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Cross-sectional study of cognitive stress appraisal and related factors among workers in metropolitan areas of Japan

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ABSTRACT

Objective Stress has major socioeconomic implications for all spheres of employment. It is a trigger for depression, and affects absenteeism, turnover, productivity, morale and suicide. Positive or negative cognitive stress appraisal can be a self-care strategy that affects workers' ability to cope with stress. This study examined cognitive stress appraisal among workers and identified related individual and environmental factors.

Design Cross-sectional study using self-administered postal questionnaires.

Setting Companies located in two metropolitan areas of Japan (Tokyo and Kanagawa prefectures).

Participants 2311 employees of 48 companies in metropolitan areas in Japan. In total, 341 questionnaires were returned (response rate: 14.8%), 337 of which were suitable for analysis (effective response rate: 98.8%).

Primary measures Cognitive stress appraisal was assessed using the Japanese version of the Perceived Stress Scale (PSS). Potential variables related to stress appraisal included demographic, individual and environmental factors. Multiple regression analysis was used to identify factors related to cognitive stress appraisal.

Results Participants' mean±SD age was 42.8±11.7 years, and two-thirds were male. The mean±SD PSS score was 25.8±6.2. The multiple regression analysis controlled for age, sex and depression showed that those with poorer economic status (β=0.171, p<0.001), lower electronic health (eHealth) literacy (β=−0.113, p=0.012), higher traditional organisational climate (β=0.131, p=0.004) and lower perceived social support (β=−0.205, p<0.001) experienced significantly higher levels of negatively perceived stress.

Conclusions The results show individual and environmental factors related to cognitive stress appraisal among workers. An effective strategy to improve mental health among workers may involve an interprofessional approach by public health nurses and health practitioners that includes enhanced self-coping skills using individual workers' eHealth literacy, improvement of organisational climates in workplaces and community-based social support.

Strengths and limitations of this study

► This study is the first to examine individual and environmental factors related to cognitive stress appraisal among healthy workers.
► We simultaneously examined electronic health literacy, multidimensional perceived social support and traditional organisational climates.
► This study used a cross-sectional design, and could not identify causal relationships between cognitive stress appraisal and related factors.
► The target population of this study was limited to metropolitan areas in Japan.

1.116 million people in 2015.[2] Depression is different from usual mood fluctuations and short-lived emotional responses to challenges in everyday life. Especially when long lasting and with moderate or severe intensity, depression may become a serious health condition. In particular, depression caused by occupational stress result in increasing rates of long-term illness and absence from work among workers.[3] WHO's Comprehensive Mental Health Action Plan 2013–2020 adopted by the 66th World Health Assembly[4] argues that determinants of mental health and psychiatric disorders include individual attributes and social, cultural, economic, political and environmental factors for protecting workers' health.[5] Mental illnesses are associated with a substantial deterioration in individual quality of life, and economic loss in the community and workplace.[5 6] Therefore, primary prevention of depressive disorders is important nationally and internationally, as well as for individuals.

Stress has major socioeconomic implications for all spheres of employment. It is a trigger for depression and affects absenteeism, turnover, productivity, morale and suicide.[7–9] In Japan, the number of employees who applied for industrial accident compensation insurance for mental disorders because of stress has increased in recent

INTRODUCTION

Depression is a common psychiatric disorder, affecting about 350 million people worldwide and is a major contributor to the overall global burden of disease.[1] In Japan, depression is estimated to have affected up to

years.[10] There was 1515 applications in 2015, which was up from 1272 in 2011.[11] The proportion of workers experiencing anxiety, distress and work stress has progressively increased since 1982, and is now estimated at 60%.[12] In this context, the Japanese government launched 'The Stress Check Program' in 2015, a new occupational health policy to screen for workers experiencing high psychosocial stress.[13] The law mandates use of the Stress Check Program and its guidelines at least once each year in all workplaces in Japan with 50 or more employees. The programme and guidelines recommend individual checks for perceived stress, and sets out four principles of care in the workplace: (1) self-care, (2) line-care, (3) health practitioners' care in the workplace and (4) health practitioners' care in the community.

