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# EFFORT-REWARD IMBALANCE AND JOB STRAIN INDEX ASSOCIATED WITH HEALTH-RELATED QUALITY OF LIFE FOR CIVIL SERVANTS IN A NATIONAL SURVEY: THE MEDIATION EFFECT OF JOB SUPPORT AND OVER-COMMITMENT

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**Abstract**

**Objectives:** Work-related stress (WRS) is significantly associated with health-related quality of life (HRQoL), but the amounts of evidence on differences of effort-reward imbalance (ERI) and job strain index (JSI) remain sparse and have limited generalizability. Therefore, we aimed to assess the association between ERI and JSI with HRQoL and assess the mediation effect of social support (JS) and over-commitment (OC) on this association in Taiwan's civil servants. **Material and Methods:** A cross-sectional national survey was given to registered civil servants in Taiwan – 20 046 civil servants from 647 institutions were enrolled using multistage stratified random cluster sampling. A web-questionnaire collected demographic in-

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formation, job characteristics, and different indexes of ERI and job-control-demand-support (JCDS) models. Structural equation model (SEM) was used to examine the association between ERI and JSI with HRQoL, and the mediation effect of JS and OC on the associations. **Results:** In the ERI model, ERI and OC were consistently negatively associated with the mental component score (MCS) (r = –0.46 and r = –0.37) and physical component score (PCS) (r = –0.45 and r = –0.34), which were higher than job demand (r = –0.28 and r = –0.22) and JSI (r = –0.38 and r = –0.29). Using hierarchical multiple regression analyses, ERI was significantly correlated with MCS and PCS, which was consistently higher than JSI. The ERI and JSI were significantly correlated with MCS (β = –0.170 and β = –0.140) and PCS (β = –0.150 and β = –0.082) using SEM analysis, whereas ERI was considerably higher than in JSI. In addition, OC and JS mediated the association between The ERI and JSI with HRQoL. **Conclusions:** We found the ERI index is significantly correlated with HRQoL superior to JSI, in particular among Taiwan civil servants. Further longitudinal studies are needed to determine the causality and spatiotemporal relation of these differences. Int J Occup Med Environ Health. 2022;35(4):425–36

**Key words:**
**job strain, civil servants, mediation analysis, health-related quality of life, effort-reward imbalance, job support**

## INTRODUCTION

Work-related stress (WRS) is widespread and not just present in certain industries, jobs, or sectors but of great concern for occupational safety and health. The WRS is the negative reaction that healthcare professionals have to excessive tension or burnout placed on them in the workplace, which has increased especially during the COVID-19 pandemic [1]. Consequently, second only to musculoskeletal disorders (MSDs), WRS and stress-related diseases are a prevalent cause of occupational health problems in the workplace [2].

Indeed, job demand-control-support (JDCS) and effort-reward imbalance (ERI) models are frequently used to measure the levels of WRS in various workplaces. Difference of theoretical grounding has examined the association between adverse job characteristic and the adverse health effects among employees. The JDCS model claims that a higher risk of adverse health effects is correlated with high job strain (high demand – low control) [3,4]. It is a useful model to effectively assess high levels of workloads and enables workers to self-reflect how to reduce workplace stress. On the contrary, the ERI model was used to measure failed reciprocity at work – with high effort and low rewards the possibility of stress-related disorders increases [5]. Previous studies [6,7] also noted that the JDCS and ERI models had complementary roles and independently predicted poor self-reported health status. However, the presence of chronic diseases was significantly related to the ERI model but not related to the JDCS model [8]. Also, the subjective perception of WRS may result in inaccurate verification of the associations between self-reporting of psychosocial work conditions and health outcomes [9]. The WRS measured by the ERI and JDCS models were significantly related to increased risk of depression over time, ORs = 2.47 (95% CI: 1.99–3.49) in the ERI model was >1.71 (95% CI: 1.22–2.42) in the JDC model [10].

