

**Job strain and psychological distress in office workers: the role of coping.**

**Deokhoon Jun<sup>1,6</sup> PhD, Shaun O'Leary<sup>1,2</sup> PhD, Steven M McPhail<sup>3,4</sup> PhD, Venerina Johnston<sup>1,5</sup> PhD**

**<sup>1</sup>School of Health and Rehabilitation Sciences, University of Queensland, Brisbane, Australia**

**<sup>2</sup>Department of Physiotherapy, Royal Brisbane and Women's Hospital, Metro North Health, Brisbane, Australia**

**<sup>3</sup>Centre for Functioning and Health Research, Metro South Health, Brisbane, Australia**

**<sup>4</sup>School of Public Health and Institute of Health and Biomedical Innovation, Queensland University of Technology, Brisbane, Australia**

**<sup>5</sup>RECOVER Injury Research Centre, Faculty of Health and Behavioural Sciences, The University of Queensland, Brisbane, Australia 4006**

**<sup>6</sup> Department of Physical Therapy, Kyongsung University, Busan, South Korea**

**Institution at which the work was performed: School of Health and Rehabilitation Sciences, University of Queensland, Brisbane, Australia**

**Corresponding author: Deokhoon Jun, Address: Division of Physiotherapy, School of Health and Rehabilitation Sciences, The University of Queensland, Saint Lucia, Queensland 4072, Phone: +61431231348, E-mail: deokhoon.jun@uq.net.au**

**Authors' contributions:**

Mr. D. Jun: Conception and design of the study, Data acquisition, Data analysis and interpretation, Writing and revision for the paper, Read and approved the final version for submission

Shaun O'Leary: Conception and design of the study, Data analysis and interpretation, Writing and revision for the paper, Read and approved the final version for submission

Steven M McPhail: Data analysis and interpretation, Read and approved the final version for submission

Venerina Johnston: Conception and design of the study, Data analysis and interpretation, Writing and revision for the paper, Read and approved the final version for submission

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## **Abstract**

**Background:** Work-related psychosocial factors such as job strain are thought to contribute to elevated psychological stress in office workers. One factor that may impact the relationship between job strain and psychological distress is the individual's coping resources.

**Objective:** The purpose of this study is to examine the interaction effect of coping resources on the relationship between job strain and psychological distress in office workers.

**Methods:** 220 office workers in Australia and Korea completed the Job Content Questionnaire (to evaluate job strain and social support at work), the Depression, Anxiety, and Stress Scale, (DASS-21, a measure of psychological distress), and the Coping with Job Stress Scale to assess control and escape coping. Hierarchical regression analyses were executed to examine the interaction and moderating effect of coping resources.

**Results:** Job strain had a direct positive relationship with all three domains of psychological distress. The relationship between job strain and depression was positively moderated by escape coping, but negatively moderated by social support. Use of higher levels of escape coping predicted higher levels of depression and anxiety symptoms when higher levels of job strain were perceived.

**Conclusions:** Findings suggest there may be a direct relationship between job strain and psychological distress in office workers. This relationship, however, may be moderated by the office workers coping resources (coping strategies and social support). It is

suggested that the evaluation of coping might be a key consideration in the elements of the assessment of psychological distress in office workers.

Key terms: interaction effect; coping strategy; social support; work stress

## 1. Introduction

Psychological distress can impact the health of office workers and is thought to be a major determinant of some conditions such as back and neck pain [1]. Epidemiological evidence supports a link between work-related psychosocial factors and psychological distress. Systematic reviews [2, 3] suggest that low job control combined with high work demands in the work environment [4] may result in psychological distress in the work environment. One factor potentially affecting the relationship between work-related psychosocial factors and psychological distress is an individual's coping resources such as coping strategies and social support [5-7].

Coping is defined as the cognitive and behavioral efforts to manage stressful situations that tax or exceed the resources of the individual [8]. A variety of coping strategies have been proposed in the evidence literature and in general they can be described in two dimensions; control coping (direct action, problem-focused, active) referred to as targeting the causes of stress in practical ways and escape coping (palliative, emotion-focused, passive, avoidance) referred to as trying to reduce or ignoring the negative emotional responses caused by stress [9].