Cognitive stress appraisal is a self-care strategy based on individuals' evaluation of how they perceive stressors. In primary appraisal, an individual's evaluations are divided into 'threat' and 'challenge'; threat describes anticipated harm/loss, and challenge describes a threat that can be met or overcome.[14 15] The cognitive appraisal of something as a 'threat' or 'challenge' can affect mental health.[15 16] The stress response and stress coping following cognitive appraisal differ among individuals, even in response to the same stressors.[17] For example, people making a positive cognitive appraisal may perceive stress as a challenging health issue to be resolved, and set themselves challenging goals.[14 15] Those making a negative cognitive appraisal may view the same issue as a health threat, and believe that resolving the issue is beyond their abilities. Positive or negative cognitive stress appraisal can therefore be an important mental health concept to improve stress-coping skills and control stress among workers. For individuals, positive cognitive appraisal contributes to prevention of depression, thereby improving quality of life. At the societal level, this is important in controlling the escalation of medical costs and increasing corporate and community-wide productivity.

The Perceived Stress Scale (PSS) measures the degree to which situations are cognitively appraised as stressful.[18] Cohen explained the PSS as a measure of the degree to which situations in one's life are appraised as stressful. PSS items were designed to capture how unpredictable, uncontrollable and overloaded respondents perceive their lives. These issues have been repeatedly found to be central components of the experience of stress. In addition, stressful life events influence disease risk through an individual's perceptions of stress and negative affect.[18] Cohen also noted that the PSS can be used to determine whether 'appraised' stress is an aetiological (or risk) factor in behavioural disorders or disease.[18 19] Therefore, we considered that the PSS can continuously measure negative cognitive stress appraisal. Previous studies have measured cognitive stress appraisal using the PSS and investigated related factors with students,[20–24] medical professionals[25 26] and patients with chronic diseases.[27–30] However, the scale has not previously been used with healthy adult workers in a range of employment types.

Previous studies clarified various individual factors related to the PSS, but these varied for different participants. Some studies examined the physical and psychological health conditions among students or conditions in particular populations (eg, adults with a disease or pregnant women).[28 31 32] Other studies examined lifestyle factors among students, pregnant women and medical professionals[26 33 34], job stress among medical professionals[25 35 36], stressors and coping in adult survivors of suicide and pregnant women[31 37], and health literacy in African-American adults.[38] However, there is limited information about the relationship between cognitive stress appraisal and individual and environmental factors (eg, work environment and available social support) among adult workers.[39]

This study aimed to examine cognitive stress appraisal among workers and identify associated individual and environmental factors. The findings may contribute to minimising the effect of factors associated with an increased risk for depression, and contribute to promoting individual self-care and improving workplace environments to promote mental health among workers. Furthermore, the findings may be useful for public health nurses and health practitioners at worksites engaged in primary prevention of mental health disorders among workers.

METHODS
Participants and sampling
Study participants were employees of companies located in metropolitan areas of Japan. The inclusion criterion was employees aged 18–64 years. The age of 64 years is the upper limit for consideration of retirement and re-employment under the Japanese Law Concerning Stabilization of Employment of Older Persons, and 18 years is the youngest age for employment immediately after graduating high school in Japan.

This study used a cross-sectional design with self-administered postal questionnaires. Data were collected from employees of companies registered in the Japan Company Handbook 2016 across two metropolitan areas of Japan (Tokyo and Kanagawa prefectures). We stratified companies by size and type of industry, and selected companies randomly within that stratification; 361 of a total 2026 companies were selected (17.8%). The questionnaire did not collect details about company name, number of employees and type of industry to safeguard participant anonymity.