Despite having high job security and relatively low flexibility compared to private institutions, civil servants working in human resource management were constantly faced with challenges. Due to government downsizing and competition from the private sector, civil servants in Taiwan frequently face higher WRS and more persistent fatigue problems contributing to poor health-related quality of life (HRQoL), intent to leave, and early retirement. A study with a large-scale cross-national survey [11] indicated that high ERI rather than low job control at work predicts poor well-being better when job stress models were both simultaneously adjusted. Obviously, well-being is adversely affected by high efforts and low rewards, both psychological and physical. In addition, over-commitment (OC) and social support (SS) at work were associated with depressive symptoms [6]. Despite a study [12] finding that ERI had elevated risks of poor employee well-being, OC remains inconsistent and the moderating effect of OC on the relationship between ERI and health effects has scarcely been examined.

Even though the 2 models both focus on 2 components (job demands and job resources), less attention has been focused on the contextual mechanism's relation to the well-being of

civil servants. In addition, WRS (measured by 2 models) was significantly associated with HRQoL, but evidence on the mediation effect of ERI and JDCS models on the association with health and its consequences remain limited. Therefore, this study aims to evaluate the association between ERI and JSI with HRQoL and assess the mediation effect of JS and OC on the association in Taiwan's civil servants.

## MATERIAL AND METHODS

### Study population

The protocol was approved by the institutional review board (IRB) of China Medical University (CMUH105-REC3-091). A cross-sectional survey was conducted for registered civil servants using proportional probabilistic sampling by multistage stratified clusters. Twenty thousand and fourty-six civil servants from 647 registered institutions returned their questionnaires, with a 35.8% overall response rate. These civil servants voluntarily filled out an anonymous web-based questionnaire and the informed consent at the time of the study. Possible reasons for a lack of response include having limited time to fill out the questionnaire, requested time off, or vacation, and they do not affect the objective of the study.

### Instrument

The questionnaire consisted of a series of questions included demographic data, work schedule, 2 kinds of job-related stress models, and a history of diseases. First, ERI was measured with 3 items for effort and 7 items for reward using a short-modified questionnaire [5]. The ERI ratio was calculated by dividing the numerator "effort" by the denominator "reward":

$$(\text{Effort}/3) / (\text{Reward}/7) \quad (1)$$

where:

effort – a sum average of scores from the 3 effort items,

reward – a sum average of scores from the 7 reward items, multiplied by a correction factor of 0.43.

An ERI ratio >1 indicates exposure to a high ERI, which constitutes as a perceived job-related stress. Six items from a Taiwanese-version questionnaire were used to measure OC [13]. Cronbach's α coefficients for effort and reward were 0.74 and 0.83, respectively, which is consistent with Siegrist's study [5] of 0.61–0.91.

Second, the JDCS model is a well-known theory that explains how job characteristics influence employees' psychological well-being [14], which included job demand (JD), job control (JC), and job support (JS). Levels of JD were measured by 8 items including time pressure, high complexity, work pressure, exhaustive work, heavy work, limited time and staff to work, and poorly defined tasks. The Likert scale was used to measure JD: strongly agree (4 pts), agree (3 pts), disagree (2 pts), and strongly disagree (1 pt). The highest score possible was 32 pts, and a higher score represented a higher JD level.

Job control included 5 items for skill discretion (SD) and 4 items for decision authority (DA). Items were scored on a 4-point rating scale from 1 – totally disagree to 4 – totally agree. The maximum score was 36 pts, and a higher score represented a higher JC level. Levels of job strain index (JSI) using job demand scores divided by job control scores.

Job support was measured by 8 items including guidance by colleagues and superiors and work support [15]. The Likert scale was used to measure JS: strongly agree (4 pts), agree (3 pts), disagree (2 pts), and strongly disagree (1 pt). Higher scores represented employees with higher JS levels in their workplace.

Three specialists including an occupational physician, an epidemiologist, and an occupational hygienist have reviewed the content validity of the questionnaire. Cronbach's α for the overall index in this study were 0.84 for men and 0.78 for women, which is comparable to a previous study from Karasek et al. [16] that indicated this is generally acceptable for the JDCS model (overall average α for women is 0.73 and for men is 0.74).

**Outcome measurement**

A widely used measure of generic HRQoL is the medical outcomes study SF-36. The SF-36 is a reliable instrument and composed of 8 multi-item scales assessing both physical and mental related health. The 8 domains include bodily pain (BP), physical functioning (PF), general health (GH), role physical (RP), role emotional (RE), social functioning (SF), vitality (VT), and mental health (MH). The 8 domains ranged from 0 – worst to 100 – best. In SF-36, the physical health-related dimensions (PF, RP, BP, GH) and mental health-related dimensions (VT, SF, RE, MH) are assigned to a physical component summary (PCS) and a mental component summary (MCS). The SF-36 Taiwan version has good reliability and validity for possessing psychometric properties and explanatory power [17,18].

