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Effort-Reward Imbalance and Quality of Life Among Female Nurses at a General Hospital in Japan

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1. Introduction

An effort-reward imbalance (ERI) model is a measurement of psychosocial work stress. The ERI model with both the effort-reward ratios and the concept of overcommitment (OC) indicates that work stress is related to high effort with low reward. Effort is evaluated by measuring work demands. Reward includes money, esteem, status, and control over promotion prospects, and job security. Overcommitment is a set of attitudes, behaviors, and emotions that reflect excessive work effort[13,14,18]. This model has been used to study psychosocial work stress in various occupational groups. It has been suggested that the ERI model has a predictive power for poor physical or mental health[2-3,6-8,10,12,14-16,18-21]. Concerning overcommitment, according to Siegrist and Tsutumi et al., overcommitment causes emotional exhaustion and exacerbates the negative effects of the effort-reward imbalance[14,18]. Weyers et al. found that nurses who report higher ERI with high overcommitment scores were twice as likely to suffer from poor psychological health compared to those who report higher ERI with low overcommitment scores[21]. Aust et al. and Ire et al. found that overcommitment was significantly reduced in an intervention group through stress management programs or counseling[1,4].

Quality of life measures were developed mainly to reflect consequences of health problems. Health-related quality of life indicators usually encompass a person's ability to effectively perform in physical, emotional, and social domains and to maintain a sense of well-being [9,11]. Therefore, quality of life is an important measurement of health-related outcomes. To our knowledge, 10 studies have examined the relationships between ERI and health-related quality of life among working and healthy populations using the Short-Form Health Survey or the World Health Organization Quality of Life (WHOQOL-26)[3,6-8,10,12,15-16,20-21]. Only three studies were conducted among hospital staff members, one of which was conducted among physicians in China[10]; the others were among nurses in Denmark[21] and Brazil[15]. Li et al. used the SF-8 to investigate the relationship between ERI, physical health, and mental health among physicians in China. Their findings suggested

that poor physical and mental health were significantly related to higher effort-reward imbalance[10]. Weyers et al. examined the relationship between ERI, physical health, and mental health among nurses in Denmark and found that risks for poor health functioning were elevated among nurses who were experiencing high effort and low reward[21]. All previous studies suggested a significant relationship between ERI and health-related quality of life, and higher ERI is likely to be a risk factor for poor health. In Japan, Watanabe et al. investigated the relationship between ERI and health-related quality of life among Japanese employees of a manufacturing plant, and suggested that ERI was associated with health-related quality of life[20]. However, no research has been conducted among Japanese nurses to examine the relationship between ERI and health-related quality of life.

Nurses are exposed to high-stress work environments, including irregular work schedules, shift work, and interaction with patients and other hospital staff members. Tsutsumi found that the level of ERI in nurses and dental technicians in Japan was almost twice that of workers in production companies[18]. The research investigating the relationship between ERI and health-related quality of life among nurses is necessary to elevate their quality of life or to prevent physical or mental impairments or disease.

We had already investigated the relationship between the ERI and depressive state in the same sample[5]. In the previous study, depressive state was measured by one item of the quality of life (WHOQOL-26), i.e., item 26, which questioned how often the subject feels despair, anxiety or depressed mood. And we found that effort-money (effort-job promotion) imbalance and overcommitment had significantly influenced on depressive state. However, depressive state is an important problem for mental health but only a part of health functioning. In the present study, we investigated the relationship between the ERI and health functioning as a whole.

The aim of the present study was to investigate the effects of ERI on quality of life among nurses at a Japanese general hospital.

2. Subjects and methods

2.1 Subjects and procedure

A part of the present study was described elsewhere[5]. Subjects consisted of all the nurses (n=682) at a general hospital in Japan, which is located in urban and has 611 beds. We conducted the present study in November 2007. The questionnaire was distributed by supervisors and was returned by 465 nurses (response rate, 68.2%). Male nurses were excluded from the sample because there were so few (n = 13). Subjects with missing ERI values were also excluded (n = 46). The final sample consisted of 406 female nurses (59.5%).

Participants were asked to fill out a questionnaire explaining the voluntary of the survey, and we assumed that participants consented to the survey with answering the questionnaire. This self-report survey was approved by the Committee for the Prevention of Physical Disease and Mental Illness among Health Care Workers in the general hospital.