There is evidence that an individual's coping strategies can influence their level of psychological distress [10]. For example, control coping strategies have been shown to reduce psychological distress [11, 12], while escape coping strategies have been shown to increase psychological distress [6, 13]. Support from colleagues and supervisors is hypothesized to buffer the negative impact of high job

demands and low job control with evidence that low social support is associated with higher risk of psychological distress in workers [5, 14]. However, the literature exploring the interaction effect and moderating role of coping resources (coping strategies and social support) on psychological distress is inconsistent. Some studies have shown that an excessive risk of psychological distress was reported when low job control, high job demand and low job support coexist [5, 15]. Lian and his colleagues also reported that increased coping resources (e.g. self-care, social support, recreation and rational coping) had a buffering effect on the relationship between work-related psychosocial factors and psychological distress [15]. On the contrary, other studies have only provided weak [7, 16] or no [9, 17] interaction effect between coping resources and psychological distress in the work environment.

Uncertainty as to the role of coping resources with regards to the modulation of psychological distress in the workplace probably reflects methodological issues associated with clarifying any relationship. One study in Spain [9] only reported the interaction effect between coping strategies and psychological distress with greater distress reported when workers used greater coping strategies and less palliative coping. Lazarus (2000) suggested that analyzing the consequences of problem-focused and emotion-focused strategies separately, leads to a limited understanding of the role of coping [18]. Beyond the psychological investigation, for instance in musculoskeletal disorder studies, coping strategies were not oriented to the perspective of work-related stressors. This was highlighted by

Cote and colleagues in their review [19] concerning the role of coping behaviors in the development of work-related neck pain. Specifically, coping with stressful situations in the workplace may differ to stressful situations outside the work environment and may require specific assessment instruments. To date, no study has investigated the relationship between work-oriented coping strategies and psychological distress.

The purpose of this study was to investigate the role of coping on the relationship between job strain (a work-place psychosocial factor) and psychological distress in office workers. Specifically, we proposed two hypotheses: 1) that job strain would be associated with psychological distress in a population of office workers and 2) that coping resources would moderate the relationship between job strain and psychological distress.

The findings of this study will inform future studies investigating the relationship between workplace psychosocial factors, psychological distress, and health-related disorders such as musculoskeletal conditions.

## **2. Methods**

### *2.1. Design and sample*

A cross-sectional exploratory study of 220 office workers was conducted in two cities, Brisbane, Australia, and Daegu, South Korea. Participants were recruited from multiple organizations employing

office workers in both regions through advertisements, social media, word of mouth, and email contact. All participants provided written consent to participate and ethical approval for the study was granted by the institute Human Research Ethics Committee in accordance with the Declaration of Helsinki.

There were 571 office workers who volunteered to participate from six organizations in two regions. The majority of participants were university educational personnel or faculty members from the University of [Edited for Review Process] (n=428), and [Edited for Review Process] University (n=81). To be eligible, participants had to be an office worker aged 18 to 60 years and working longer than 30 hours per week, performing computer, document, and phoning intensive work for more than 20 hours per week. Participants were excluded if they reported musculoskeletal pain of the neck and back region in the past twelve months, or took sick or health care leave due to musculoskeletal neck and back pain. The definition of a musculoskeletal disorder to neck and back region was derived from a conceptual model classified by the Neck Pain Task Force, as follows: “Interfering neck or back pain which prompts the participant to consider action” [20]. If there was any uncertainty regarding an individual’s eligibility based on the online survey an interview with the investigator was arranged to clarify eligibility. Non-eligible participants did not complete the main questionnaires.

In Brisbane, 441 potential participants were screened via email or by interview with 160 participants meeting the study inclusion criteria. Exclusion from participation occurred due to performing non-office



work (n=114), the presence of pain (n=81), non-response to follow up communication (n=72), working part-time (n=7), upcoming leave (n=5), and other miscellaneous reasons (n=2). In Daegu, 130 potential participants underwent initial screening with 60 satisfying the study inclusion criteria. Reasons for exclusion were the presence of pain (n=42), performing non-office work (n=15), no response (n=8), and working part-time (n=5). In total, 220 office workers consented to participate in the study and completed all required questionnaires. Participants were recruited over a 20 month period between May 2014 and December 2015.

## 2.2. Questionnaires

Data were collected via an online survey and included measures of job strain, coping, psychological distress, as well as potentially confounding individual and work-related measures.

*Job Strain:* **Job strain** was assessed with the Job Content Questionnaire (JCQ) which incorporates measures of psychological demand and decision latitude [21]. Psychological demands (work fast, work hard, over load, time constraints, and conflicting demands) were measured by five items. Decision latitude which consists of skill discretion (occasions for new learning, repetitive work, work creativity, high level skills, task variation, and skill development) and decision authority (decision allowance, decision freedom, and influence on work and policy) was measured by nine items.