Data collection
Out of 361, 48 companies agreed to participate in this study. Before sending the questionnaires to each company, we identified the relevant sample size from company administrators. In total, 2311 questionnaires were mailed to the 48 companies. Of these, 341 questionnaires were returned (response rate: 14.8%). Potential participants (all employees of the participating companies) were invited to complete the questionnaire anonymously on a voluntary basis, between 1 October 2016 and

9 December 2016. Participant anonymity was maintained throughout data collection as the questionnaires did not collecting any identifying information. In addition, participants returned completed questionnaires by mail to the researchers themselves. Returning a completed questionnaire was considered to indicate provision of informed consent.

Instruments
Dependent variable: cognitive stress appraisal
The dependent variable was cognitive stress appraisal, which was determined using the Japanese version of the PSS.[40 41] The PSS comprises 14 items and includes questions such as, 'In the last month, how often have you been upset because of something that happened unexpectedly?' and 'In the last month, how often have you felt that you were unable to control the important things in your life?' Responses were coded for scoring as never=0, almost never=1, sometimes=2, fairly often=3 and very often=4. Possible total scores ranged from 0 to 56, with higher scores indicating higher levels of negative cognitive stress appraisal. All 14 items in the Japanese version of the scale are highly intercorrelated (Cronbach's alpha=0.74).

Demographic characteristics
Participants' demographic characteristics included age, sex (male=1, female=2), marital status (unmarried and divorced/widowed=1, married=2), household membership (live alone=1, spouse=2, spouse and children=3, parents=4, others=5), educational status (junior high school/high school=1, vocational college/Junior college=2, college or university/graduate school=3), employment status (fulltime=1, part time=2, others=3), economic status (sufficient=1, slightly sufficient=2, slightly insufficient=3, insufficient=4) and depression. Items were based on standard questions generally used in previous studies involving workers and items used in a recent national survey for workers.

Depression was measured using the Japanese version of the Center for Epidemiologic Studies Depression Scale (CES-D),[42 43] which comprises 20 items. Each item is measured on a four-point Likert-type scale from 0 to 3. Total scores range from 0 to 60, with higher scores indicating greater levels of depression. CES-D scores above 16 indicate a depressive state. The CES-D was developed for use in epidemiological studies of depressive symptomatology in the general population.[42 43] A specific group with a higher mean score may be interpreted to be at risk for a depressive state or in need of intervention.[43] Cognitive stress appraisal is affected by participants' mental condition at that particular time, which includes depression. The psychometric properties of the CES-D have been investigated, and the scale showed high internal consistency, acceptable test–retest stability, excellent concurrent validity for clinical and self-report criteria and substantial evidence of construct validity. When the CES-D was designed, the internal consistency was high in the general population (0.77–0.87) and higher in the patient sample (0.85–0.92), and test–retest correlations were in the moderate range (0.45–0.70). In addition, the CES-D showed moderate correlations with the Hamilton Clinician's Rating scale and the Raskin Rating scale (0.44–0.54) at admission.[42 43]

Independent variables
The conceptual framework of this study was to examine cognitive stress appraisal and identify related individual and environmental factors. According to Lazarus's theory, individual and environmental factors mutually affect the cognitive stress appraisal process. Therefore, we considered both individual and environmental factors to be important. Independent variables were selected based on previous studies.[20–37]

Individual factors included any disease currently under treatment (eg, cancer, diabetes), body mass index (BMI), self-rated health, physical complaints, physical demands, lifestyle, perceived health competence and electronic health (eHealth) literacy. BMI was calculated from self-reported weight and height. Self-rated health was measured on a four-point Likert-type scale from 1 (very poor) to 4 (very good).