3. Measured variables

3.1 Work environment

The survey included demographic variables such as age and work-related variables (work style, occupational status, overtime hours, and shift work). Age was coded into a four-category classification and ranged from 20s to 50s or over (<30, 30 to <40, 40 to <50, and ≥50). Work style was either full-time or part-time. Occupational status responses included: manager, middle manager or subordinate. Overtime work responses were in hours per week. Shift work categories included: no shift work, shift work with night shift, or shift work without night shift. Table 1 shows the characteristics of the subjects.

3.2 Effort-reward imbalance

Work stress was measured using the Japanese version of the ERI (23 items) translated by Tsutsumi [19]. The ERI consists of three subscales: efforts (6items, e.g., quantitative and qualitative load), rewards(11items) and overcommitment(6items). The rewards subscale is further divided into three subgroups: esteem (5items, e.g., "I receive the respect I deserve from my superiors."), job security (2 items, e.g., "My job security is poor.") and job promotion (4 items, e.g., "My job promotion prospects are poor."). Overcommitment is measured by six items which refer to respondent's inability to withdraw from work obligations and to develop a more distant attitude towards job requirements. The validity of this questionnaire has been confirmed [18]. Higher ERI ratio and overcommitment scores indicate high-risk conditions. Means and standard deviations of ERI subscales and overcommitment are presented in Table 1.

3.3 Health-related quality of life

Quality of life was measured by the Japanese version of WHOQOL-BREF (WHOQOL-26) [17]. The WHOQOL-26 contains 26 items divided into the following domains: Physical Health (7 items), Psychological (6 items) Social Relationships (3 items), and Environment (8 items). The four domain scores denote an individual's perception of their quality of life in each particular domain. Higher scores represent better quality of life. The WHOQOL has been applied to assess health functioning [9,11].

3.4 Statistical analysis

Four kinds of ERI ratios (effort-reward imbalance, effort-esteem imbalance, effort-job security imbalance and effort-job promotion imbalance) were calculated according to Tsutsumi[19]. The effort-reward imbalance was calculated as effort × 11/reward × 6. The effort-esteem imbalance was calculated as effort × 5/esteem × 6. The effort-job security imbalance was calculated as effort × 2/security × 6. The effort-job promotion imbalance was calculated as effort × 4/job promotion × 6. Higher scores of the three imbalances and overcommitment were defined as high-risk conditions. The lower tertile of the four domain scores of QOL were each assigned to the poor health functioning group (n =117, 111, 183, 120 for Physical Health, Psychological, Social Relationship, and Environment, respectively). The upper tertile of each of the four domain scores of QOL was assigned to the good health functioning group (n =114, 116, 128, 121 for Physical Health, Psychological, Social Relationship, and Environment, respectively). The medium scores (n =175, 179, 95, 165 for

Physical Health, Psychological, Social Relationship, and Environment, respectively) were all excluded from further analyses. Mean and standard deviation of the four domain scores of QOL are presented in Table 1.

		Nurses (n = 406)
		n (%)
Age, years	<30	272 (67)
	30 to <40	91 (22)
	40 to <50	25 (6)
	≥50	13 (3)
Work style	Full-time	368 (91)
	Part-time	21 (5)
Occupational status	Manager	18 (4)
	Middle manager	21 (5)
	Subordinate	367 (90)
Overtime work, h/wk	<50	353 (87)
	≥50	1 (0)
Quality of life*	Poor Physical Health	117
	Good Physical Health	114
	Poor Psychological	111
	Good Psychological	116
	Poor Social Relationship	183
	Good Social Relationship	128
	Poor Environment	120
	Good Environment	121
Scale	Mean	SD
ERI		
Effort	18.65	5.31
Reward	42.66	8.06
Esteem	20.36	4.12
Job security	8.05	1.8
Money	14.25	3.26
Effort-reward ratio	0.86	0.42
Effort-esteem ratio	0.83	0.44
Effort-security ratio	0.86	0.55
Effort-job promotion ratio	0.97	0.55
Overcommitment	15.8	3.54
Quality of life		
Physical Health	20.98	4.51
Psychological	17.6	3.79
Social Relationship	9.77	1.71
Environment	23.62	4.17
*Poor group, lower tertile; good group, upper tertile		

Table 1. Characteristics of study subjects.

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Table 2. Comparison between Poor and Good Physical Health groups.