**Data analysis**

Statistical analyses were conducted using SPSS v. 24.0. Univariate analysis was used to test the differences in demographics, job characteristic, and health behaviors in the 2 groups of ERI and JSI. An index of ERI and JDCS model correlated with MCS and PCS using Pearson's correlation. Hierarchical multiple regression analysis examined the level of MCS and PCS associated with demographics, the index of ERI and JDCS models and coefficients in all study variables were standardized. Structural equation model (SEM) was applied to assess job-related stress by ERI and JDCS models associated with MCS and PCS. In addition, the indirect effects of JC and OC on the association between ERI and JSI with MCS and PCS were examined by the mediation effect.

## RESULTS

Table 1 shows a comparison of demographics in 2 indicators of job-related stress groups. The 2 ERI and JSI groups had significant differences in all demographic variables. Subject groups with high ERI were female (61.4%), of moderate age group (64.8%), university level educated (60.2%), short work duration (61.9%), and "other" marital status (62.4%). Similarly, the high JSI groups were female (60.9%), younger (65.9%), university level educated (61.0%), short work duration (63.1%), and unmarried (65.5%).

Table 2 indicates levels of MCS and PCS correlated with various indexes of job-related stress. In the ERI model, ERI and OC indexes were consistently negatively associated with MCS ($r = -0.46$ and $r = -0.37$) and PCS ($r = -0.45$ and $r = -0.34$), which were higher than job demand ($r = -0.28$ and $r = -0.22$) and JSI ($r = -0.38$ and $r = -0.29$). Job support and job control had positive correlations with MCS ($r = 0.31$ and $r = 0.26$) and PCS ($r = 0.22$ and $r = 0.16$). Interestingly, all indexes had higher correlation with MCS than PCS. Generally, the index of the ERI model was more correlated with MCS and PCS than the index in the JDCS model.

Table 3 showed the effects of indexes in the ERI and JDCS models on MCS using hierarchical multiple regression analyses. Standardized coefficients were calculated in all explanatory variables. In the first step, demographics were significantly associated with MCS except for marital status. In the second step, ERI and OC indexes were negatively associated with MCS ($\beta = -0.3081$ and $\beta = -0.3043$). In the third model, MCS was negatively associated with JSI ($\beta = -0.111$) but positively associated with job support ($\beta = 0.165$). Generally, coefficients of indexes in ERI models were consistently higher than the JSI indicator of JDCS model.

The effects of indexes in the ERI and JDCS models were associated with PCS using hierarchical multiple regression analyses in Table 3. Similarly, variables of gender, age, and education levels were significantly associated with PCS in the first step. In the second step, ERI and OC indexes were negatively correlated with PCS. In the third step, PCS was negatively correlated with JSI but positively correlated with job support. Similar to Table 3, we found a high coefficient of indicators in ERI models.

**Table 1.** Comparisons of effort-reward imbalance (ERI) and job strain index (JSI) ratio scores between different demographic characteristics among Taiwan's civil servants in 2016