Physical complaints were measured using the Brief Job Stress Questionnaire (BJSQ).[44] The BJSQ is used in the Japan Stress Check Test by the Ministry of Health, Labour and Welfare,[12] and can be easily used in the workplace. It comprises 57 items on 19 subscales, from which we drew 11 items (eg, 'I have felt dizzy' and 'I have experienced joint pains'). Each item was measured on a four-point Likert-type scale. Total scores ranged from 11 to 44, with higher scores indicating more frequent physical complaints. Physical demands were measured using the Job Content Questionnaire (JCQ),[45] which comprises 45 items on 6 subscales. We used three items for physical exertion and two for isometric load. Items were measured on a five-point Likert-type scale. Total scores for physical exertion ranged from 3 to 15, and for isometric load from 2 to 10, with higher scores indicating stronger physical demands/isometric load. The JCQ was developed based on the job demands–control model, and has been nationally standardised by occupation in several countries.[45–47]

Lifestyle was measured using seven items based on Breslow's good health habits.[48] These items covered smoking, drinking alcohol, eating breakfast every day, physical activity, eating snacks after dinner, skipping breakfast, and sleeping and resting. Responses were coded for scoring as 'yes' or 'no'. Perceived health competence was measured using the Japanese version of the Perceived Health Competence Scale (PHCS).[49] The PHCS comprises eight items measured on a five-point Likert-type scale. Total scores ranged from 8 to 40, with higher scores indicating higher perceived health competence. Perceived health competence is related to stress,[50] and the PHCS was designed to assess efficacy and competence beliefs about personal health at an intermediate level of domain specificity.[51]

Finally, eHealth literacy was measured using the Japanese version of the eight-item eHealth Literacy Scale (eHEALS).[52] eHealth literacy is defined as the ability to seek, find, understand and appraise health information from electronic sources, and apply that knowledge in addressing or solving a health problem.[53 54] Responses were assessed using a five-point Likert-type scale. Total scores ranged from 8 to 40, with higher scores indicating greater eHealth literacy. In Japan, internet penetration in the studied age group is over 90%.[55] eHEALS was developed to address the need to assess eHealth literacy for a range of populations and contexts. It is designed to provide a general estimate of consumer eHealth-related skills to inform clinical decision-making and health promotion planning for individuals or specific populations.[54]

Environmental factors: organisational climate

Organisational climate was measured using the 12-item Organisational Climate Scale,[56] which is divided into two six-item subscales: a tradition scale and an organisational environment scale. Responses were coded for scoring as yes=2 and no=1. The total possible scores ranged from 6 to 12 for each subscale. Higher scores on the tradition scale indicate a more mandatory, injunctive and feudalistic organisational climate. Higher scores on the organisational environment scale indicate a more flexible organisational system. A previous study showed that organisational climate may affect occupational stress.[57] This scale measures organisational properties based on the model of healthy work organisations at the National Institute for Occupational Safety and Health of US Department of Labor.[56]

Social support

Social support was measured using the short version of the Multidimensional Scale of Perceived Social Support (MPSS) in Japanese,[58 59] which comprises seven items. Responses were on a seven-point Likert-type scale, with lower scores indicating lower perceived social support. The MPSS specifically addresses the subjective assessment of social support adequacy, and was designed to assess perceptions of social support adequacy from three sources: family, friends and significant others.[59]

Statistical analysis

Means, SDs, frequencies and percentages were calculated for demographic characteristics, positive or negative cognitive stress appraisal (PSS scores), and individual and environmental factors. Univariate analysis using Spearman's correlation was used to examine correlations between the dependent and independent variables. A multiple regression analysis was then used to identify factors related to cognitive stress appraisal among workers, using all potentially significant predictors identified by the univariate analyses (p<0.05). Multicollinearity of independent variables was considered via the forced entry (variable reduction) method. The multiple regression model included selected independent variables and all statistical analyses.

In the model, step 1 included the control variables, step 2 the demographic characteristics and step 3 the remaining predictors. Sex, age and depression were entered as control variables. A previous study reported high correlation between the PSS and the CES-D, but both scales still independently predicted symptomatology.[18] Because the aim of this study was primary prevention of poor mental health, specifically depression, we assumed that depression was a covariate and treated it as a control variable. Of the 337 effective response, data were missing for; BMI (n=2, 0.59%), self-rated health (n=14, 4.15%), household membership (n=3, 0.89%), employment status (n=2, 0.59%) and CES-D (n=10, 3.20%), therefore, these cases were excluded from the multiple regression models. The sample size was calculated using G*Power V.3.0.10.[60] With power of 80%, a 0.05 level of statistical significance, an effect size of 0.15[61] and the number of predictors as 13, the required sample size for the multiple regression model was calculated as 131. The level of significance was set at p<0.05. All analyses were performed using IBM SPSS Statistics for Windows V.22.0.

