	1.97	0.76
9	1.00	-0.60	1.17	3.06	0.68
10	1.06	-1.61	0.70	1.95	0.74
11	0.96	-1.43	0.89	2.40	0.54

1 Note. α = the item slope parameter of Item Response Theory (IRT), β = the item difficulty
2 parameter of IRT
3

1 Table 4. The item slope and item difficulty parameters, and polyserial correlation coefficients
 2 (PCC) for the Coping Scale

Item	α	β_1	β_2	β_3	PCC
1	0.65	-2.14	-0.05	1.32	0.41
2	0.53	-2.53	-0.53	1.54	0.39
3	0.06	-3.16	1.99	3.82	0.19
4	0.71	-1.50	0.64	1.87	0.47
5	0.68	-2.26	-0.08	1.33	0.43
6	0.87	-0.24	0.75	1.76	0.46
7	0.76	-1.25	0.47	1.41	0.42
8	0.19	-2.51	0.70	2.60	0.23
9	0.79	-2.40	-0.07	1.65	0.51
10	0.92	-0.76	0.45	1.35	0.57
11	0.47	-1.80	0.65	1.99	0.39
12	0.61	0.14	1.55	2.28	0.49
13	0.43	0.02	1.70	2.71	0.34
14	0.70	-1.70	0.05	1.37	0.56
15	0.75	-0.16	0.81	1.74	0.60
16	0.49	1.31	2.25	2.64	0.39
17	0.80	-0.82	0.78	1.74	0.64
18	0.36	-1.24	1.12	2.36	0.31
19	0.82	-1.55	-0.05	1.31	0.57
20	0.49	-1.44	0.96	2.04	0.45
21	0.45	-1.90	0.19	2.10	0.36
22	0.75	-0.50	0.62	1.68	0.49
23	0.60	-0.99	0.69	1.39	0.35
24	0.77	-0.90	0.82	1.71	0.53
25	0.75	-0.88	0.67	1.70	0.55

26	0.55	−0.11	1.37	1.93	0.46
27	0.66	−0.78	0.82	1.37	0.40
28	0.90	−0.89	0.91	1.70	0.61
29	0.45	−0.88	0.79	1.71	0.30
30	0.68	−0.98	0.66	1.58	0.48
31	0.45	−1.24	0.78	1.82	0.30

- 1 Note. α = the item slope parameter of Item Response Theory (IRT), β = the item difficulty
- 2 parameter of IRT

1 Table 5. Correlations between BJSQ, Coping Scale, ABCR-14, and CAOD

	BJ1	BJ2	BJ3	BJ Total	Cs1	Cs2	Cs3	Cs Total	AB1	AB2	AB3	AB Total
Cs1	−0.045	−0.103	−0.185*	−0.123								
Cs2	−0.041	−0.051	−0.396**	−0.109								
Cs3	−0.063	0.290**	−0.039	0.261**								
Cs Total	−0.043	−0.130	−0.225**	−0.155*								
AB1	0.465**	0.454**	0.521**	0.534**	−0.149*	−0.120	0.049	−0.160*				
AB2	0.423**	0.392**	0.374**	0.448**	−0.084	−0.038	0.031	−0.088				
AB3	0.284**	0.289**	0.236**	0.313**	−0.040	−0.044	0.047	−0.045				
AB Total	0.458**	0.434**	0.445**	0.499**	−0.109	−0.075	0.044	−0.116				
CA1	0.426**	0.539**	0.283**	0.559**	−0.001	−0.044	0.028	−0.011	0.497**	0.484**	0.364**	0.517**
CA2	0.372**	0.501**	0.425**	0.544**	−0.060	−0.140	−0.044	−0.070	0.526**	0.504**	0.422**	0.554**
CA3	0.211**	0.531**	0.445**	0.571**	−0.156*	−0.204**	0.100	−0.178*	0.536**	0.457**	0.398**	0.526**
CA4	0.361**	0.561**	0.537**	0.623**	−0.086	−0.155*	0.143	−0.116	0.704**	0.656**	0.468**	0.711**
CA Total	0.393**	0.588**	0.461**	0.633**	−0.077	−0.140	0.067	−0.096	0.634**	0.597**	0.457**	0.650**