	Poor Physical Health group n=117	Good Physical Health group n=114	
	n (%)	n (%)	χ2 (Chi-square
Age, years			2.41
<30	82 (70.0)	74 (64.9)	
30 to <40	22 (18.8)	27 (23.7)	
40 to <50	8 (6.8)	5 (4.4)	
≥50	4 (3.4)	6 (5.3)	
Work style			4.29
Full-time	110 (94.0)	103 (90.4)	
Part-time	2 (1.7)	8 (7.0)	
Occupational status			0.88
Manager	7 (6.0)	4 (3.5)	
Middle manager	5 (4.3)	6 (5.3)	
Subordinate	105 (89.7)	104 (91.2)	
Shift work			6.12
without night shift	8(6.8)	2(1.8)	
with night shift	90(76.9)	83(72.8)	
no shift work	17(14.5)	27(23.7)	
	Mean (SD)	Mean (SD)	t value
Overtime work, h/wk	9.01(8.4)	6.09(4.8)	3.01
Effort-reward ratio	1.13 (0.53)	0.64 (0.28)	8.41
Effort-esteem ratio	1.08 (0.57)	0.64 (0.28)	7.56
Effort-job security ratio	1.19 (0.82)	0.64 (0.27)	6.72
Effort-job promotion ratio	1.31 (0.75)	0.74 (0.34)	7.41
Overcommitment	18.10 (3.42)	13.55 (3.09)	10.60
			* **p < 0.01

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	Poor Psychological group n=111	Good Psychological group n=116		
	n (%)	n (%)	χ2 (Chi-square value)	
Age, years			6.12	n.s
<30	77 (69.4)	71 (61.2)		
30 to <40	24 (21.6)	28 (24.1)		
40 to <50	7 (6.3)	9 (7.8)		
≥50	2 (1.8)	6 (51.7)		
Work style			8.40	*
Full-time	106 (95.5)	105 (90.5)		
Part-time	0 (0)	8 (6.9)		
Occupational status			0.60	n.s
Manager	4 (3.6)	4 (3.4)		
Middle manager	5 (4.5)	8 (6.9)		
Subordinate	102 (91.9)	104 (89.7)		
Shift work			6.5	*
without night shift	5(4.5)	1(0.9)		
with night shift	86(77.5)	84(72.4)		
no shift work	17(15.3)	31(26.7)		
	Mean (SD)	Mean (SD)	t value	
Overtime work, h/wk	8.64(7.08)	6.27(5.46)	2.67	**
Effort-reward ratio	1.09 (0.51)	0.67 (0.29)	7.74	***
Effort-esteem ratio	1.04 (0.52)	0.65 (0.33)	6.91	***
Effort-job security ratio	1.12 (0.78)	0.65 (0.27)	6.20	***
Effort-job promotion ratio	1.27 (0.75)	0.74 (0.35)	6.89	***
Overcommitment	17.88 (3.38)	13.38 (3.07)	10.51	***
			*p < 0.05	***p < 0.001

Table 3. Comparison between Poor and Good Psychological groups.

	Poor social Relationship group n=183	Good social relationship group n=128		
	n (%)	n (%)	χ2 (Chi-square value)	
Age, years			8.40	n.s
<30	117 (63.9)	92 (71.9)		
30 to <40	43 (23.5)	25 (19.5)		
40 to <50	15 (8.2)	4 (3.1)		
≥50	5 (2.7)	5 (3.9)		
Work style			3.26	n.s
Full-time	166 (90.7)	116 (90.6)		
Part-time	7 (3.8)	9 (7.0)		
Occupational status			3.43	n.s
Manager	10 (5.5)	5 (3.9)		
Middle manager	12 (6.6)	3 (2.3)		
Subordinate	161 (88.0)	120 (93.8)		
Shift work			0.82	n.s
without night shift	6(3.3)	6(4.7)		
with night shift	142(77.6)	95(74.2)		
no shift work	32(17.5)	26(20.3)		
	Mean (SD)	Mean (SD)	t value	
Overtime work, h/wk	8.13(7.39)	6.68(5.04)	1.78	n.s
Effort-reward ratio	0.98 (0.48)	0.71 (0.31)	5.66	***
Effort-esteem ratio	0.96 (0.51)	0.68 (0.35)	5.32	***
Effort-job security ratio	0.99 (0.69)	0.68 (0.29)	4.70	***
Effort-job promotion ratio	1.09 (0.60)	0.81 (0.39)	4.72	***
Overcommitment	17.87 (3.41)	14.35 (3.25)	6.38	***
				***p < 0.001

Table 4. Comparison between Poor and Good Social Relationship groups.