Patient and public involvement

Patients and/or public were not involved in developing the hypothesis, the aim, nor were they involved in developing plans for study design or implementation of the study.

RESULTS

In total, 341 questionnaires were returned. Four questionnaires were from participants aged over 65 years or who did not provide their age. We excluded these questionnaires, which left 337 questionnaires for analysis (effective response rate: 98.8%). Participants' background information (demographic characteristics, individual factors, environmental factors) is shown in table 1. Results are reported below as mean±SD.

Participants mean age was 42.8±11.7 years. Approximately, 67.7% were male and 60.2% were married. 38.6% lived with their spouse and children, and 22.8% lived alone. 61.1% had graduated with a college education or higher, and most participants had regular employment. 83.4% felt good about their economic status. The mean CES-D score was 12.8±7.6, with 99 participants (29.5%) rated as having depression based on the cut-off point. The mean PSS score was 25.8±6.2, with one-quarter of participants being treated for a disease. The mean BMI was 22.0±3.1; 74.8% of participants were in the healthy range (over 18.5, less than 25). 83.3% reported their self-rated health as good or fairly good. The mean physical complaint score was 19.3±5.1, and mean scores for physical exertion and isometric load were 4.9±1.8 and 3.2±1.3, respectively. At least 50% of participants chose most of the healthy lifestyle options, and approximately 75% chose some health options. The mean PHCS and eHEALS scores were 23.4±6.5 and 22.0±7.5, respectively. The mean tradition subscale score was 8.0±1.6 and that

Table 1 Background of the participants

Items	No or mean±SD	% (range)
Demographic characteristics		
Age	42.8±11.7	(18–64)
Sex		
Male	228	67.7
Female	109	32.3
Marital status		
Unmarried	110	32.6
Married	203	60.2
Divorced/widowed	24	7.1
Household membership		
Live alone	76	22.8
Spouse	48	14.4
Spouse and children	129	38.6
Parents	50	15.0
Others	31	9.3
Educational status		
Junior high school/high school	78	23.1
Vocational college/Junior college	53	15.7
College or university/graduate school	206	61.1
Employment status		
Full-time worker	301	89.9
Part-time worker	27	8.1
Others	7	2.1
Economic status		
Sufficient	106	31.5
Slightly sufficient	175	51.9
Slightly insufficient	51	15.1
Insufficient	5	1.5
Depression (CES-D)		
Score	12.8±7.6	(0–45)
Depression (CES-D ≥16; cut-off point)	99	29.5
Dependent variable		
Cognitive stress appraisal (PSS)	25.8±6.2	(6–48)
Disease currently under treatment		
No	252	75.0
Yes	84	25.0
High blood pressure	25	7.4
Gout	11	3.3
Hyperlipidaemia	8	2.4
Respiratory disease	8	2.4
Diabetes	7	2.1
Digestive disease	7	2.1