2 Note. BJSQ = Belief Job Stress Questionnaires; ABCR-14 = Assessment of Belief Conflict in Relationship-14; CAOD = Classification and
3 Assessment of Occupational Dysfunction, BJ1 = Job Stressor, BJ2 = Stress Response, BJ3 = Social Factor, BJ Total = Total number completing
4 the BJSQ, Cs1 = Active, Cs2 = Seeking social support, Cs3 = Passive , Cs Total = Total number completing the Coping Scale, AB1 = Belief

1 conflict among the same healthcare workers, AB2 = Belief conflict between healthcare workers and other staff, AB3 = Belief conflict in
2 therapeutic relationships, AB Total = Total number of completing the ABCR-14, CA1 = Occupational imbalance, CA2 = Occupational
3 deprivation, CA3 = Occupational alienation, CA4 = Occupational marginalization, CA Total = Total number completing the CAOD, * $P < .05$.,
4 ** $P < .01$.

1 Table 6. Correlations between BJSQ, Coping Scale, ABCR-14, CAOD, and participant characteristics

	Pc1	Pc2	Pc3	Pc4	Pc5	Pc6	Pc7	Pc8	Pc9	Pc10	Pc11	Pc12	Pc13	Pc14	Pc15	Pc16	Pc17
Bj2	-0.04	0.03	-0.06	0.06	-0.11	-0.12	-0.13	0.02	0.39**	0.33**	0.40**	-0.04	-0.31*	-0.05	-0.02	0.42**	0.14
AB Total	0.06	0.03	-0.04	0.07	0.22*	-0.13	-0.04	0.00	0.21*	0.24**	0.28**	0.08	-0.08	-0.07	-0.02	0.49	0.09
CA Total	0.02	0.18	-0.01	0.08	-0.07	-0.15	-0.10	0.07	0.63**	0.54**	0.51**	0.08	-0.14	-0.09	-0.21*	0.45**	0.12

2 Note. BJSQ = Belief Job Stress Questionnaires; ABCR-14 = Assessment of Belief Conflict in Relationship-14; CAOD = Classification and
3 Assessment of Occupational Dysfunction, BJ2 = Stress response, AB Total = Total number completing the ABCR-14, CA Total = Total number
4 completing the CAOD, Pc1 = Age, Pc2 = Sex, Pc3 = Job, Pc4 = Years of clinical experience, Pc5 = Job position, Pc6 = Working arrangement, Pc7
5 = Work time per day (h), Pc8 = Commuting time per day (h), Pc9 = Opportunities for refreshment, Pc10 = Satisfaction with leisure time, Pc11 =
6 Time for sleeping, Pc12 = Alcohol consumption, Pc13 = Smoking, Pc14 = Marital status, Pc15 = Experience of childbirth, Pc16 = Human
7 relationships, Pc17 = Frequency of interacting with hemodialysis patients., * $P < .05$., ** $P < .01$.

1 Table 7. DIC, BIC, and PSR values for the Hypothetical Models

		DIC	BIC	Iterations	PSR
Hypothetical	Type A	5033.848	5312.447	21800	1.094
Model 1	Type B	5035.328	5314.151	23100	1.098
Hypothetical	Type A	5639.272	5980.134	19000	1.098
Model 2	Type B	5640.613	5981.207	12300	1.1

2 DIC: Deviance Information Criterion, BIC: Bayesian Information Criterion, PSR: Potential

3 Scale Reduction

1 Table 8. Hypothetical Model 1 Type A using Bayesian structural equation modeling

	Estimate	Posterior S.D.	One-Tailed P-Value	95%CI
Standardized model results				
Stress response on				
Job stressor	0.124	0.073	0.044	−0.019; 0.266
Belief conflict	0.063	0.098	0.264	−0.130; 0.254
Occupational dysfunction	0.406	0.109	0.000	0.191; 0.616
Social factor	−0.077	0.084	0.188	−0.232; 0.094
Occupational dysfunction on				
Belief conflict	0.441	0.068	0.000	0.303; 0.568
Social factor	0.106	0.071	0.064	−0.029; 0.248
Belief conflict on				
Social factor	0.362	0.078	0.000	0.198; 0.506
Stress response by				
Lack of vigor	0.515	0.057	0.000	0.397; 0.620
Irritability	0.611	0.051	0.000	0.499; 0.701
Fatigue	0.796	0.031	0.000	0.728; 0.848
Anxiety	0.959	0.010	0.000	0.937; 0.975
Depression	0.961	0.010	0.000	0.940; 0.977
Somatic symptoms	0.739	0.038	0.000	0.657; 0.804
Belief conflict by				
Belief conflict among the same healthcare workers	0.991	0.010	0.000	0.963; 0.999
Belief conflict between healthcare workers and other staff	0.883	0.019	0.000	0.843; 0.916
Belief conflict in therapeutic	0.445	0.060	0.000	0.321; 0.555