Psychological demand and decision latitude were combined to create

the linear scale of job strain score to equally weight the magnitude of psychological demand and decision latitude (subtraction of decision latitude from psychological job demand) [22]. Thus, a higher job strain score reflected higher psychological demands and lower levels of decision latitude. Cronbach's  $\alpha$  coefficients for job demand and decision latitude were acceptable in this study sample reporting 0.70 and 0.85 for Brisbane, and 0.70 and 0.78 for Daegu, respectively. A Korean version of the JCQ was utilized for data collection in the Korean participants [23].

*Coping Resources:* Two different strategies with the potential to influence the degree of psychological distress experienced were selected and measured; coping strategies (escape and control coping) to work stress, and social support from supervisor and co-workers.

Coping strategies to stressful workplace situations were measured using the Coping with Job Stress Scale [24]. This instrument is a compact, comprehensive, and reliable inventory widely used to assess behavioural strategies preferred by people when faced with stressful conditions at work. The five scales were developed for work stress by integrating three different conceptual coping frameworks; control (direct actions and proactive cognitive evaluations to stressful situation in workplace), escape (avoidance from stressful situation), and symptom management (manage job stress in different aspect such as alcohol consumption). This instrument demonstrated good internal consistency and reliability for each scale (coefficient alpha: help-seeking= 0.61, avoidance/resignation= 0.74, positive-thinking = 0.76, direct action= 0.69, and alcohol use= 0.83). With acceptable

validity and reliability, this was the only scale appropriate for assessing the strategies of coping with workplace stress [25]. Following the general distinction of coping strategies, the five domains were divided into two contrary domains; control coping (positive thinking, direct action, and help seeking) and escape coping (avoidance/resignation and alcohol use) [24]. The internal consistency for escape coping and control coping was 0.61 and 0.82 for Brisbane and 0.70 and 0.87 for Daegu, respectively.

Social support was evaluated with eight items in the JCQ, four items each relating to support from coworkers (coworkers' component, coworker interest in me, friendly coworkers, and helpful coworkers), and support from supervisors (concerned about me, pays attention to me, helpful supervisor, and good organizer), respectively. Both scales were combined to calculate job support score. Cronbach's  $\alpha$  coefficients for social support in this study sample was 0.83 for Brisbane and 0.74 for Daegu, respectively.

*Psychological Distress:* Psychological distress was evaluated with the short version of the Depression, Anxiety and Stress Scale consisting of twenty one questions (DASS-21) [26]. This instrument is a widely used quantitative screening tool of psychological distress for both clinical and non-clinical purposes. The three scales each contain seven items assessing symptoms of depression (displeasure, hopelessness, devaluation of life, self-depreciation, lack of interest or involvement, anhedonia, and inertia), anxiety (autonomic arousal, skeletal musculature effects, situational anxiety, subjective anxious affect), and stress (relaxation, nervous arousal, easily upset,

irritability, and impatience). Good internal consistency (Cronbach's  $\alpha$ ) in this study sample for Depression, Anxiety, and Stress scales have been attained at 0.82, 0.76, and 0.82 for Brisbane, and 0.85, 0.80, 84 for Daegu, respectively.

### *2.3. Covariates*

Several individual and work-related variables were recorded as potential covariates and considered in all adjusted analytic models. Individual variables included; gender, age, body mass index, alcohol consumption, geographic location (Brisbane, Daegu), self-rated perceived health (five scales - poor to excellent), job insecurity (JCQ) and physical activity levels as measured with the International Physical Activity Questionnaire (IPAQ – short version) [27]. The IPAQ measures four domains of physical activity (work, transport, domestic, and leisure time) during the previous seven days to estimate physical activity levels (high, moderate, or low level of activity). Work-related factors included hours of computer work per week in work, duration of break per day and self-satisfaction with the physical work environment (lighting, acoustics, temperature, air quality, room space) with each item rated from 1 to 5 (very poor to excellent).

### *2.4. Statistics*

Analyses were performed with Stata version 13. Continuous

variables were presented as mean  $\pm$  SD, and dichotomous or categorical variables were presented as numbers and percentages. To standardize different units of measurement in exploratory variables (job strain and coping resources), z-score transformation was performed for all four exploratory variables. Potential differences in each variable between office workers from Brisbane and Daegu were examined using the Student t-test (continuous variables) and Fisher exact test (categorical variables). The correlation between job strain, coping resources, and psychological distress were evaluated using Spearman's  $r$ .

