Original Article

Co-effect of Demand-control-support Model and Effort-reward Imbalance Model on Depression Risk Estimation in Humans: Findings from Henan Province of China*

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Abstract

Objective To investigate the co-effect of Demand-control-support (DCS) model and Effort-reward Imbalance (ERI) model on the risk estimation of depression in humans in comparison with the effects when they are used respectively.

Methods A total of 3 632 males and 1 706 females from 13 factories and companies in Henan province were recruited in this cross-sectional study. Perceived job stress was evaluated with the Job Content Questionnaire and Effort-Reward Imbalance Questionnaire (Chinese version). Depressive symptoms were assessed by using the Center for Epidemiological Studies Depression Scale (CES-D).

Results DC (demands/job control ratio) and ERI were shown to be independently associated with depressive symptoms. The outcome of low social support and overcommitment were similar. High DC and low social support (SS), high ERI and high overcommitment, and high DC and high ERI posed greater risks of depressive symptoms than each of them did alone. ERI model and SS model seem to be effective in estimating the risk of depressive symptoms if they are used respectively.

Conclusion The DC had better performance when it was used in combination with low SS. The effect on physical demands was better than on psychological demands. The combination of DCS and ERI models could improve the risk estimate of depressive symptoms in humans.

Key words: Depression; Work-related stress; Demand-control-support; Effort- reward imbalance

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INTRODUCTION

Psychosocial factor at work has been believed to be a risk factor to mental health, especially to the depression, in recent two decades. Most psychosocial studies in developed countries revealed a strong association between work environment and depression[1-11]. Among some studies, two main theoretical models were used to measure psychological factors at work, i.e., job strain model[12] and the effort–reward imbalance model[13]. Some studies found that

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depressive symptoms were more prevalent in workers with high demand[14-18], low job control[14-19], low social support[14-15,18,20], or high effort-reward imbalance[21-25]. Two previous investigations have studied the all scales of the job strain model and effort-reward imbalance model simultaneously[26-27], and another three previous studies have studied the main dimensions of the job strain model and effort-reward imbalance model simultaneously in order to test their effects on depressive symptom prediction[28-30]. Since both models measure different aspects of psychological factors, the combination of two models should has stronger explanatory power for predicting depressive symptoms than one model alone. However, no study has been conducted on the co-effect of these two models on depression risk estimation so far.

The purpose of this study was to investigate each dimension of the DCS model and the ERI model as to their association with depression, to compare the DCS and ERI models as to their associations with depression, and to evaluate whether the combination of DCS and ERI models enhance the risk estimation for depression as compared the effect when each model is used alone.

METHODS

Study Population

This cross-sectional study was conducted in Henan Province, located in the central region of China, from November 2008 to June 2009. A total of 5 338 subjects were recruited from 13 factories or companies, in which 274 were from a diamond production plant, 771 from a diesel engine plant of a tractor factory, 405 from an electrolyte aluminum plant, 335 from a chemical fiber production factory, 264 from a battery plant, 1 772 from a high voltage electric equipment factory, 209 from an environment protection equipment factory, 200 from an oil equipment factory, 176 from a garment plant, 329 from a mechanical equipment fabrication plant, 181 from a chemical processing plant, 218 from a refractory plant, and 204 from a train transportation company. The subjects were engaged in a variety of jobs, including managers, technicians, workers and auxiliary workers. The informed consents were signed by the subjects and the study protocol was approved by the Medical Ethics Committee of the Henan Provincial Institute of Occupational Health. Each subject was given a questionnaire at his/her workplace and required to complete the questionnaire within 45 min. The questionnaire was designed to collect following information: gender, age, education level, service year and type, smoking and alcohol use histories, psychosocial factors at work and depression symptoms.

Of the 6 711 potential eligible subjects, 5 909 (88.1%) agreed to participate the study. The subjects missing variables for ≥three items (9.6%) were excluded from the analyses, so 5 338 subjects were left, the final response rate was 79.6%.

Measurement Methods

Job Stress Psychological demands, physical demands, job control, social support (SS) dimensions of the DCS model were used in this study[31]. The reliability and validity of the questionnaires (Chinese version) have been established[27]. Cronbach's α coefficient for psychological demands, physical demands, job control social support scales in this sample were 0.60, 0.77, 0.70, and 0.65, respectively. DC indicates a ratio computed between the two scores of demands and job control, given the same weight to both variables.

The ERI questionnaire (Chinese version) was also used in this study[32]. The reliability and validity of this questionnaire have also been established[27]. It consists of the following three scales: extrinsic efforts (6 items), occupational rewards (11 items), and overcommitment (OC, 6 items). Extrinsic efforts were evaluated by measuring the psychosocial workload; occupational rewards evaluation was based on the worker's financial status (i.e. salary), self-esteem, and career opportunity (e.g. promotion prospects and job security). Overcommitment as a personal (intrinsic) factor was defined as a set of attitudes, behaviors, and emotions, reflecting excessive striving along with a strong desire for approval and esteem. Cronbach's α for effort, reward, and overcommitment scales in this sample were 0.78, 0.58, and 0.64, respectively. ERI indicates a ratio computed between the two scores of effort and reward, given the same weight to both variables.

Depressive Symptoms Depressive symptoms were measured by the Center for Epidemiological Studies Depression (CES-D) Scale (Chinese version)[33]. The CES-D scale consists of 20 items related with characteristic symptoms and behaviors of depression. We applied in this study the threshold value 19 recommended for identifying subjects with