| Variable | Participants (N = 20 046) [n (%)] | | | |
|---|---|---|---|---|
| | ERI | | JSI | |
| | <1 (N = 8072, 40.3%) | ≥1 (N = 11974, 59.7%) | <1 (N = 8171, 40.8%) | ≥1 (N = 11875, 59.2%) |
| Gender | | | | |
| women | 4325 (38.6) | 6885 (61.4) | 4379 (39.1) | 6831 (60.9) |
| men | 3747 (42.4) | 5089 (57.6) | 3792 (42.9) | 5044 (57.1) |
| Age | | | | |
| ≤35 years | 2495 (40.3) | 3692 (59.7) | 2109 (34.1) | 4078 (65.9) |
| 36–50 years | 3028 (35.2) | 5583 (64.8) | 3363 (39.1) | 5248 (60.9) |
| ≥51 years | 2549 (48.6) | 2699 (51.4) | 2699 (51.4) | 2549 (48.6) |
| Education level | | | | |
| ≤12 years | 442 (50.1) | 441 (49.9) | 364 (41.2) | 519 (58.8) |
| 13–15 years | 1303 (43.6) | 1685 (56.4) | 1221 (40.9) | 1767 (59.1) |
| 16 years | 4072 (39.8) | 6166 (60.2) | 3996 (39.0) | 6242 (61.0) |
| ≥17 years | 2255 (38.0) | 3682 (62.0) | 2590 (43.6) | 3347 (56.4) |
| Work duration | | | | |
| <10 years | 4934 (38.1) | 8013 (61.9) | 4781 (36.9) | 8166 (63.1) |
| 10–20 years | 2093 (39.5) | 3205 (60.5) | 2315 (43.7) | 2983 (56.3) |
| >20 years | 1045 (58.0) | 756 (42.0) | 1075 (59.7) | 726 (40.3) |
| Marital status | | | | |
| unmarried | 2643 (39.2) | 4102 (60.8) | 2324 (34.5) | 4421 (65.5) |
| married | 5166 (41.0) | 7436 (59.0) | 5571 (44.2) | 7031 (55.8) |
| other | 263 (37.6) | 436 (62.4) | 276 (39.5) | 423 (60.5) |

All variables have significant differences with ERI and JSI.

Figure 1a shows indexes of work-related stress by ERI and JDCS models associated with MCS using SEM analysis. The JSI was positively correlated with ERI (β = 0.570) and over-commitment (β = 0.095) but negatively correlated with job support (β = –0.073). Similarly, ERI was positively correlated with over-commitment (β = 0.430) but negatively correlated with job support (β = –0.410). The JSI and ERI were consistently correlated with MCS, the standardized coefficient of ERI (β = –0.170) was revealed to be considerably higher than in JSI (β = –0.140). The MCS was positively correlated with job support (β = 0.150) but negatively correlated with over-commitment (β = –0.30). Indirect effects of job support accounted for 36.2% for ERI and 7.8% for JSI on MCS, respectively. Similarly, indirect effects of over-commitment accounted for 20.4% for ERI and 75.9% for JSI on MCS, respectively.

Figure 1b shows indexes of work-related stress associated with PCS using SEM analysis. Similar to Figure 1a,

**Table 2.** Mental component summary (MCS) and physical component summary (PCS) correlated with 2 job-related stress index of 2 models

| Model | MCS | PCS |
|---|---|---|
| ERI model | | |
| effort-reward imbalance | –0.46** | –0.37** |
| over-commitment | –0.45** | –0.34** |
| JCDS model | | |
| job demand | –0.28** | –0.22** |
| job support | 0.31** | 0.26** |
| job control | 0.22** | 0.16** |
| job strain index | –0.38** | –0.29** |

** $p < 0.01$.

JSI and ERI indexes were consistently correlated with PCS, the standardized coefficient of ERI (β = –0.150) was revealed to be considerably higher than in JSI (β = –0.082). PCS was positively correlated with job support (β = 0.140) but negatively correlated with over-commitment (β = –0.220). Indirect effects of job support accounted for 38.3% for ERI and 12.5% for JSI on PCS, respectively. Similarly, indirect effects of over-commitment accounted for 25.5% for ERI and 63.0% for JSI on PCS, respectively.

## DISCUSSION

With the increasing concerns regarding job-related stress, previous studies have indicated psychosocial factors are contributing to adverse health effects for employees in various industries. The Chinese version of the *Job Content Questionnaire* (C-JCQ) based on Karasek's JDCS model verified by item response theory (IRT)-based Rasch model was used to evaluate job strain of individuals in Taiwan [19]. Thus, C-JCQ subscales is suitable for easily, quickly, and clearly assessing employees' job strain in workplace settings. Similarly, a validation study of ERI was conducted to measure psychological stress at work in Chinese healthcare