Mixed effects linear regression analyses with two cities as a random effects variable were executed to detect interaction effects of coping resources on each of the psychological distress symptoms (depression, anxiety, and stress). For the highest prediction accuracy with a parsimonious set of independent variables without overfitting each model least absolute shrinkage and selection operator (Lasso) variable selection method was applied [28]. The initial models were formed by the variable selections from the Lasso method. Next, potential interaction terms between variables were entered into the initial models. Verification that the study data met the assumptions of the regression analyses was performed for all models (linearity, normality of residuals, homoscedasticity, and no multicollinearity).

Interaction terms (two-way or three-way combinations of job strain with control coping, negative coping, and social support) were entered into the regression models to examine Hypothesis 2. The newly created models with interaction terms were compared with

initial models (without interaction term) using the Akaike's information criterion (AIC) [29]. Given a set of variables, AIC estimates the goodness of fit of each model on the basis of the maximized log-likelihood and includes a penalty for each additional parameter that discourages overfitting. When interaction effect exists, it was measured by plotting the change of marginal effect of variables on the outcome of psychological distress symptoms (Figures 1, 2) [30]. Demographic factors considered to be important covariates (age, gender, and body mass index (BMI)) were included in all models.

### **3. Results**

A total of 220 office workers (98 male and 122 female) met the inclusion criteria. Descriptive details regarding participants and variables assessed are found in Table 1. Male and female workers did not significantly differ in variables and confounders included in the analysis, except for BMI scale ( $25.2 \text{ kg}^2/\text{m} \pm 3.19$  for men and  $23.05 \text{ kg}^2/\text{m} \pm 4.66$  for women). Office workers in Daegu reported significantly higher job strain, greater depression and anxiety symptoms, less satisfaction with the office environment, and lower physical activity, compared to the office workers in Brisbane (Table 1). Correlations between the study variables are shown in Table 2. Briefly, psychological distress symptoms were positively associated with job strain and escape coping strategy, but negatively associated with social support from supervisors and colleague. For each of the mixed effect models, there was no significant intracluster correlation

with country as a random factor (Table 3).

### *3.1. Effect of coping resources on depression symptom*

The first column of findings in Table 3 displays the results of the regression performed to examine associations with depression symptoms. Job strain and escape coping were positively associated with depression symptoms. No significant associations were found between control coping, social support, and depression symptoms.

A significant interaction effect was found between job strain, escape coping, and social support on depression symptoms; however, control coping neither interacted with job strain nor with other coping resources (Table 3). Figure 1 shows the predicted value of depression symptoms on the different levels of job strain (z-score) when interacting with escape coping and social support. An interaction effect was distinctive when higher job strain presented. Specifically, workers using higher levels of escape coping (mean z score + 1 SD), as well as those receiving greater levels of social support were more likely to report greater depression symptoms than other workers with less social support from work. In contrast, workers with low levels of escape coping were expected to have less depression symptoms with least interaction effect of social support on the relationship between job strain and depression symptom.

### *3.2. Effect of coping resources on anxiety symptom*

The second column of findings in Table 3 displays the results of the regression performed to examine associations with anxiety symptoms. Job strain was positively associated with anxiety symptoms. No significant associations were found between coping resources, and anxiety symptoms. An interaction effect was found between job strain and escape coping on anxiety symptoms (Table 3). Figure 2 shows the predicted value of anxiety symptoms on the different levels of job strain (z-score) when interacting with escape coping. When workers used less escape coping, the adverse effect of job strain on anxiety symptom was minimal. However, the effect gradually increased as the usage of escape coping increased (Figure 2).

### *3.3. Effect of coping resources on stress symptom*

The third column of findings in Table 3 displays the results of the regression performed to determine associations with stress symptoms. Job strain and escape coping were positively associated with stress symptoms. However, no interaction effect was found between job strain and stress symptoms.

## **4. Discussion**

This study investigated the interaction effect of coping resources (coping strategies and social support) on the relationship between job strain and psychological distress in office workers from two different



cultural settings. While these two cultural groups differed in two of their psychological distress measures (depression and anxiety, Table 1), these differences were explained by job strain and coping resource factors, not cultural setting with negligible clustering in any of the mixed models with country as a random factor. This may infer generalizability between the cultural groups with respect to the association between job strain, coping resources, and psychological distress despite differences in distress levels between cultural settings.

Overall, an increase in job strain was shown to be a significant predictor of higher levels of all three elements of psychological distress (depression, anxiety, stress) in our sample of office workers (Hypothesis 1). However, interaction effects of coping resources impacted the relationship between job strain and these three elements of psychological distress differently (Hypothesis 2). For depression symptoms, the enhancing effect of job strain on depression symptoms increased as the levels of escape coping increased, while the enhancing effect reduced as the levels of social support increased. On the other hand, the enhancing effect of job strain on anxiety symptoms was only moderated by escape coping.