relationships

Occupational dysfunction	by				
Occupational imbalance		0.849	0.026	0.000	0.791; 0.890
Occupational depression		0.948	0.018	0.000	0.908; 0.976
Occupational alienation		0.779	0.033	0.000	0.708; 0.835
Occupational marginalization		0.788	0.035	0.000	0.712; 0.847
Social factor	by				
Supervisor support		0.944	0.009	0.000	0.923; 0.959
Coworker support		0.998	0.003	0.000	0.989; 1.000
Family and friend support		0.677	0.043	0.000	0.585; 0.752
Stress response	on				
Opportunities for refreshment		−0.044	0.088	0.309	−0.215; 0.127
Satisfaction with leisure time		0.059	0.081	0.233	−0.102; 0.214
Time sleeping		0.046	0.070	0.256	−0.091; 0.182
Human relationships		0.125	0.087	0.085	−0.054; 0.285
Passive		0.299	0.060	0.000	0.177; 0.411
Occupational dysfunction	on				
Opportunities for refreshment		0.378	0.062	0.000	0.251; 0.496
Satisfaction with leisure time		0.150	0.066	0.012	0.021; 0.278
Time sleeping		0.173	0.058	0.002	0.060; 0.283
Human relationships		−0.098	0.068	0.075	−0.230; 0.037
Belief conflict	on				
Satisfaction with leisure time		0.025	0.071	0.364	−0.112; 0.168
Time sleeping		0.104	0.066	0.062	−0.028; 0.231
Human relationships		0.408	0.074	0.000	0.255; 0.545

2 Note. BSEM = Bayesian structural equation modeling, Posterior S.D.= Standard deviation

3 of the posterior distribution, CI = Confidence interval, On = Structural association, By =

4 Constr

Hypothetical model 1 Type A

Hypothetical model 1 Type B

Hypothetical model 2 Type A

Hypothetical model 2 Type B

Figure 1: Hypothetical model

Note. Js, Job stressor; Sr, Stress response; Bc, Belief conflict; Od, Occupational dysfunction;
Cs, Coping strategy

Figure 2: Confirmatory factor analysis for Job Stressor

Note. Job Stressor included four factors: quantitative overload (Js1, 2), mental demand (Js3, 4, 5, 6), job control (Js8, 9, 10), and interpersonal relationships (Js12, 13). CFI = 0.968, TLI = 0.949, RMSEA = 0.072.

Figure 3: Confirmatory factor analysis for Social Factors

Note. Paths without statistical significance are depicted by a dotted line. Pc10, Satisfaction with leisure time; Pc16, Human relationships. Social Factors included three factors: Supervisor support (Sf1, 4, 7), Coworker support (Sf 2, 5, 7), Family and friend support (Sf 3, 6, 9). CFI = 0.956, TLI = 0.949, RMSEA = 0.041.

Figure 4: Confirmatory factor analysis for Coping scale

Note. Coping Strategy included three factors; Active (Cs1, 4, 5, 9, 14, 17, 20, 24, 25), Seeking social support (Cs11, 22, 27, 30), and Passive (Cs12, 18, 21, 26, 29, 31). CFI = 0.924, TLI = 0.913, RMSEA = 0.071.

Figure 5: Hypothetical Model 1 Type A using Bayesian structural equation modeling

Note. DIC = 5033.848, BIC = 5312.447. Paths without statistical significance are depicted by dotted lines. (1) Lack of vigor, (2) irritability, (3) fatigue, (4) anxiety, (5) depression, (6) somatic symptoms, (7) Belief conflict among the same healthcare workers, (8) Belief conflict between healthcare workers and other staff, (9) Belief conflict in therapeutic relationships, (10) Occupational imbalance, (11) Occupational deprivation, (12) Occupational alienation, (13) Occupational marginalization, (14) Supervisor support, (15) Coworker support, (16) Family and friend support.