	Poor Environment group n=120	Good Environment group n=121		
	n (%)	n (%)	$\chi 2$ (Chi-square value)	
Age, years			7.28	n.s
<30	87 (72.5)	76 (62.8)		
30 to <40	25 (20.8)	27 (22.3)		
40 to <50	5 (4.2)	9 (7.4)		
≥50	2 (1.7)	7 (5.8)		
Work style			7.90	*
Full-time	111 (92.5)	107 (88.4)		
Part-time	2 (1.7)	11 (9.1)		
Occupational status			1.10	n.s
Manager	5 (4.2)	7 (5.8)		
Middle manager	5 (4.2)	8 (6.6)		
Subordinate	110 (91.7)	106 (87.6)		
Shift work			9.62	**
without night shift	7(5.8)	3(2.5)		
with night shift	95(79.2)	82(67.8)		
no shift work	16(13.3)	35(28.9)		
	Mean (SD)	Mean (SD)	t value	
Overtime work, h/wk	8.46(7.80)	6.65(5.76)	1.92	n.s
Effort-reward ratio	1.04 (0.46)	0.70 (0.31)	6.73	***
Effort-esteem ratio	0.99 (0.48)	0.68 (0.34)	5.79	***
Effort-job security ratio	1.06 (0.68)	0.67 (0.28)	5.79	***
Effort-job promotion ratio	1.21 (0.70)	0.76 (0.35)	6.29	***
Overcommitment	17.43 (3.61)	14.18 (3.36)	7.23	***
		*p < 0.05, **p < 0.01, ***p < 0.001		

Table 5. Comparison between Poor and Good Environment groups.

In the next step, the relationships between health functioning and work-related or ERI variables were examined using stepwise logistic regression. We used the tertile of the four domain scores as dependent variables and the ERI ratios, overcommitment scores, and the work-related scores as independent variables. The results are shown as odds ratios (ORs) with 95% confidence intervals (CIs). All analyses were conducted using SPSS 11 (SPSS Inc., Chicago, IL, USA).

4. Results

The four effort-reward ratios and overcommitment scores significantly correlated with poor health functioning in the four domains (Table 2~Table 5).

4.1 ERI and physical health domain

Shift work and overtime hours per week also significantly correlated with poor physical health functioning (Table 2). According to the stepwise logistic regression analyses between Physical Health and the work-related variables (shift work and overtime hours per week), the three imbalances (effort-esteem imbalance, effort-job security imbalance and effort-job promotion imbalance), and overcommitment, significant correlations were found with Poor Physical Health: a higher effort-job promotion ratio (OR, 0.24; 95% CI, 0.09-0.64) and higher overcommitment (OR, 0.64; 95% CI, 0.64-0.83) (Table 6).

4.2 ERI and psychological domain

We found significant differences for work style, shift work and overtime hours per week between the two groups (Table 3). According to the stepwise logistic regression analyses between Psychological and the work-related variables (shift work and overtime hours per week), the three imbalances, and overcommitment, significant correlations were found with Poor Psychological Health: a higher effort-job promotion ratio (OR, 0.25; 95% CI, 0.09-0.70) and higher overcommitment (OR, 0.71; 95% CI, 0.62-0.81) (Table 6).

4.3 ERI and social relationship domain

We found no significant differences for age or work-related variables (work style, occupational status, shift work, and overtime hours per week) (Table 4). According to the stepwise logistic regression analyses between Social Relationship and the three imbalances and overcommitment, significant correlations were found with Poor Social Relationship: a higher effort-esteem ratio (OR, 0.31; 95% CI, 0.13-0.71) and higher overcommitment (OR, 0.86; 95% CI, 0.79-0.94) (Table 6).

4.4 ERI and environment domain

We found significant differences for work style and shift work between the two groups (Table 5). According to the subsequent stepwise logistic regression analyses between Environment and the work-related variables (work style and shift work), the three imbalances and overcommitment, significant correlations were found with Poor Environment: a higher effort-job promotion ratio (OR, 0.27; 95% CI, 0.11-0.64), higher overcommitment (OR, 0.85; 95% CI, 0.77-0.94), and shift work (OR, 1.99; 95% CI, 1.04-3.80) (Table 6).

5. Discussion

The four effort-reward ratios and overcommitment scores of the poor health functioning group were significantly higher than those of the good health group in the four domains of the WHOQOL (Table 2~5). Moreover, all the effort-reward ratios of the poor health functioning group were above 1, and therefore were defined as a high-risk condition for poor physical and mental health [19].

The significant association between Physical Health or Psychological domains of the WHOQOL and the ERI was similar to previous findings among hospital staff members, including nurses in other countries[10,15,21].