#### *4.1. Comparisons with other studies*

This is the first study to examine the effect of coping resources on psychological distress in office workers using a work-oriented coping assessment scale. Our findings were consistent with previous studies which reported that job strain and escape strategies were positively

associated with the level of psychological distress [6, 9, 13, 15]. However our findings did not support previous findings that control coping [11, 15] and social support [31, 32] are negatively related to psychological distress. This discrepancy may be due to methodological differences in studies. Previous studies did not incorporate both elements of coping resources (coping strategies and social support) and other confounders within their analysis. Instead, in our multivariable analyses the effect of control coping and social support was eliminated by the addition of other strong predictors such as age, job strain, and escape coping. These results highlight the necessity of incorporating both elements of coping resources when investigating the relationship between job strain and psychological distress.

This study found out that each distress symptom was predicted by different interactive composition of coping resources and stress factors. Of the two aspects of coping resources evaluated, escape coping was revealed as a core coping strategy interacting with other coping resources, as well as job strain. Escape coping interacted with job strain and social support when predicting depression symptoms while it interacted with job strain when predicting anxiety symptom. The highest depression and anxiety symptoms were found when escape copings and job strain were also high. This finding is consistent with previous studies which reported the role of emotional oriented coping negatively interacted with work stressor to predict psychological distress [16, 33]. In addition, this study also found a minor buffering effect of higher levels of escape coping on

depression and anxiety symptom, which few studies also have found when only low levels of job strain existed [6, 16].

Although social support did not directly predict distress symptoms, it interacted with job strain and escape coping to predict depression symptom. When lower levels of job strain existed, the workers reported similar levels of depression symptoms, irrespective of the levels of social support. However, the difference between workers with depression symptoms increased as levels of job strain increased. This buffering effect of social support was consistent with previous studies [5, 34]. In contrast, a reverse buffering effect of social support on distress symptom was reported when it interacted with escape coping. The buffering effect of social support was not presented when higher levels of escape coping were used. This finding may infer that social support would not work anymore as a stress buffer when it interacts with emotional coping, but stress catalyst. An exceptional case for the buffer hypothesis of social support with regards to persistent fatigue at work was previously reported by Vanroelen et al [35] in that strong solidarity in team work could encourage workers to provide other coworkers the same or higher amount of social support as they were given, which in return resulted in increased responsibility. Above all, this antagonistic effect is not in line with what has been reported from the general buffer hypothesis [36].

The observed effect of control coping on distress symptoms are inconsistent in previous studies. In the present study, control coping neither interacted with job strain nor other coping resources to predict

distress symptoms. This was consistent with previous studies that reported control coping to not have a buffering effect on the relationship between work stressors and burnout [9, 37]. In contrast, other studies had found an interaction effect of control coping on distress symptoms [38-40]. Further research to understand factors that may underpin these observed inconsistencies between studies is warranted.

#### *4.2. Implications*

The findings of this study infer practical implications for workers to assist in the management of work-related psychological distress. Intervention programs that include training to control work-related stress have shown effectiveness in the management of stress [41]. This study suggests office workers may benefit from reducing their dependence on escape coping in the work environment, as the buffering effect of social factors and control coping seemed to be ineffective when escape coping was utilized. These findings are of relevance to both industry and research settings. In particular, it is suggested that assessment of office workers should consider a comprehensive battery of measures that include job strain, coping resources, as well as psychological distress. Lastly, this study reinforces the need to carefully consider job strain in office workers as it is likely to have a direct detrimental effect on their psychological wellbeing.

### 4.3. Limitation

Some limitations of this study should be acknowledged. Psychological distress is multifactorial incorporating physical, mental and psychosomatic factors [41, 42]. Although the present study represents an advancement in the field through the examination of coping among a range of other factors, there may be other factors influencing distress mechanisms that were beyond the scope of this study. Additionally, the coping strategies addressed in this study were only considered from a work perspective without consideration of coping strategies outside of the work environment. Social factors outside of the workplace (e.g., marital status, dependents) were also not included. While this was intentional to focus specifically on workplace factors it could represent a study limitation. The inclusion of two cultural groups may be considered a strength of the study; however, findings may not be generalizable to dissimilar cultures or other types of occupational environments. It is important to note that the findings are based on a relatively small sample size for a study of this nature. This study was also restricted to pain-free healthy office workers and observed relationships between factors considered in this study may be different in the presence of pain or illness [43]. However, this study design was appropriate for successfully addressing the stated research aims to examine the relationship between job strain, coping, and psychological distress in office workers without the confounding effect of pain or illness.