**Table 3.** The effects of effort-reward imbalance (ERI) and job control-demand-support (JCDS) models on mental component summary (MCS) and physical component summary (PCS) using hierarchical multiple regression analyses

| Variable | MCS | | | PCS | | |
|---|---|---|---|---|---|---|
| | step 1 | step 2 | step 3 | step 1 | step 2 | step 3 |
| Demographics | | | | | | |
| gender | 0.035** | 0.003 | 0.002 | 0.056** | 0.033** | 0.033** |
| age | 0.141** | 0.127** | 0.130** | –0.043** | –0.057** | –0.055** |
| education | 0.058** | 0.079** | 0.068** | 0.076** | 0.092** | 0.083** |
| marital status | –0.006 | –0.004 | –0.007 | –0.031 | –0.030** | –0.032** |
| ERI model | | | | | | |
| ERI | | –0.308** | –0.165** | | –0.279** | –0.166** |
| OC | | –0.304** | –0.314** | | –0.201** | –0.207** |
| JCDS model | | | | | | |
| JSI | | | –0.111** | | | –0.093** |
| Job support | | | 0.165** | | | 0.126** |
| $R^2$ [%] | 2.0 | 29.7 | 32.8 | 1.5 | 18.6 | 20.6 |
| $\Delta R^2$ [%] | 2.0 | 27.7 | 3.5 | 1.5 | 17.1 | 2.0 |

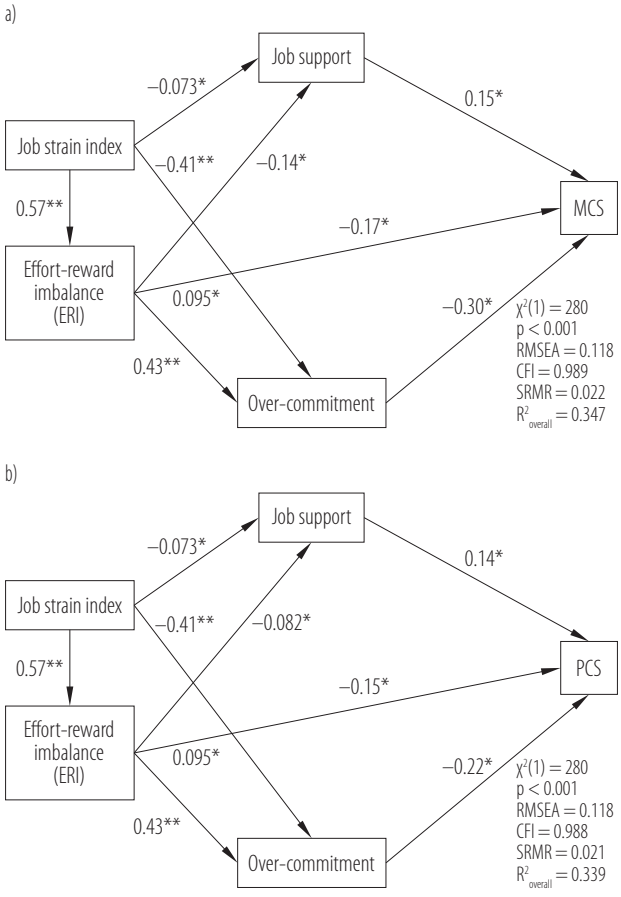
JSI – job strain index; OC – over-commitment.
* $p < 0.01$.
** $p < 0.001$.

workers [20]. The both models tested the association between job-related stress and adverse health effects in various workplaces in prospective and cross-sectional studies [5]. They revealed high job strain elicits recurrent states of excessive activation of the autonomic nervous system in workers, contributing to the development of stress-related diseases, such as psychosomatic symptoms [8] and cardiovascular diseases (CDVs) [21].

This study indicated demographic groups of civil servants frequently facing high ERI and JSI were female, young and moderate age group, of university level education, short work duration, and "other" marital status. Our results were similar to previous studies [22,23] that females have higher stress scores than males in the same cultural context, in contrast to our study, low stress was found in high education levels and income. The high strain experienced by civil servants with high education and short work duration may be caused by taking on workloads greater than their capability and on a voluntarily basis. Executive class workers in Taiwan generally experience more psychological stress than those in blue-collar workers [23], which mainly contributes to heavy workloads, lack of resources, financial responsibilities, and role conflict between the demands from the top management and that from the employees.