The strength of our study is also that we investigated in detail the independent contribution of the three ratios of effort-reward imbalance (effort-esteem imbalance, effort-job security imbalance and effort-job promotion imbalance) and overcommitment to health functioning measured by the WHOQOL. Physical Health, Psychological, and Environment domains of the WHOQOL were each significantly associated with a higher effort-job promotion ratio and higher scores of overcommitment (Table 6). Social Relationship domain was significantly associated with a higher effort-esteem ratio and higher scores of overcommitment (Table 6). According to Chandola et al., the ERI has been extended to include general and close social relationships, and lack of close social relationships was

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Table 6. Odds ratios of QOL domains by effort-reward imbalance and overcommitment.

	Poor Physical Health		Poor Psychological		Poor Social Relationsh	
	B	OR (95% CI)	B	OR (95% CI)	B	OR (95% CI
Effort-job promotion ratio	−1.42	0.24 (0.09−0.64)**	−1.40	0.25(0.09−0.70)**		
Effort-esteem ratio					−1.18	0.31(0.13−0.
Overcommitment	−0.32	0.64 (0.64−0.83)***	−0.34	0.71(0.62−0.81)***	−0.15	0.86(0.79−0.9
Shift work						
R2		0.47		0.46		
Note: OR, odds ratio; 95% confidence intervals are shown in parentheses						
		*p < 0.05, **p < 0.01, ***p < 0.001				

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associated with poorer health [2]. Social Relationship domain of the WHOQOL included three items: satisfaction with human relations, support from friends, and satisfaction with sex life. For our results, the association between effort-esteem imbalance and Social Relationship partially agreed with the findings of Chandola et al., possibly indicating that nurses with higher effort-esteem imbalance tend to be dissatisfied with their social relationships.

For work-related variables and the WHOQOL, only shift work was significantly associated with the Environment domain.

The present findings suggest that nurses must reduce subjective feelings of overcommitment. In addition, improving the work situation—for example, better promotion prospects, higher salaries, respect from supervisors, or reducing the burden of shift work—may improve the physical and mental health of nurses.

In this study, overcommitment was associated with all four domains of the WHOQOL. In accordance with previous studies[1,4,14,18], overcommitment is a set of attitudes, behaviors and emotions that reflect excessive work effort, and is combined with a strong desire for approval. Therefore, the overcommitment that many nurses experience may be reduced through mental health services such as group cognitive psychotherapy. Such interventions may improve immediate and long-term health functioning. In the future, investigations should be done to determine whether such mental health services actually improve health functioning among nurses through a reduction of overcommitment.

From the position of occupational health practitioners, it is possible to improve working conditions such as shift work, or respect from superiors. Concerning shift work, planning shift duty in an orderly manner (ie. morning shift → afternoon shift → night shift → morning shift) will reduce the burden of work shift. We may be able to educate the supervisors and administrators about issues related to mental health of nurses; the stressors or burden for nurses, respect to their skill or the adequate support in difficult situations.

Nevertheless, the present study has some limitations. First, the sample size was small and only one general hospital was surveyed. A larger sample should be examined in the future. Second, our results were inconclusive about the impact of ERI on health-related quality of life. We should conduct follow-up studies to investigate the change of health functioning through reduction of nurses' overcommitment or improvement of the effort-job promotion imbalance and effort-esteem imbalance.

In spite of the limitations, our findings provide insight into the factors influencing health functioning among nurses in the general hospital. From a practical point of view, our suggestion to reduce feelings of overcommitment among nurses may be valuable for professionals who care for hospital nurses, such as occupational health practitioners.

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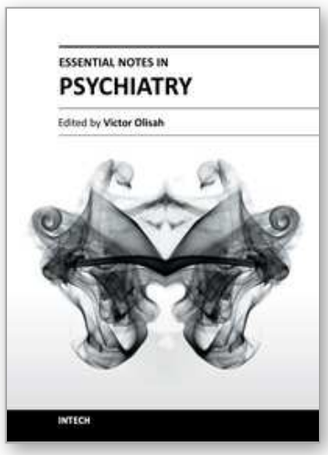
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Psychiatry is one of the major specialties of medicine, and is concerned with the study and treatment of mental disorders. In recent times the field is growing with the discovery of effective therapies and interventions that alleviate suffering in people with mental disorders. This book of psychiatry is concise and clearly written so that it is usable for doctors in training, students and clinicians dealing with psychiatric illness in everyday practice. The book is a primer for those beginning to learn about emotional disorders and psychosocial consequences of severe physical and psychological trauma; and violence. Emphasis is placed on effective therapies and interventions for selected conditions such as dementia and suicide among others and the consequences of stress in the workplace. The book also highlights important causes of mental disorders in children.

How to reference

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