## 5. Conclusion

This study has provided new evidence highlighting the direct relationship between job strain and psychological distress in office workers across two different cultures. However, the results also indicated that office workers' coping resources (coping strategies and social support) may moderate this relationship. Furthermore, the results indicated the moderating effect of coping resources may influence the three elements of psychological distress (stress, depression, and anxiety) differently. A key implication from this study is that coping resources should be considered when planning interventions for mitigating distress among office workers.

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Table 1. Characteristics of participants (n=220) from Brisbane and Daegu cities.

<b>Variables</b>	<b>Mean or cases in Brisbane (n= 160)</b>	<b>SD or %</b>	<b>Mean or cases in Daegu (n=60)</b>	<b>SD or %</b>	<b>Mean or cases in Total (n=220)</b>	<b>SD or %</b>
Age (years)	37.4	± 10.14	37.4	± 9.9	37.4	± 10.1
Female (n)	98	61.3%	24	40.0%	122	55.5%
BMI (kg <sup>2</sup> /m)*	25.2	± 4.3	23.1	± 3.6	24.0	± 4.2
Non-smoker (n)*	152	95%	49	81.8%	201	91.4%
Drinking (scale)*	2.4	± 1.4	2.08	± 0.8	2.4	± 1.3
Job positions (n)*						
Manager	12	7.5%	4	6.7%	16	7.3%
Professional	81	50.6%	10	16.7%	91	41.4%
Administrative	67	41.9%	46	76.7%	113	51.4%
Years working in current organization*	4.4	± 5.7	9.9	± 9.2	5.9	± 7.3
Computer hours per day (hr)	7.3	± 1.1	7.4	± 1.2	7.3	± 1.1
Hours of work before break (n)						
< 2hour work	93	58.1 %	40	66.7%	133	60.5%
> 2hour work	67	41.9 %	20	33.3%	87	39.6%
Satisfaction to workplace environment (scale)*	3.2	± 0.5	2.5	± 0.5	3.0	± 0.6
Physical activity level (n)*						
Low activity	18	11.3%	20	33.3%	38	17.3%
Moderate activity	77	48.1%	26	42.3%	103	46.8%
High activity	65	40.6%	14	23.3%	79	35.9%
Job insecurity	5.51	± 1.94	5.37	± 2.07	5.47	± 1.98
Job strain (score)*	-39.39	± 12.54	-33.4	± 6.51	-33.76	± 11.52
Control coping (score)*	63.35	± 8.54	59.75	± 9.44	62.37	± 8.92
Escape coping (score)	19.74	± 4.03	19.12	± 4.49	19.57	± 4.16
Social support (score)*	25.22	± 3.30	23.95	± 2.38	24.87	± 3.12
Depression (score)*	2.31	± 2.62	3.22	± 2.71	2.56	± 2.67
Anxiety (score) *	1.62	± 2.32	2.63	± 2.54	1.90	± 2.42
Stress (score)	4.5	± 3.46	5.23	± 3.03	4.7	± 3.36

\*:  $p < 0.05$  for 2x2 Fisher's exact test (categorical variables) or t-test (continuous variables) of the comparisons between Brisbane and Daegu regions.

Table 2. Correlations of the study variables.