This is similar to an international cohort study [24] that indicated high-grade employees had high control, long working hours, and high demands. The Finnish cohort had less grade differences in poor PCS and disadvantaged work characteristics than those in the British and Japanese cohorts. Recently, civil servants have faced various challenges in Taiwan due to reduced budgets and staff and high caseloads. As a result, civil servants experience various risks from occupational injuries, CVDs, metabolic syndromes, and psychosomatic symptoms. Similar to "karoshi" in Japan (meaning "death from overwork"), some victims experienced psychiatric disabilities and work-related mental illnesses (such as depression, psychosomatic disorders, and suicide) due to exposure to high work-related stress. Thus, enhancing job support and promoting autonomy were seen as important for reducing work-related stress and its related consequences [25].

Despite civil servants having stable wages and welfare provided by public finances, they are obligated to routinely perform public duties for citizens under an inflexible bureaucratic system. However, the economic downturn and increasing unmet needs for citizens in Taiwan have led to stagnation in public sector salaries. Most civil servants




CFI – comparative fit index; RMSEA – root mean squared error of approximation; SRMR – standardized root mean squared residual.
* $p < 0.01$.
** $p < 0.001$.

**Figure 1.** Schematic of work-related stress by effort-reward imbalance (ERI) and job demand-control-support (JCDS) models associated with a) mental component summary (MCS) and b) physical component summary (PCS) using structural equation model

are experiencing increased work pressure, emotional demands, harassment, and work-life conflicts, which can lead to more adverse health effects. There were significant increases to the development of peptic ulcer diseases for Taiwan civil servants with high job demand and low job support [26]. The HRQoL has been used widely to measure levels of job stress and workload in the field of occupational health. Sufficient evidence has indicated that civil servants with poor HRQoL had mental disorders [27].

In addition, a study for Chinese civil servants stated the average score for quality of life (QOL) was 75, which was significantly affected by neurotic personality traits, occupational stress, and job satisfaction. Occupational stress and job satisfaction acted as mediators on the association between neuroticism and QOL [28]. Despite discovering negative associations with QOL for civil servants with occupational stress, Kong's study cannot discriminate the intensities of the 3 models on QOL. Moreover, QOL domain was not classified into 2 subsets (MSC and PCS). In our study, MCS and PCS was more negatively correlated with the ERI index ($r = -0.46$ and $r = -0.37$) than JSI ($r = -0.38$ and $r = -0.29$) in univariate analysis.

Similar to hierarchical multiple regression analyses, the standardized β coefficients on MCS and PCS were −0.165 and −0.207 for ERI were considerably higher than JSI with −0.111 and −0.093 and positive for JS ($\beta = 0.165$ and $\beta = 0.126$). Therefore, the ERI model is more suitable for examining the psychological stress arising from the imbalance of efforts spent and rewards received underlying the typical job contract. Obviously, combining ERI and JDCS models resulted in a better predictor of MCS and PCS than either model alone. Due to the nature of public services, civil servants facing job-related stress are exposed frequently to "high effort/low reward" failed reciprocity at work increasing the possibility of incident stress-related disorders, such as CVDS or depression.

A study [29] in Japanese civil servants measured by Japanese versions of WHOQoL-BREF related the domain of physical health positively to job control but negatively to job demand. Non-shift workers in Japan with high perceived stress had high ORs of insomnia: 2.27 for difficulty initiating sleep, 2.15 for difficulty maintaining sleep, and 2.96 for poor quality of sleep [30].

Despite vast evidence having shown PCS and MCS were significantly associated with physical activity, educational level, weekly working hours, turnover intention, age, and experienced occupational stress (both ERI and over-commitment), limited research has explored the mechanism of ERI and JDCS models on MCS and PCS in variety of occupational settings. Our findings found the ERI and JDCS models was significantly associated with MCS and PCS, more associated with ERI and OC than with JSI and JS. In addition, the mediation effects of OC on the association between ERI with MCS and PCS were greater than those that JS had on the association between JSI with MCS and PCS.

Meanwhile, a study [31] has examined the independent and collective contributions from the ERI and JDCS models to employee health and concluded the combination of the 2 models offered a superior estimation of the likelihood of psychological distress than achieved by 1 model in isolation. However, the Jachens and Houdmont study [31] did not explore the tentative mechanism of various indexes of the ERI and JDCS model on the direct and indirect effect on MCS and PCS. It is beneficial to design effective interventions to reduce psychological factors in order to improve employee' health status in the workplace. Similar to our findings, a large-scale cross-sectional study [11] indicated high ERI more than low job control were stronger predictors of poor psychosomatic health complaints and physical health symptoms when the 2 job stress models were both adjusted.