Continued

Table 1 Continued

Items	No or mean±SD	% (range)
Mental disease	7	2.1
Others	26	7.7
Body mass index (BMI)		
Mean	22.0±3.1	(14.5–34.6)
Thin (BMI <18.5)	32	9.8
Standard (18.5≤BMI<25)	243	74.8
Obesity (25≤BMI)	50	15.4
Self-rated health		
Very poor	7	2.2
Rather poor	47	14.6
Rather good	216	66.9
Very good	53	16.4
Brief Job Stress Questionnaire (BJSQ)		
Physical complaint	19.3±5.1	(11–36)
Physical demands (job content: JCQ)		
Physical exertion	4.9±1.8	(3–11)
Isometric load	3.2±1.3	(2–8)
Life style		
No smoking	255	75.7
Non or sometimes drinking alcohol	256	76.0
Breakfast everyday	241	71.5
More than once a week physical activity	75	22.3
No eating after dinner over 3 days per week	246	73.0
No skipping breakfast over 3 days per week	248	73.6
Get enough sleep and rest	190	56.5
Perceived health competence (PHCS)	23.4±6.5	(8–40)
eHealth literacy (eHEALS)	22.0±7.5	(3–40)
Environmental factors		
Organisational climate		
Tradition	8.0±1.6	(6–12)
Organisational environment	8.6±1.8	(6–12)
Social support	5.4±1.2	(2–7)

CES-D, Centre for Epidemiologic Studies Depression Scale; eHEALS, eHealth Literacy Scale; JCQ, Job Content Questionnaire; PHCS, Perceived Health Competence Scale; PSS, Perceived Stress Scale.

of the organisational environment scale was 8.6±1.8. The mean social support scale score was 5.4±1.2.

There were correlations among demographic characteristics, individual and environmental factors, and cognitive stress appraisal. Spearman's correlation coefficients

Table 2 Cognitive stress appraisal and related factors

	β	P values
Demographic characteristics		
Economic status	0.171	<0.001
(1=sufficient, 2=slightly sufficient, 3=slightly insufficient, 4=insufficient)		
Individual factors		
eHealth literacy (total score)	−0.113	0.012
Environmental factors		
Organisational climate: tradition (total score)	0.131	0.004
Social support (total score)	−0.205	<0.001
Adjusted R^2		0.412

Multiple regression analysis.
Controlled variables: age, sex (0=female, 1=male), depression (0=no, 1=yes).
eHealth, electronic health.

were used to measure the linear relationship between each factor and PSS among workers. The demographic characteristics showing significant correlations with cognitive stress appraisal were: age (r=−0.300, p<0.001), marital status (r=−0.207, p<0.001), household membership (r=−0.231, p<0.001), economic status (r=0.355, p<0.001) and depression (r=0.528, p<0.001). Individual factors showing significant correlations with cognitive stress appraisal were: self-rated health (r=−0.275, p<0.001), physical complaints (r=0.372, p<0.001), total scores for physical exertion (r=0.109, p=0.048) and isometric load (r=0.183, p=0.001), physical activity (r=−0.162, p=0.003), sleeping and resting (r=−0.278, p<0.001), perceived health competence (r=0.412, p<0.001) and eHealth literacy (r=−0.295, p<0.001). Environmental factors showing significant correlations with cognitive stress appraisal were: total scores for the tradition (r=0.197, p<0.001) and organisational environment scales (r=−0.182, p=0.001) and social support (r=−0.398, p<0.001).

In the multiple regression analysis, factors associated with cognitive stress appraisal, (marital status, household membership, economic status, physical activity, sleeping, isometric load, eHealth literacy, tradition and organisational environment scales, and social support) were used as independent variables, and age, sex and depression as control variables (table 2). This analysis indicated that those with poorer economic status (β=0.171, p<0.001), lower eHealth literacy (β=−0.113, p=0.012), higher traditional organisational climate (β=0.131, p=0.004) and lower perceived social support (β=−0.205, p<0.001) experienced a higher level of perceived negative stress. The adjusted R^2 in this analysis was 0.412.

DISCUSSION

Participants in this study were representative of healthy adult workers in a range of employment types in Japan. First, in terms of demographic characteristics (eg, age, sex) and proportion of participants, this study was similar to the reported national statistics for full-time workers in Japan.[62] Second, the PSS scores in this study were similar to those obtained when the PSS was originally developed[18] and those of adults in other countries.[63 64] Therefore, this study can be generalised to other workers in Japan and to other developed countries.