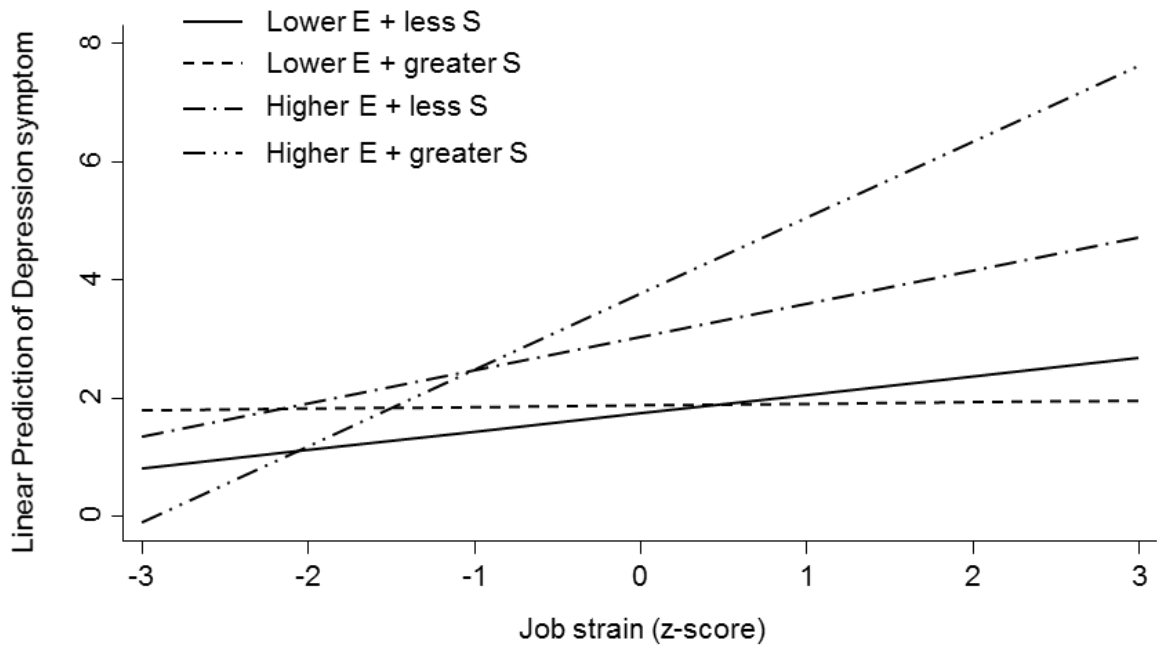
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>1</b> Depression	1						
<b>2</b> Anxiety	0.52**	1					
<b>3</b> Stress	0.62**	0.58**	1				
<b>4</b> Job strain	0.33**	0.22**	0.27**	1			
<b>5</b> Control coping	-0.16*	0.06	-0.03	-0.12	1		
<b>6</b> Escape coping	0.35**	0.14*	0.33**	0.12	0.03	1	
<b>7</b> Social support	-0.21**	-0.15*	-0.18**	-0.29**	0.07	-0.11	1

\* $p < 0.05$ , \*\* $p < 0.01$ . Two-tailed

Table 3. Mixed effects linear regression analysis of job strain and coping resources with psychological distress symptoms (n=220)