A study [32] in Brazil indicated that ERI appeared to be a good tool for predicting absenteeism if used alone, whereas JDC performed better when combined with ERI or JS. A 4-year longitudinal study [10] in Canada as-

sessed the combined effects of JDC and ERI and work-family conflicts (WFC) on the risk of major depressive episodes. Resulting ORs of depressive episodes over time were 1.71 (95% CI: 1.22–2.42) for the combined effect of JDS and ERI, 2.47 (95% CI: 1.99–3.49) for ERI and WFC, 2.21 (95% CI: 1.48–3.30) for WFC and JDC, respectively. Using the 3 occupational stress models, authors also found the additive effects of these factors (job strain, ERI, and WFC) on the risk of major depression. Nevertheless, a prospective cohort study stated WFC may act as a key mediator on job stressors and psychological distress, the revealed indirect effects were 47.5% for male and 64.0% for female [33]. WRS was associated with obesity [34] and cognitive impairment [35] due to irregular dietary behavior and poor sleep quality. A stronger association was found between sleep quality and mental health than sleep quality and physical health in young adults [36]. Despite widespread interest in psychological stress and its consequences for health and well-being, debate remains about how to clearly elaborate the association with each other. As usual, the ERI and JDCS models are frequently used to measure levels of psychological stress in relation to adverse health effects by questionnaire interview. As a result, previous studies [7,8,31] consistently seemed utilize the complimentary effects of the different models rather than employing a single model to link health and its consequences.

Our results were similar to previous studies [31] that indicated that ERI seems to be a good instrument for predicting MCS and PCS if used alone. Notably, whereas the mediation effect of OC and JS should be highlighted when combined with the ERI or JDCS models. Our results have not only demonstrated the associations between ERI and JDCS with HRQoL but also found JS and OC acted as moderators in the associations. It means the intervention program for civil servants on improvement of HRQoL should not focus on reduction of psychological stress, but on the contrary, focus on enforcing sufficient job support from colleagues/manager and decreasing the level of over-commitment on their job. In addition, the JDC model, including decision latitude, skill discretion, and decision authority, are not appropriate resources to compensate for the negative effects of physical demands. Social support was effective in counterbalancing the negative effects of both emotional and physical demands. Importantly in civil servants, "high effort/low reward" service work results in poor MCS and PCS, the ERI model implies the analytical notion of the cost of social reciprocity in these reoccurring transactions.

### Limitations

This study possesses several limitations in design and methodology. First, the present study was cross-sectional in nature, thus any temporality between job-related stress and HRQoL cannot be determined. Nevertheless, previous studies have demonstrated the exposure to psychological stress negatively contributed to health and its consequences. Second, the healthy worker effect could not be avoided, but civil servants in Taiwan have considerably low turnover and are relatively healthy individuals. As a result, its effect may lead to underestimations of the association between job-related stress and HRQoL. Third, job-related stress and HRQoL were measured by web-questionnaire anonymously and voluntarily filled out at the time of the study. Possible reporting biases may have influenced the present findings. However, the aim of the study was not to link the negative affectivity and social desirability in civil servants, which is nearly impossible to take into account in the association between psychosocial factors and health outcomes. We thus caution interpreting comparisons between 2 models on the effect of HRQoL.

## CONCLUSIONS

The results showed ERI and OC were consistently negatively associated with MCS ($r = -0.46$ and $r = -0.37$) and PCS ($r = -0.45$ and $r = -0.34$) higher than job demand

(r = –0.28 and r = –0.22) and JSI (r = –0.38 and r = –0.29). Based on SEM analysis, ERI and JSI were significantly correlated with MCS (β = –0.170 and β = –0.140) and PCS (β = –0.150 and β = –0.082), whereas ERI was considerably higher than in JSI. In addition, OC and JS mediated on the association between ERI and JSI with HRQoL. In other words, empowering job support and decreasing the level of over-commitment in their jobs will sustain a "balanced" work situation between job demands and job resources and are beneficial to employee well-being in the long run. As a result, further longitudinal studies are needed to determine the causality and spatiotemporal relation of these differences.

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