Our study is the first to examine the features of cognitive stress appraisal in workers and identify associated individual and environmental factors. This study adds to existing research evidence that both individual factors (including eHealth literacy) and environmental factors (such as organisational climate) are related to cognitive stress appraisal among workers. Therefore, this study has important practical implications in promoting stress management and primary prevention of stress-related disease and suicide among workers.

Economic status was related to cognitive stress appraisal. It is possible that poor economic status in itself is the origin of stress, and workers with poor economic status have difficulty coping with their own stress. Cognitive stress appraisal and subjective economic status are related, and self-efficacy plays an important role as a mediator between cognitive evaluation of stress and life satisfaction.[65] Workers may be unable to appraise challenges and struggle in stressful situations because they feel that their own ability level is low and they have limited resources.

We found that lower eHealth literacy was related to negative stress appraisal. Health literacy is a cognitive and social skill that determines individuals' motivation and ability to gain access to, understand and use information in ways that promote and maintain good health.[66] Higher health literacy may enable an individual to actively seek support and solutions to problems.[67] Good eHealth literacy means people can access health information resources via the internet. The internet is increasingly becoming an effective information tool for improving self-care behaviour.[68–70] In addition, the internet holds a considerable amount of health information, which is helpful for positive cognitive stress appraisal. Improving eHealth literacy may empower workers to obtain, understand and act on information they need for optimal mental health.

We also found that more traditional organisational climates were related to negative cognitive stress appraisal. A traditional organisational climate is more directive and feudalistic.[56] Higher tradition scores correspond to higher levels of depressive state, lower job satisfaction and lower levels of mental health.[56] A traditional structure or climate implies high levels of mandatory working, a lack of respect for individual opinion and pressure from superiors. Workers in traditional organisational climates have less discretion and a more stressful environment. They may be unable to ask for help from their supervisor, or make improvements to the work environment. The relationship between organisational climate and workers' performance may be explained using the social exchange theory. This theory is based on the assumption that social

exchanges involve several actions that create obligations, and that relationships evolve over time into trusting, loyal and mutual commitments.[71] Organisational climate can be changed when employers establish a climate that is perceived as positive by their employees with good relationships, and this can result in better organisational performance and higher levels of motivation in workers.

In addition, lower levels of social support were related to negative stress appraisal. This is consistent with previous studies that reported the amount of social support was associated with levels of depression,[72] and that social support buffered adverse effects on mental health.[73] Social support also protects individuals from the pathogenic effects of stressful events by altering the appraisal of those events or the process by which perceived stress causes illness.[18] Those who feel that they have little social support may be unable to buffer stressful events, whereas those who feel that they have sufficient social support may be able to buffer stressful events.

Our findings suggested that an interprofessional approach involving public health nurses and health practitioners that includes provision of enhanced self-coping skills using individual workers' eHealth literacy, along with development of more modern organisational climates in workplaces and social support in communities may be effective in minimising the effect negative cognitive stress appraisal that may be associated with an increased risk of depression. This would contribute to the overall promotion of mental health among workers.

Limitations

This study had several limitations. First, we used a cross-sectional design, meaning that we could not identify causal relationships between cognitive stress appraisal and related factors. Second, the response rate was low, which might be explained by the number of instruments included in the questionnaire. Future studies should consider the number of included questions and collection method for questionnaires. Third, the adjusted R^2 was 0.412, which was higher than the values of 0.05–0.27 previously reported.[65] Although this provides an adequate explanation of factors related to cognitive stress appraisal, other factors are also likely to have contributed. In future, longitudinal studies should be conducted across other areas to widen the scope of investigation.

CONCLUSIONS

This study examined cognitive stress appraisal and identified factors related to cognitive stress appraisal among workers. The results indicated that cognitive stress appraisal is associated with economic status, depression, eHealth literacy, traditional organisational climates and social support. Therefore, it is recommended that public health nurses and health practitioners enhance eHealth literacy, and improve organisational climates and social support, to help improve depression and support workers

to develop better cognitive stress appraisal. Furthermore, occupational and community interventions are required to create and inform people of opportunities for cognitive stress appraisal in the workplace and the community.

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