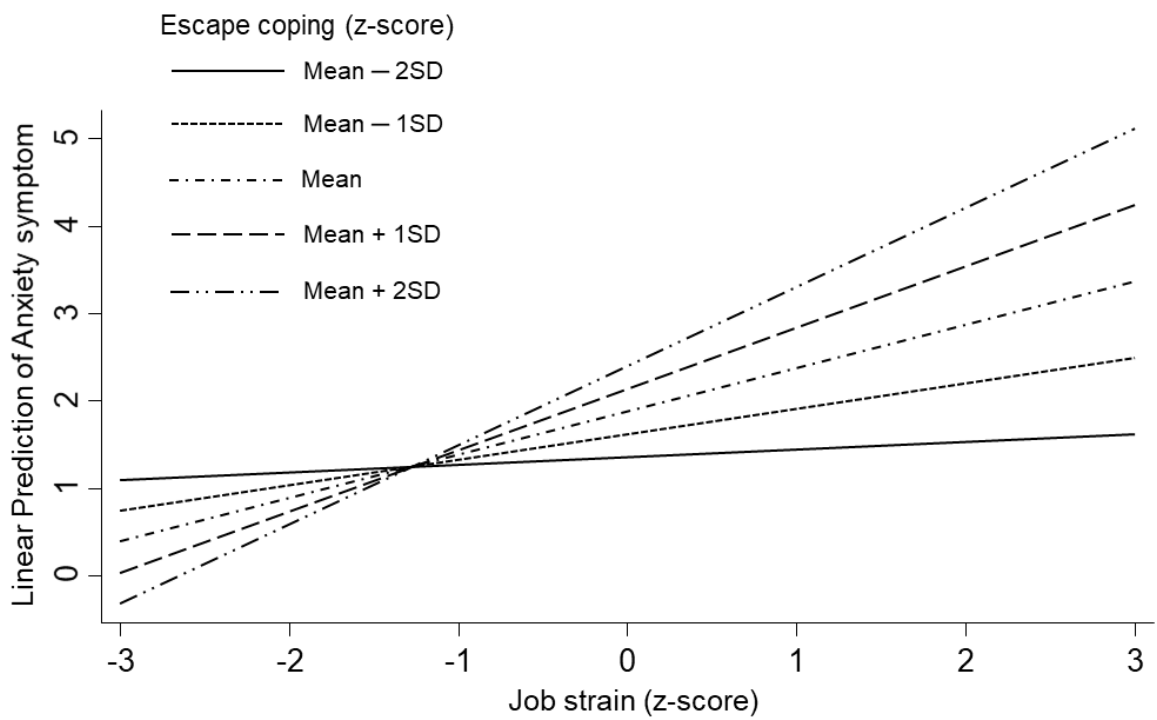
Explanatory variables	Outcome variables								
	Depression			Anxiety			Stress		
	Coeff.	95% CI	P value	Coeff.	95% CI	P value	Coeff.	95% CI	P value
Age (per 10 year)	-0.29	-0.60 to 0.03	0.07	-0.35	-0.67 to -0.03	<b>0.03</b>	-0.28	-0.72 to 0.14	0.20
Gender	-.43	-1.05 to 0.20	0.28	-0.27	-0.89 to 0.35	0.39	0.16	-0.69 to 1.02	0.71
BMI	-0.02	-0.10 to 0.06	0.63	-0.06	-0.14 to 0.02	0.15	-0.04	-0.15 to 0.07	0.46
Drinking (> 1-2 standard drink per day)	0.57	-.66 to 1.80	0.37	1.51	0.28 to 2.73	<b>0.02</b>			
Job insecurity	0.16	0.00 to 0.31	<b>0.047</b>	0.11	-0.04 to 0.26	0.16			
Satisfaction with physical work environment	-0.30	-0.85 to 0.25	0.29	-0.51	-1.06 to 0.04	0.07			
Hours of computer work per week	NI	NI	NI	0.04	-0.02 to 0.10	0.22			
Break hours (>2 hrs per day)	-0.64	-1.2 to -0.4	<b>0.04</b>	NI	NI	NI	NI	NI	NI
Self-rated perceived health	-0.54	-0.82 to -0.26	<b>0.00</b>	NI	NI	NI			
Physical activity levels (high activity level)									
Moderate activity level	0.43	-0.25 to 1.10	0.21	NI	NI	NI			
Low activity level	0.95	0.05 to 1.84	<b>0.04</b>						
Job strain	0.55	0.21 to 0.88	<b>0.00</b>	0.50	0.18 to 0.82	<b>0.00</b>	0.75	0.32 to 1.18	<b>0.00</b>
Control coping	-0.19	-0.50 to 0.11	0.21	0.14	-0.17 to 0.44	0.38	0.12	-0.30 to 0.54	0.58
Escape coping	0.79	0.46 to 1.12	<b>0.00</b>	0.26	-0.04 to 0.55	0.09	0.88	0.47 to 1.29	<b>0.00</b>
Social support	0.22	-0.11 to 0.54	0.19	0.01	-0.31 to 0.32	0.97	-0.21	-0.64 to 0.22	0.34
<b>Interaction effects</b>	Job strain × Escape coping × Social support			Job strain × Escape coping			No interaction effect		
Job strain × Escape coping	0.38	0.05 to 0.71	<b>0.03</b>	0.20	-0.09 to 0.50	0.17			
Job strain × Social support	0.11	-0.21 to 0.44	<b>0.50</b>	NI	NI	NI			
Escape coping × Social support	0.15	-0.15 to 0.46	0.33	NI	NI	NI			
Job strain × Escape coping X Social support	0.25	-0.01 to 0.51	<b>0.06</b>	NI	NI	NI			
<b>Adj. R-squared</b>	0.35			0.19			0.17		

Interaction model effects: Interaction models were developed with three-way interaction terms (job strain × escape coping × social support) for depression symptoms and two-way interaction terms (job strain × escape coping) for anxiety symptom model. An interaction model was not applied for stress symptoms due to non-significant effects of interaction terms. NI: explanatory variables not included in the model.



*Note: The X-axis ranges from -3 to 3 by z-score transformed scale of job strain (originally range from -74 to -2). One standard deviations above the mean (z-score) and below the mean were created for escape coping and social support to simulate four combination of coping strategies: 1) lower escape coping use(lower E) + less social support (less S), 2) higher escape coping use (higher E)+ less social support (less S), 3) lower escape coping use (lower E) + greater social support (greater S), 4)higher escape coping (higher E) + greater social support (greater S)*

Figure 1. Linear prediction of depression symptom on job strain in different condition of escape coping and social support.



*Note: The X-axis ranges from -3 to 3 by z-score transformed scale (originally range from -74 to -2). The incremental levels of escape coping by  $\pm$  SD z-score from mean were created to predict anxiety symptom.*

Figure 2. Linear prediction of anxiety symptom on job strain in different level of escape coping.